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EUROPEAN MICROWAVE WEEK 2013

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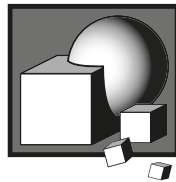


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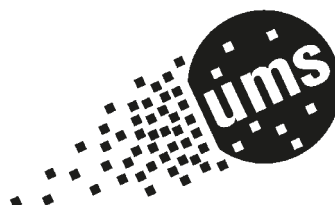


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## THALES



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***European Microwave Week Future Events  
EuMW 2014 - Rome  
EuMW 2015 - Paris  
EuMW 2016 - London***

*Details in this booklet were correct at the time of going to press. They are subject to change. For up-to-date information visit our website: [www.eumweek.com](http://www.eumweek.com)*

# Welcome to the 16th European Microwave Week

*Grüß Gott*, welcome to Nuremberg, the regional metropolis of Franconia, in the northern part of Bavaria! It is my pleasure to welcome you to the 16th European Microwave Week (EuMW), which will be held at the Nürnberg Convention Center (NCC), from Sunday 6th to Friday 11th October 2013. The European Microwave Week, with the European Microwave Conference (EuMC) as its centre piece together with the European Microwave Integrated Circuits Conference (EuMIC) and the European Radar Conference (EuRAD), is the premier RF and microwave event in Europe and brings together our community from around the world. The three conferences come together with the European Microwave Exhibition, which is the largest RF and microwave trade show in Europe. The Week is organised by the European Microwave Association (EuMA). The first Week was held in Amsterdam in the year 1998, and now it is the first time that the Week will come to Nuremberg. However, for the European Microwave Conference alone it is already the second time because thirty years ago, in the year 1983 (when Germany was still divided into two countries) the 13th EuMC already took place in Nuremberg.

Both the conferences and the exhibition are complemented by workshops, short courses and seminars. With 1055 preliminary papers as well as 48 workshop and 12 short course proposals submitted from nearly 60 countries we had a good response to our Call for Papers, and I am sure that out of these submissions our technical programme committees made an exciting, high-quality international conference programme presented in oral, poster, special, focus and panel sessions as well as in workshops and short courses; you will like it! The opening and closing plenary sessions of each of the three conferences will feature key-note speeches by world leaders in their fields and a welcome address by the President of the IEEE. In addition, exhibitor workshops and seminars on a variety of topics will be organised. We will also have a one-and-a-half day Special Forum on Defence and Security featuring presentations from industry leaders and concluding with an executive panel session. This special forum will be held in combination with the opening session of the European Radar Conference.

Three exciting panel sessions will be integrated into the Week's programme. We will repeat the successful Women in Microwave Engineering (WIE) event, which shows growing interest. This year's WIE event will focus on the challenges for RF and microwave technology induced by the current development trends towards the Internet of Things and cyber physical systems. Professional associations are promoting technological advances and innovations and are fostering networking. In the case of RF and microwaves, "How can we do better for the Microwave Community?" is a key question in our rapidly changing knowledge- and information-based society which will be addressed by the presidents of EuMA, IEEE, IEEE MTT-S, and VDE/ITG in a presidents' panel. The key

qualification for the industrial production in the 21st century is the capability to develop and manufacture electronic systems. An executive panel session featuring experts and executives being involved in today's electronic systems development trends will discuss whether Europe can afford to let it happen that its capabilities to produce and test electronics are more and more shifted to Asia.

Two European microwave schools and two student competitions will be offered especially for students and PhD students. The European Microwave Doctoral School features world leading microwave scientists and engineers as distinguished lecturers whereas the European Microwave Student School is devoted to microwave measurement techniques; here the students may earn also credit (ECTS) points. In addition, eligible students are invited to take part and compete in the Student Challenge, which is a poster competition, as well as in the Student Design Competition, which is a design and measurement competition.

Our student activities will also incorporate a Graduate Student Industrial Career Platform for PhD, master and bachelor students who are about to finish their academic studies and who may use this opportunity to get in touch with the industry. Furthermore, both university as well as non-university research institutes will present their current research results and demonstrate their application potential in our Research Institute Platform.

EuMW2013 will host the fall meetings of the European Microwave Association including its first National Society Liaison Committee meeting. I am also happy that the Administrative Committee (Ad-Com) of the IEEE Microwaves Theory and Techniques (MTT) Society has decided to have its AdCom fall meeting as well as its Technical Coordinating Committee and its Chapter Chairs' meetings in Nuremberg during EuMW, a fact which reflects the excellent relationship between EuMA and the IEEE MTT Society. EuMA has also an excellent cooperation with the Asia-Pacific Microwave Conference (APMC) steering committees, which is demonstrated by the EuMC2013 Special Session on APMC, which is an all-invited session. EuMW2013 will host also the Executive Committee (ExCom) fall meeting of the IEEE Section Germany, an IEEE German MTT/AP Joint Chapter meeting, and several technical committee meetings of the Information Technology Society (ITG) of the VDE and of other technical associations being active in the field of RF and microwaves such as the European Radio and Microwave Interest Group (EuRaMIG).

We will offer several social events such as a EuMIC Get-Together and the traditional Welcome Reception at NCC Ost on Monday and Tuesday, respectively, and a State Reception of the Free State of Bavaria in the Historical City Hall Nuremberg in the Old Town on Wednesday, just to name the most prominent ones. We also will have an interesting partner programme which does not only include



activities during the Week but also pre- and post-conference tours. Getting to Nuremberg is easy via the Nuremberg Airport, by high speed trains (ICE trains) or by car. During EuMW2013, in Nuremberg there will be many hotel rooms available for you. We have also pre-booked several hotels for you, all of which are located in or near to Nuremberg's lovely Old Town from where NCC Ost can easily be reached. Your registration package will include a 7-day pass to freely use the public transportation system of Nuremberg incorporating all metro lines, S-trains, trams and public buses. You will receive this 7-day pass as part of the booking confirmation if you register online, so in this case you will have your ticket already in your pocket when arriving in Nuremberg.

Nuremberg is the centre of a prospering European metropolitan region with 2.5 million inhabitants incorporating cities like Fürth, Erlangen, Bamberg, Bayreuth, and Würzburg. Nuremberg has a long history with its economic and cultural heyday being in the late 15th and early 16th century when it was the centre of the German countries. In World War II, the city was badly damaged by bombs, however its rebuilding today presents Nuremberg as a successful blend of a lively past and modern present-day life: Nuremberg just offers everything to everyone with easy access to everywhere! So I hope that you will find some time to retire from the hectic daily routine of your business at the Week.

Let me also recommend to **BRING YOUR FAMILY!** On behalf of the organising committee, The Nürnberg Team, as we call it, and on behalf of the City of Nuremberg I would like to invite you, your family, and your friends to take part in this unparalleled event and explore the friendly atmosphere of Nuremberg. The city is loved, among other things, for its hospitality, for its variety of impressive museums such as the German National Museum (the largest museum of German art and culture), the Albrecht Dürer House (where Germany's most famous artist lived and worked), the Hirs-vogel Hall (the home of the most important Renaissance interior north of the Alps), the Documentation Centre Nazi Party Rally Grounds, the Memorium Nuremberg Trials Exhibition, the New Museum exhibiting contemporary art, the Toy Museum (focusing on Nuremberg's tradition as a "City of Toys"), its emperor's castle, its cathedrals and its many other historic medieval buildings. It is also treasured for its beer gardens and micro-breweries, for its German gingerbread (Lebkuchen), for its roast sausages (Nürnberger Bratwürste) and for its Franconian smoked shoulder of pork (Schäuferle). From Nuremberg, you easily reach nearby beautiful cities such as Rothenburg, Dinkelsbühl, Bamberg, Bayreuth, Regensburg, or Würzburg, the latter being the centre of the Franconian wine growing area, and you may visit Munich, Prague, or Dresden. Coincidentally, this year the world famous Bavarian beer festival, the Munich Oktoberfest will overlap with the beginning of the European Microwave Week, and Munich can easily be reached by the frequently running ICE high speed trains. Useful

information is available from [www.eumweek.com](http://www.eumweek.com) and from the Nuremberg tourism web site at <http://tourismus.nuernberg.de/en>.

Our motto **MEET EXPERTS, MAKE FRIENDS** not only reflects the great potential of our unique destination but also the spirit of the international microwave community. The Nürnberg Team, which does not only incorporate the chairmen and chief officers listed in this programme book but also many volunteering members of the Department of Electrical Engineering, Electronics and Information Technology of the University of Erlangen-Nuremberg, of our Inter-societal Liaison Committee and our Industrial Advisory Board, and our colleagues of Horizon House are working selflessly around the clock for you and for our EuMW events to make sure this year's EuMW will be a unique success. My sincere thanks to all members of Horizon House and to all members of The Nürnberg Team!

We have had over 500 reviewers and 107 Technical Programme Committee members; let me give a big thanks to all of them. I would also like to greatly thank the organisers of workshops, short courses, special, focus, or panel sessions and all the session chairs, all of whom have volunteered their time and skills to ensure that EuMW2013 is of highest quality.

Finally, let me express all my thanks to the financial sponsors, for greatly helping us to make the Week more sound and convenient for the attendees, and to the non-EuMA technical co-sponsors, for assisting us in many ways to promote the Week.

As I am writing this foreword, it is early April, and we are still planning to set-up a few more technical, social and other events. Until October there will be much more information available for you, so keep track of it by occasionally browsing through [www.eumweek.com](http://www.eumweek.com). Please prepare your attendance to ensure a memorable time and experience that you cannot afford to miss; and bring your family and friends. We look forward to welcoming you at the 2013 European Microwave Week in Nuremberg.



**Robert Weigel**  
General Chair

# Promoting European Microwaves

## EuMA

### Organising the European Microwave Week

Europe's Premier Microwave, RF, Wireless and Radar Event. Conferences are set to be cutting edge and groundbreaking.

- **Future events**
- 2014 ► Rome
- 2015 ► Paris
- 2016 ► London
- 2017 ► Nuremberg
- 2018 ► Madrid

### Archiving through the Knowledge Centre

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RF MEMS *circuits and systems*  
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EuRaMIG *industrial participation*

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**For more information and contact, please visit :**



[www.eumwa.org](http://www.eumwa.org)

## EuMA

European Microwave Association

### Welcome from the President of the European Microwave Association

Welcome to the 2013 European Microwave Week on behalf of the European Microwave Association (EuMA)!

*EuMA* is the organisation behind the Week; our mission is to promote microwaves in Europe and to foster networking between microwave scientists and engineers in Europe. The European Microwave Week, the EuMW, is the key event serving this purpose.

For those who do not know *EuMA* so far: We are open to membership for all those working in the field of microwaves, particularly from Europe, but also from around the world. The General Assembly, the highest governing body of the Association, gathers representatives from European countries, from North America, from the Asia-Pacific region, and from North Africa and the Middle East. If you are not a *EuMA* member yet, I encourage you to join. Among other benefits, such as reduced fees for attending the EuMW and other *EuMA*-sponsored conferences, you will have access to our website which provides an archive of publications and the online version of the International Journal on Microwave and Wireless Technologies as well as networking opportunities.

The European Microwave Week (EuMW) is the premier microwave conference and exhibition event in Europe. Its centrepiece is the European Microwave Conference (EuMC), the largest of the three conferences that form the Week. It is complemented by the European Microwave Integrated Circuits Conference (EuMIC) focusing on semiconductor device and circuit technologies, and the European Radar Conference (EuRAD), targeting the field of radar, from components to applications. The success of the EuMW is also a result of the collaboration with the IEEE MTT Society (technical co-sponsor of the Week) and the GAAS Association (co-sponsor of EuMIC). But the Week is not only conferences, the Exhibition forms an integral part of it, attracting a major part of the visitors. It is organised by our long-standing partner Horizon House.

Preparing and hosting the EuMW is a major effort, from paper submission and review to the on-site organisation in the conference centre, and this is accomplished by a team of volunteers year by year. Therefore, my special and sincere thanks go to Robert Weigel, 2013 General Chair, to Lorenz-Peter Schmidt, EuMC Chair, to Manfred Berroth, EuMIC Chair, and to Arne Jacob, EuRAD Chair - just to name a few on behalf of the entire team. They all have been working hard to set up an outstanding technical and scientific programme for you and to make your stay in Nuremberg exciting and enjoyable. Thank you!

In the more recent history of EuMW, Nuremberg is a new venue. It is exactly 30 years ago when the European Microwave Conference was held there the last time. Now we went back to this venue since Nuremberg offers a spacious and well-equipped conference centre ideally suited for our purposes. Moreover, the city of Nuremberg forms a nice environment for such an event. What's more, it is not far from Munich and thus provides an excellent industrial background in the microwave field. For those who have not been to Nuremberg so far, please consult the information regarding the city and the traffic connections in this booklet.

The theme this year is "Meet experts, make friends". This highlights what we are aiming at with the EuMW: A high-quality event on the technical side, and at the same time the place to meet for the European microwave community. We hope you will not only get inspiring ideas from presentations and posters but also find enough time to meet with colleagues and friends. Join us and see you in Nuremberg!



**Wolfgang Heinrich**  
President  
European Microwave  
Association

# Welcome from the Bavarian Minister of Economic Affairs, Infrastructure, Transport and Technology

Ladies and Gentlemen,

It is a great pleasure for me to cordially welcome you to the 16th European Microwave Week, which will be held at the Nürnberg Convention Center NCC in Nuremberg, Germany. Microwave engineering is an important discipline in Bavaria, since the major part of the German RF & microwave industry is based here. As the centre of the prospering Nuremberg Metropolitan Region, Nuremberg makes an ideal international meeting place for researchers, developers and manufacturers working in this field. The NCC is a modern, excellently suited location for exchanging views and developing new ideas.

Microwave technologies are crucial to the competitiveness of companies and entire industry sectors, as these technologies provide pertinent key enabling functionalities and are thus a driving force behind numerous product innovation activities. In particular, microwave technologies play a key role in nearly all high-speed communications, sensing and localisation applications. They are therefore indispensable for all wireless and most wired signal transmission applications. The global demand for affordable technical solutions ensuring a high degree of interconnectivity will increase immensely

in the years to come. High growth rates are expected not only in the communications and consumer sectors but also in the area of industrial and medical technologies, security, logistics, mobility, energy saving, and environmental protection.

I wish the European Microwave Week every success and the attendees of the conferences and the visitors to the exhibition interesting, informative, and profitable days. The Week will add a special flavour to Nuremberg's beautiful autumn. I promise that you will discover a world of awe-inspiring Central European history, rich culture, local as well as international cuisine, and the warm camaraderie and sheer joy of life typical of the unique City of Nuremberg.



**Martin Zeil**  
Bavarian Minister of  
Economic Affairs, Infrastructure,  
Transport and Technology

## European Microwave Week 2013 National Sponsors

The organisers would like to thank the Free State of Bavaria, the German Research Foundation (DFG) and the Friedrich-Alexander-University of Erlangen-Nuremberg (FAU) for their valuable support.



Furthermore, the help of Gerotron Communication, Medical Valley EMN, FAU's Embedded Systems Institute (ESI), EnergieCampus Nürnberg (EnCN), VDE YOUNG NET and IEEE Germany Section is highly appreciated.



### Welcome from the General TPC Chair

Dear attendees, authors, reviewers and TPC members,

welcome to EUMW, which will be in Nuremberg for the first time. As General TPC Chair I would like to acknowledge the intensive work conducted by the reviewers and TPC members. This year we had about 500 reviewers and 107 TPC members handling a large number of submissions of 1055. Review has been conducted through 40 subcommittees, each consisting of 7 to 25 reviewers. From 25th February until 18th March 2013 the reviewers assessed the quality of the submissions in various categories and provided comments to the authors and conference organisers. At the TPC meeting on 23rd March 2013 in Nuremberg the TPC members made final decisions on the submissions and compiled the conference programme by setting up the sessions. Feedback from the reviews was collected and provided to the authors as consolidated recommendations on how to further improve their submission.

I also would like to especially thank the administrators of the TPMS system Matthias Rudolph, Marc van Heijningen and Jeff Pond, who have done a tremendous work in setting up TPMS and maintaining its correct operation. Together with the regular conference programme this year we have a high number of special and focus

sessions and workshops providing you with most recent research results and applications of microwave components and systems.

For me it was a great honour and great experience to serve as General TPC Chair of the EuMW2013 and I hope I made a valuable contribution on its success. While working in the organizing team I sensed a great spirit and devotion to evolve EuMW2013 further and compile an interesting conference programme that addresses your interests as attendees. First and foremost, I want to thank the authors, who built the basis of the conference through their submissions. I observed that you put heart and soul into writing your submissions. I hope you will discover the outcome of this joint effort resulting in a high quality conference programme. Enjoy the programme, enjoy Nuremberg and "make friends when meeting the experts".



**Georg Fischer**  
General TPC Chair

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### Welcome from the Workshop Chair

The EuMW2013 organising committee worked very hard to provide you with the best possible workshop and short course programme. Based on the large number of high quality proposals, we were able to set up 39 workshops and nine short courses. As a special format, four project workshops present recent results of publicly funded projects in Europe.

The topics covered by the workshops and short courses comprise microwave power amplifiers and RFIC transceivers, metamaterial circuits, RF-MEMS, THz systems and technologies, photonics, microwave sensors and applications, radar, remote sensing, array technology, energy harvesting, wireless power transmission as well as topics like RFID, embedded wireless systems, signal integrity and on-chip security, software defined and reconfigurable radio, and RF and microwaves as an enabler for the internet of things. The subject of automotive radar is featured in three excellent workshops. One special highlight of the workshop programme will be a hands-on live presentation of automotive radar systems at the exhibition.

A schedule with regular breaks and the structure of the workshops and short courses provide excellent opportunities for discussion and face-to-face contact among the workshop and short course participants and lecturers. Finally, we like to note that the programme would not have been made possible without the dedicated efforts of the workshop and short course organisers and the authors of the presentations. We hope that you will enjoy technical depth and breadth of the programme, and that you will be engaged in fruitful discussions during the workshops and short courses in Nuremberg.



**Martin Vossiek**  
Workshop Chair



# Welcome to the European Microwave Week 2013 Conferences: 43rd EuMC, 8th EuMIC, 10th EuRAD

The European Microwave Week is traditionally composed of three microwave conferences, covering the different aspects of today's microwave component and system technology.

The **European Microwave Conference** in its 43rd edition has a long tradition and now returns, after 30 years, to Nuremberg. Whereas the 13th EuMC in 1983 was a single 4-day conference, the 43rd EuMC in 2013 is the biggest of three conferences in the very busy European Microwave Week. From 7th to 10th October, the EuMC covers a broad range of high frequency related topics. Examples include the latest developments for passive components, modelling and design of high frequency and high data rate microwave photonics, highly stable and low-noise microwave sources, new linearisation techniques, electronically steered antenna arrays and the impact of new packaging technologies on development applications. Special emphases are placed on emerging technologies and materials for microwave components such as MEMS, meta-material structures and devices, tuneable and reconfigurable RF systems, and systems-in-package. An additional focus has been put on microwave components and systems for the rapidly growing field of wireless communications, radar with wireless communication capability, millimetre-wave imaging systems, and microwaves in medical applications.

For the Opening and Closing Sessions of the EuMC, which are the formal opening and closing events of the entire week, we are happy to present four prominent key-note speakers: Reinhard Ploss, CEO of Infineon Technologies, Munich, and Ralf G. Herrtwich, Director Driver Assistance and Chassis Systems, Daimler, Böblingen, for the Opening Session and Erich R. Reinhardt, President of Medical Valley EMN, Erlangen, and Dirk Beernaert, Adviser to the DG for Interdisciplinary and Integrating Activities, European Commission, Brussels, for the Closing Session.

The **European Microwave Integrated Circuits Conference**, the successor of the former GAAS Conference since 2006, covers a wide scope of semiconductor materials and monolithic integration techniques. The EuMIC is the premier European technical conference on technologies, modelling, simulation, design and characterisation of integrated devices and circuits for RF, microwave, millimetre-wave, and THz applications. Power amplifiers and integrated antennas are also hot topics. Both the increase of the data rate and energy efficiency are the key aspects in the design of future wireless systems, which will be the focus of this year's conference from 6th to 8th October.

We are fortunate to have two eminent plenary key-note speakers: Hermann Eul, Corporate Vice President and General Manager Mobile and Communications Group, Intel, USA, and Sorin Voinigescu, University of Toronto, Canada. The Closing Session will include a foundry panel discussion and an invited talk from Zhigong Wang, Southeast University, Nanjing, China on future challenges of integrated circuits in China.

The 10th **European Radar Conference**, which is one of the most prominent radar events in Europe and even in the world, takes place from 9th to 11th October. The EuRAD covers all relevant aspects of modern radar technology, including components and subsystems, architectures and applications, and signal processing.

The Opening Session, which is part of the Special Event, features key-note talks from two internationally recognised experts. Alberto Moreira, DLR, Germany, will highlight outstanding space-based SAR applications, while Jürgen Sachs, TU Ilmenau, Germany, is to present the latest advances in ultra-wideband radar and sensing. During the Closing Session – just after the traditional conference lunch – Andreas Stelzer, a leader in industrial radar applications from the Johannes Kepler University Linz, Austria, will report on the most recent developments in this field.

With more than 1000 papers submitted from all over the world, the EuMC, EuMIC, and EuRAD conferences demonstrate the importance and attractiveness of microwave engineering in our modern world. All papers have been carefully reviewed and, thanks to the huge effort of over 500 specialists in the field, a well-tailored layout of the three conferences with high-quality papers was set up to fill a busy week of scientific and industrial presentations and fruitful discussions, together forming a package of high information content for all delegates. In total, 630 submissions were selected to be presented in three poster sessions and 106 regular sessions, 11 focus and five special sessions. A total of 48 workshops and short courses dealing with current fields of innovation complement the very comprehensive conference programmes. A considerable number of these workshops will be presented on Sunday and on Friday in order to reduce the overlap with the conference sessions and other events during the conference week. This year, particular emphasis is placed on displaying recent scientific and industrial microwave achievements in Germany's eastern neighbouring countries by means of a series of three special sessions. Furthermore, based on an agreement between EuMA and the organisers of the Asia-Pacific Microwave Conference, three invited speakers from Asia will contribute to the conference week with views from their home countries. In the Closing Sessions, prestigious awards will be handed out to best paper and best young engineer presenters, with the papers and presenters carefully selected by a special awards committee – one of many good reasons to stay until the very last moments of the conferences.

Finally, we would like to conclude this welcome address by expressing our thanks to all the reviewers and the TPC members who have worked hard to maintain the high standard of these conferences. They have devoted much of their valuable time to the difficult task of ensuring the high quality of accepted papers and organising attractive sessions in order to offer you a very exciting EuMW2013. We look forward to welcoming you to the EuMC, the EuMIC, and the EuRAD. Let us participate and make an exciting microwave week in Nuremberg in October 2013!

### Meet Experts Make Friends



**Lorenz-Peter Schmidt**  
Chair EuMC 2013  
FAU Erlangen-Nürnberg



**Manfred Berroth**  
Chair EuMIC 2013  
University of Stuttgart



**Arne Jacob**  
Chair EuRAD 2013  
TU Hamburg-Harburg



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General Chair  
FAU Erlangen-Nürnberg



**Georg Fischer**  
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**Martin Vossiek**  
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TNO, The Netherlands



**Matthias Hein**  
Student Challenge  
TU Ilmenau



**Chafik Meliani**  
Student Design Competition  
IHP, Frankfurt (Oder)



**Thomas Ußmüller**  
Special Platforms  
FAU Erlangen-Nürnberg



**Larissa Vietzorreck**  
Industrial Career Platform  
TU München



**Ilona Rolfes**  
Women in Engineering  
Ruhr-Universität Bochum



**Dominique Schreurs**  
Women in Engineering  
KU Leuven, Belgium



**Nils Pohl**  
Doctoral School  
Fraunhofer FHR, Wachtberg



**Holger Maune**  
Student School  
TU Darmstadt



**Roland Dill**  
Treasurer's Officer  
TU Darmstadt

# 2012 European Microwave Week Amsterdam Prizes

### EuMC Microwave Prize



Dual-Band Class-ABJ AlGaIn/GaN High Power Amplifier

**V. Carrubba, S. Maroldt, M. Mußer, H. Walcher, M. Schlechtweg, R. Quay, O. Ambacher**

Fraunhofer Institute for Applied Solid State Physics, Freiburg, Germany

### Student Challenge



EndoSENS – The Doctor Inside You

**M. Hofmann, S. Lindner, J. Nehring, G. Vinci**

Institute for Electronics Engineering, University of Erlangen-Nuremberg, Erlangen, Germany

**THALES**

### EuMC Young Engineer Prize



Novel Fully-Planar Extended-Composite Right/Left Handed Transmission Line based on Substrate Integrated Waveguide for Multi-Band Applications

**M. Durán-Sindreu<sup>1,2</sup>, J. Bonache<sup>1</sup>, F. Martín<sup>1</sup>, T. Itoh<sup>2</sup>**

<sup>1</sup>GEMMA/CIMITEC, Departament d'Enginyeria Electrònica, Universitat Autònoma de Barcelona, Spain

<sup>2</sup>Department of Electrical Engineering, University of California, Los Angeles, United States



Negative Impedance Converters for Broadband Antenna Matching

**O. O. Tade, P. Gardner, P. S. Hall**  
School of Electronics, Electrical and Computer Engineering, University of Birmingham, United Kingdom

### EuRAD Best Paper Award



Fast Imaging by 3-D Deconvolution in Short-range UWB Radar for Concealed Weapon Detection



**T. G. Savelyev, A. G. Yarovoy**  
University of Technology, Delft, The Netherlands

**THALES**

### EuRAD Young Engineer Prize

Model-based Classification of Human Motion, Particle Filtering applied to the Micro-Doppler Spectrum

**S. Groot<sup>2</sup>, R. Harmanny<sup>1</sup>, H. Driessen<sup>1</sup>, A. G. Yarovoy<sup>2</sup>**

<sup>1</sup>Thales Nederland B.V., Delft, The Netherlands, <sup>2</sup>Delft University of Technology, Delft, The Netherlands



### EuMIC Prize and GAAS Assoc. Silver Plaque



A 24GHz Wideband Single-Channel SiGe Bipolar Transceiver Chip for Monostatic FMCW Radar Systems

**C. Bredendiek<sup>1</sup>, N. Pohl<sup>1</sup>, T. Jaeschke<sup>1</sup>, S. Thomas<sup>1</sup>, K. Aufinger<sup>2</sup>, A. Bilgic<sup>3</sup>**

<sup>1</sup>Ruhr-Universität Bochum, Germany, <sup>2</sup>Infineon Technologies, Neubiberg, Germany, <sup>3</sup>Krohne Messtechnik, Duisburg, Germany

### EuMIC Young Engineer Prize and GAAS Assoc. Silver Plaque



Automated Determination of Device Noise Parameters Using Multi-Frequency, Source-Pull Data  
**S. Colangeli, W. Ciccognani, M. Palomba, E. Limiti,**  
University of Roma Tor Vergata, Rome, Italy

### GAAS Association Student Fellowship



Silicon Integrated Waveguide Technology for mm-Wave Frequency Scanning Array  
**G. Gentile, M. Spirito, L.C.N. de Vreede, B. Rejaei, R. Dekker, P. de Graaf**  
Delft University of Technology, Delft, The Netherlands

Multi-band/Multi-mode and Efficient Transmitter Based on a Doherty Power Amplifier

**P. Saad, L. Piazzon, P. Colantonio, J. Moon, F. Giannini, K. Andersson, B. Kim, C. Fager**

Chalmers University of Technology, Gothenburg, Sweden



### **2012 EuMA Outstanding Career Award**



**Sir Christopher Snowden**

Professor Sir Christopher Snowden is President Vice-Chancellor of the University of Surrey, UK. He is a member of the Prime Minister's Advisory Council for Science and Technology. Sir Christopher is a Fellow of the Royal Society and a member of its Council. He is a Fellow and Vice-President of the Royal Academy of Engineering, chairing the Engineering Policy Committee, and was President of the Institution of Engineering and Technology (IET) from 2009 to 2010. He is Vice-President of Universities UK and a member of the governing body of UK's Technology Strategy Board. He is also a Board member of the ERA Foundation which promotes electrotechnical industry and business.

Prior to his appointment at Surrey in 2005, he was CEO of Filtronic ICS, having joined Filtronic PLC in 1998, and being promoted to Joint CEO in 1999 from his role as Director of Technology. His early experience was with Mullard and Racal MESL. Following a period at the University of York and the University of Leeds, he later worked as the Senior Staff Scientist in Corporate R&D at M/A-COM, USA. He moved back to the University of Leeds, where he became Head of the School of Electronic and Electrical Engineering and founded the Institute of Microwaves and Photonics. He has been a consultant for several major international microwave technology companies and has held a number of non-executive directorships. He was General Chair of the 2006 European Microwave Week, a member of the Board of the EuMA from 2001 to 2008.

Sir Christopher is well known for his large-signal physical modelling research on compound semiconductor devices. His models, CAD techniques and designs have been widely used in both industry and academia. He has also pioneered new designs of microwave power transistor. Sir Christopher has been a regular technical contributor to the EuMW conferences for over 30 years and a strong advocate of European and international research collaboration.

Sir Christopher is also a Fellow of the IET, the IEEE and the City and Guilds of London Institute. He was Knighted by the Queen in the UK's New Year's Honours for his services to Engineering and Higher Education. He was awarded the 1999 IEEE Microwave Prize, the Silver Medal of the Royal Academy of Engineering in 2004 for his contributions to the microwave semiconductor industry and the 2009 IEEE Distinguished Educator Award. He has published eight books and over 330 technical papers and patents.

Sir Christopher is also a Fellow of the IET, the IEEE and the City and Guilds of London Institute. He was Knighted by the Queen in the UK's New Year's Honours for his services to Engineering and Higher Education. He was awarded the 1999 IEEE Microwave Prize, the Silver Medal of the Royal Academy of Engineering in 2004 for his contributions to the microwave semiconductor industry and the 2009 IEEE Distinguished Educator Award. He has published eight books and over 330 technical papers and patents.

### **2012 EuMA Distinguished Service Award**



**Paul-Alain Rolland**

Paul-Alain Rolland received an engineer diploma from ISEN (Lille France) in 1971, then a PhD and a These d'Etat degrees from the University of Lille in 1973 and 1978, respectively. He became Assistant Professor at the University Lille 1 in 1973 and was a Professor at this university from 1985 to 2011. He retired in 2011 and is now an Emeritus Professor. In 1971 he joined the Centre Hyperfréquence et Semicon-

ducteur (CHS University Lille 1) and from 1971 to 1992 he worked on millimetre-wave two-terminal devices and on X-band HBTs for radar power modules in close connection with Thomson. He was one of the first to propose in 1976 the concept of harmonic balance to study highly nonlinear circuits while working on high rank avalanche diode frequency multipliers. He spent two years (1985-1987) at Thomson in the framework of a NATO programme dealing with 94 GHz self driving missiles.

In 1992 the CHS became the major department of IEMN (Institute for Electronics Microelectronics and Nanotechnology) and Paul-Alain Rolland was head of this department from 1996 to 2010. He moved his research activity from devices to systems and sub-systems in the field of communication and radars and participated to numerous European programmes (DRIVE, RACE, ACTS, ESPRIT). From 1996 to 2002 he was expert for the European Commission in the framework of the ESPRIT programme for projects dealing with automotive safety and from 1993 to 1998 he was scientific consultant for the French MoD in the framework of the European projects IEPG-RFP7 and RFP8. In 2005 he became head of a multidisciplinary Institute IRCICA where he launched a novel activity concerning microsources of energy (storage and energy scavenging) for autonomous WSN or smart microsystems.

From 1995 to 2000 he was member of the national scientific research council (Co CNRS) and chair of the micro opto-electronic section of this council from 2000 to 2004. He was a member of numerous EuMC TPCs and member of the organisation committee of the first EuMW in Amsterdam in 1998. He was member of the EuMA Board of Directors from 2003 to 2009 and Chair of the EuMA Awards Committee (2008 – 2009).

Paul-Alain Rolland is author or co-author of more than 160 technical papers. He was active in the field of microwave in France as a member of the TPCs of the French microwave national days (JNM) every two years from 1990 to 2006 and chair of the JNM 2003 in Lille.

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Robert Weigel (2013)  
Roberto Sorrentino (2014)

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Group 2 - Germany  
Group 3 - Italy, San Marino, Vatican City  
Group 4 - United Kingdom, Ireland, Gibraltar, Malta  
Group 5 - Belgium, The Netherlands, Luxembourg  
Group 6 - Iceland, Norway, Sweden  
Group 7 - Denmark, Faroe Islands, Finland, Greenland  
Group 8 - Bulgaria, Czech Republic, Hungary, Romania, Slovakia  
Group 9 - Estonia, Latvia, Lithuania, Poland  
Group 10 - Armenia, Azerbaijan, Georgia, Moldova, Ukraine  
Group 11 - Albania, Bosnia and Herzegovina, Croatia, Cyprus, FYR Macedonia, Montenegro, Greece, Israel, Serbia, Slovenia, Turkey  
Group 12 - Belarus, Russia  
Group 13 - Austria, Liechtenstein, Switzerland  
Group 14 - Andorra, Portugal, Spain  
Group 15 - North America  
Group 16 - Asia-Pacific  
Group 17 - Africa and Middle East countries

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###### **For EuMIC:**

Franco Giannini (GAAS)  
Raymond Quéré (EuMA)

###### **For EuRAD:**

Philippe Eudeline  
Alexander G. Yarovoy (EuMA)

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**GAAS Treasurer:** Massimo Comparini  
**IEEE MTT-S:** Richard Snyder

##### **Current Year Chairs**

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**EuMC:** Lorenz-Peter Schmidt  
**EuMIC:** Manfred Berroth  
**EuRAD:** Arne Jacob

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Rolf Jakoby

##### **EuMW General Chairs of past and next two years:**

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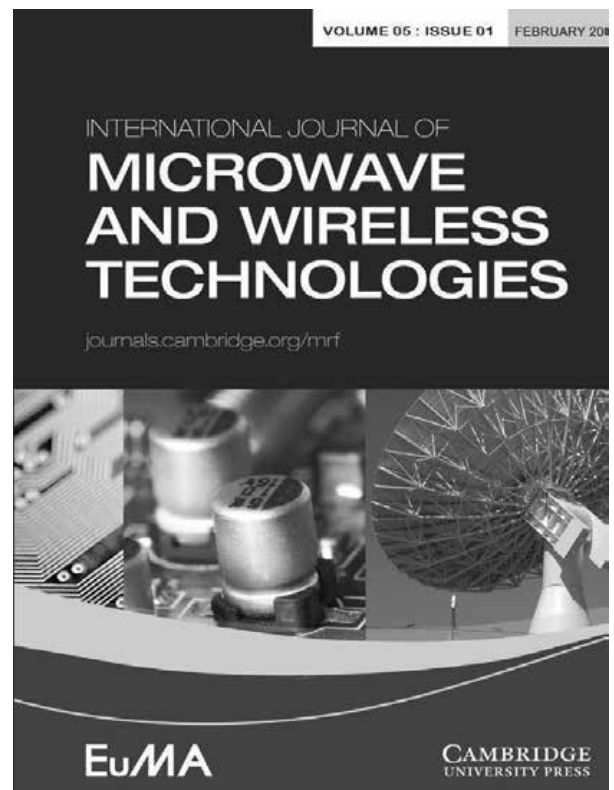


## **International Journal of Microwave and Wireless Technologies: EuMW2013 Special Issue**

The International Journal of Microwave and Wireless Technologies was created in 2009 by the European Microwave Association (EuMA) and Cambridge University Press for the benefit of the microwave research community in Europe and overseas.

The journal is published six times a year. It allows academic and industrial researchers to promote their work and stay connected with the most recent developments in microwave and RF technology. The journal is referenced in databases such as Scopus and Google Scholar and is indexed in the Thomson Reuters Web of Science. Following the success of previous microwave weeks, the journal will again publish a special issue dedicated to the European Microwave Week 2013.

The authors of a number of highly ranked papers presented at the conferences will be invited to submit an extended version for publication in the journal. The special issue will be guest edited by Professors Arne Jacob, Lorenz-Peter Schmidt, and Manfred Berroth. Accepted papers will be published online at <http://journals.cambridge.org/MRF> within six weeks of acceptance and can be referenced using their DOI (Digital Object Identifier). Once all submissions are received the articles will be collated into an issue and published in print, which is expected to appear in June 2014.



## **2013 Technical Programme Committee**



### Welcome to EuMW 2013

European Microwave Week continues its series of successful events, with its 16th at the Nürnberg Convention Center, NCC Ost, Nuremberg, Germany. EuMW 2013 will be held for the first time in this beautiful city that offers the culture, entertainment and history of a big city, while also affording the charm and warmth of one much smaller. Bringing industry, academia and commerce together, European Microwave Week 2013 will see an estimated 2000 conference delegates, over 5000 visitors and 250 plus exhibitors.

The 16th European Microwave Week combines:

- Three Major Conferences
- Associated Workshops
- Tailored Courses and Seminars for Industrialists, Academics and Researchers
- A Leading International Trade Show
- A Special Forum on Defence and Security
- Two Microwave Schools for Students and PhD Students

In addition, Exhibitor Workshops and Seminars will be provided by several top organisations with superior expertise in Microwave, RF, Wireless or Radar.

Choose from three separate but complementary conferences. Spanning the length of the week, starting from Sunday 6th October, the conferences and workshops are scheduled as follows:

- European Microwave Integrated Circuits Conference (EuMIC): 7th – 8th October 2013
- European Microwave Conference (EuMC): 8th – 10th October 2013
- European Radar Conference (EuRAD): 9th – 11th October 2013
- Workshops and short courses: from 6th October 2013

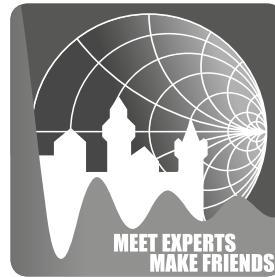
The conferences encompass a wide range of subject areas including:

- Microwave, Millimetre-wave and Submillimetre-wave Systems
- Antennas and Propagation
- Wireless Technologies
- Telecommunication (RF, Microwave and Optical)
- ICs, Semiconductor Materials and Packaging
- Radar Architectures, Systems and Subsystems
- Sensors and Remote Systems
- Test and Measurement

#### CONFERENCE REGISTRATION & LOCATION

Online registration opens on 1st June 2013 and remains open up to and during the event until 11th October 2013. During the event, you can also register onsite from Saturday 5th October 2013 (16:00h -19:00h) and from 07:30h each morning from Sunday 6th October 2013 to Friday 11th October 2013.

The conferences will be held in different rooms over the conference dates. Please refer to the Conference Matrix at the back of this booklet for a detailed overview. Delegates should register for one, two or all three of the conferences. Registration at one conference does not allow any access to other conference sessions. Those who wish to register for two or more conferences will receive a discount on these registrations.



**EUROPEAN  
MICROWAVE WEEK**  
NCC NUREMBERG, GERMANY  
6-11 OCTOBER 2013  
[www.eumweek.com](http://www.eumweek.com)

Fees and discounts are all explained in the Conference Registration Information section of this booklet.

#### BADGES

Online registrants will automatically be e-mailed their badge barcode and an order confirmation receipt immediately after they pay. All those who have pre-registered should bring their badge barcode and confirmation with them to the conference where they can print out their badge by scanning their barcode at the Fast Track desk onsite. Once you have collected your badge, you can collect the conference proceedings which are on a USB stick and the delegate bag for the conferences. Processing will be quick and easy but queues may form at busy times, so please arrange to collect your badge well in advance of your first conference session.

The registration area will be located at the Entrance, Level 0 within the NCC Ost. Delegate bag collection will be available to the right of the registration desk area.

Those who have not pre-registered can do so onsite. There will be onsite registration terminals located within the registration area, where delegates can enter their details and either pay immediately by swiping their credit or debit cards through the card readers attached to the terminals.

Alternatively, you can pay at the Cashier desk if you require a printed receipt.

If you have any questions regarding registration procedures and payment, please contact: [eumwreg@itnint.com](mailto:eumwreg@itnint.com).

#### EXHIBITION HOURS

The exhibition area will be located in Hall 7A as shown on the Floor Plans at the back of this booklet. As a registered delegate you will have full access to the exhibition area.

The exhibition opening hours are:

Tuesday 8th October: 9:30h – 17:30h (followed by the Welcome Reception)

Wednesday 9th October: 9:30h – 17:30h

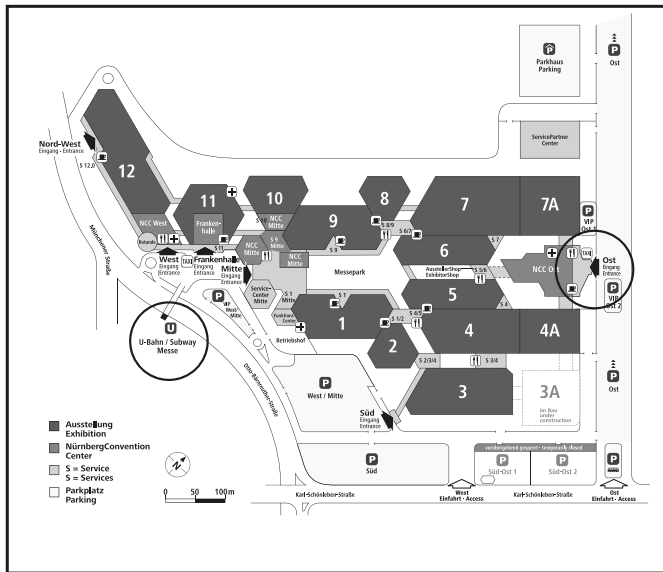
Thursday 10th October: 9:30h – 16:30h

See the back cover for a full listing of the exhibitors (correct at the time of going to press).

#### CYBER CAFÉ AND WIFI

There will be a cyber café located within the Exhibition Hall for all delegates, exhibitors and visitors to use. In addition there is WiFi access throughout the venue. Both the cyber café and the WiFi are sponsored by CST.

# GENERAL INFORMATION



## SPEAKER PREPARATION SPACE

A speaker preparation area will be available on the first floor, close to the press centre.

## CONFERENCE PROCEEDINGS ON USB

All papers published for presentation at your chosen conference will be on a USB stick given out with the delegate bags. There will be one USB stick combining all three conferences.

## WORKSHOP/SHORT COURSE PROCEEDINGS ON USB

A Workshop/Short Course Proceedings USB will be given out at the end, to all those attending the Workshop/Short Courses.

## EUMA ARCHIVAL PAPERS

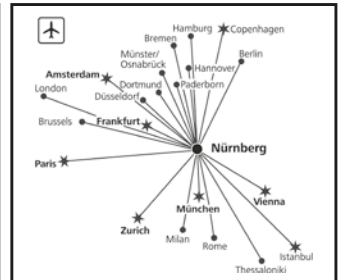
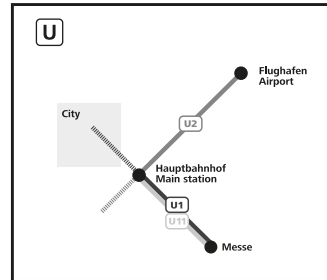
16,000 papers published by EuMA are presently at the EuMA website, accessible to all EuMA members. Conference papers are also available on two DVDs. During the European Microwave Week, the cost for the 2004-2008 DVD is € 10 and the 1969-2003 DVD is free. Both DVDs will be available at the EuMA Membership Desk. After EuMW 2013, the DVDs can be ordered from the EuMA website ([www.eumwa.org](http://www.eumwa.org)) or from: Annemie Van Nieuwerburgh, EuMA Headquarters Assistant, [annemiev@eumwa.org](mailto:annemiev@eumwa.org).

## EUMA MEMBERSHIP

The Conferences in the European Microwave Week offer discounted fee levels for EuMA members. EuMA membership is based on calendar years from 1st January through 31st December. Applications received after 1st August 2013 are considered for the next membership term, the calendar year 2014. The membership fee is € 25 for Professionals and € 15 for Students. EuMA offers a three-year free membership for people residing in NIS and some African countries. For more information please visit the EuMA website at [www.eumwa.org](http://www.eumwa.org).

## EUMA INTERNATIONAL JOURNAL

The "International Journal of Microwave and Wireless Technologies" is published annually with six issues. All EuMA members are entitled to free electronic access to the Journal. There is a special offer when subscribing to both Membership and printed Journal: € 67 for Professionals, € 57 for Students. For more information please visit the EuMA website [www.eumwa.org](http://www.eumwa.org).



## GETTING TO THE NCC, NUREMBERG, GERMANY

The city of Nuremberg (German: Nürnberg) is located in the south of Germany and it is well connected to the European motorway, rail and flight networks, which allow easy access to the Nürnberg Convention Center (NCC). The NCC is connected by subway lines to the main railway station (about eight minutes) and to the airport (about 25 minutes).

Address: NürnbergMesse GmbH, Messezentrum 1, 90471 Nürnberg

### By Car

Your navigation system will find the Nürnberg Convention Center by inserting the address: Karl-Schönleben-Strasse, Nuremberg, Germany or if you enter Messezentrum, Nuremberg as a special destination.

### By Rail

Nuremberg is also well connected within the railway system. There are four different kinds of trains: ICE (Intercity Express), IC (Intercity), RE or RB (local trains) and the S (commuter train). The ICE trains are the fastest ones which run from Frankfurt am Main and Munich to Nuremberg in only 2 hours and 1 hour, respectively. To get more information for connections within the German railway system (Deutsche Bahn) visit: [www.bahn.com](http://www.bahn.com).

To get more information for local connections and subway lines in and around Nuremberg visit: [www.vgn.de/home\\_engl/](http://www.vgn.de/home_engl/).

### By Plane

Nuremberg Airport (NUE) offers numerous direct flights from nearly all major European cities (more than 50 European direct connections are available). From overseas, Nuremberg Airport is easily reached by international flights via Frankfurt am Main or Munich. Within Germany, Nuremberg is also excellently connected by national flights.

To get more information for connections to the Nuremberg Airport visit: [www.airport-nuernberg.de/english](http://www.airport-nuernberg.de/english).

## GENERAL INFORMATION

### PASSPORT & VISA REQUIREMENTS

A valid passport will be required for entry into the organising country, in this case Germany. Since EuMW events are held in the European Union, no visa is usually required for travellers with passports from a number of countries, like for instance: European Union, United States, Canada, Japan, South Korea, Australia or Singapore. However you will need to check with your local embassy. If you need a visa, we recommend that you speak with the German consulate, in your own country. You should organise this at least three to four months prior to EuMW.

### PERSONAL INVITATION

The organisers will be pleased to send a letter of invitation to any conference delegate, exhibitor or speaker requesting it. The letter of invitation is not a commitment on the part of the conference or exhibition organisers to provide any financial support to delegates or exhibitors and the conference fees will not be waived, it may simply be used by delegates or exhibitors to help raise funds or for visa applications. The letter of invitation is also available for any conference delegate, exhibitor or speaker who took participation in EuMW the last three years. For any information about visa contact us at

- [visa@eumw2013.com](mailto:visa@eumw2013.com) if you are a conference delegate, or at
- [rvaughan@horizonhouse.co.uk](mailto:rvaughan@horizonhouse.co.uk) if you are an exhibitor.

Requests for a letter of invitation should be made no later than 6th September 2013.

### POSTER SESSIONS

Poster Sessions will take place on Tuesday, Wednesday & Thursday within the Exhibition Hall 7A.

### INSURANCE

It is highly recommended that all participants carry the proper travel and health insurance, as the organiser cannot accept any liability for any accidents or injury that occur during or when travelling to the event. Please also insure that personal items are covered for loss, damage or theft either through a personal policy or by a corporate policy. We cannot accept any liability for personal items that are lost, damaged or stolen during or travelling to and from European Microwave Week 2013.

### ELECTRICITY

Electricity is supplied at 230V, 50Hz.

### SOCIAL EVENTS & PARTNER PROGRAMME

Full details and contacts for the Partner Programme and other Social Events can be obtained via the EuMW website [www.eumweek.com](http://www.eumweek.com)

### STATE RECEPTION TICKETS

The reception of the Free State of Bavaria will take place in the Historical City Hall Nuremberg in the Old Town of Nuremberg on Wednesday 9th October 2013, 19:30h to 22:00h. As only limited space is available, it is not possible to invite all conference delegates, exhibitors and visitors; only oral conference speakers and invited persons may attend the reception. Those oral conference speakers who will attend the reception will receive their personal ticket in the registration area (NCC Ost, level 0) on Wednesday 9th October 2013, 8:00h to 14:00h.

### CREDIT CARDS

All major hotels and most restaurants and shops will accept credit cards. It is advisable to carry other identification as well. Visa and MasterCard are the most widely accepted cards.

### HOTEL RESERVATION

Horizon House has teamed up with Hotelzon, our preferred hotel booking supplier, to offer you the ability to book your accommodation for this exhibition at the most competitive rates available. It is very easy to make an immediate hotel booking. Simply visit Hotelzon's booking page [www.hotelzon.com/en/uk/events-eumw](http://www.hotelzon.com/en/uk/events-eumw) and make your booking, or email [sally.garland@hotelzon.co.uk](mailto:sally.garland@hotelzon.co.uk). You will find a wide range of accommodation to suit every budget. Alternatively, see the hotel booking pages within this booklet.

### SHOPPING & SIGHTSEEING

In your delegate bag you will find guides for shopping and sightseeing. In the registration area a helpdesk will be available, providing support in booking tourist trips, purchasing public transport tickets etc.

In the Old Town of Nuremberg you can feel the almost one thousand year old history. The special ambience invites you to extensive sightseeing tours. Numerous shopping possibilities and the active art and culture scene of Nuremberg are always worth to visit. Whether it is on the Main Market Square with its fruit and vegetable stalls under their red and white umbrellas, whether it is behind the glass facades of elegant shopping malls: Nuremberg's inner city offers a unique shopping atmosphere with 500 shops in this historical backdrop. During the week, you can shop here until 20:00h. Picturesque roast sausage "kitchens" invite guests to sample Franconian specialities, while starred restaurants offer culinary delights even for the most discerning palate.

Do not leave Nuremberg without:

- having watched the "Männleinlaufen", the clockwork on the facade of the "Frauenkirche" on the Main Market Square just five minutes before noon,
- having looked down on the roofs of the city from the Imperial Castle, and
- having eaten some of the famous Nuremberg roast sausages or a "Schäuferle".

For information on shopping and sightseeing, visit [www.nuernberg.de/internet/portal\\_e/kultur](http://www.nuernberg.de/internet/portal_e/kultur).

Alternatively, see the "Social Events & Partner Programme" section of this booklet for tours and excursions before, during and after EuMW 2013.

### FREE PUBLIC TRANSPORTATION

For conference delegates (not for exhibitors) the printed conference registration with the fast track QR-code can be used as a ticket for all subway (U), commuter (S), tram and bus lines within Nuremberg. It is valid from Sunday 6th October 2013 to Friday 11th October 2013. When the conference registration is lost there will be no replacement.



# CONFERENCE REGISTRATION INFORMATION

## Fast Track Badge Retrieval

Register online and print out your badge in seconds onsite from the Fast Track Check In Desk

### Register Online at [www.eumweek.com](http://www.eumweek.com)

ONLINE registration is open from 1st June 2013 up to and during the event until 11th October 2013.

ONSITE registration is open from 16:00h on 5th October 2013.

ADVANCE DISCOUNTED RATE (until 6th September) STANDARD RATE (from 7th September & Onsite)

Delegates can self-register online through [www.eumweek.com](http://www.eumweek.com).

### CONFERENCE REGISTRATION FEES

There are TWO different rates available for the EuMW conferences

- **ADVANCE DISCOUNTED RATE** – for all registrations made online until 6th September (these are 30% cheaper than the Standard Rate)
- **STANDARD RATE** – for all registrations made online from 7th September and onsite.

Please see the Conference Registration Rates table on the following pages for complete pricing information. All payments must be in € (Euro) – cards will be debited in € (Euro).

### CONFERENCE REGISTRATION DETAILS

#### Online Registration

- All registrations should be made online at [www.eumweek.com](http://www.eumweek.com). Those completed by 6th September will be charged at the 'Advance Discounted Rate' and those after 6th September will be charged at the 'Standard Rate'.
- Online registration is open from 1st June 2013 up to and during the event until 11th October 2013. You can also register ONSITE from 16:00h on Saturday 5th October 2013 and then at the times detailed below.

#### Onsite Registration

Onsite registration is available:

- |                         |                 |
|-------------------------|-----------------|
| • Saturday 5th October  | 16:00h – 19:00h |
| • Sunday 6th October    | 07:30h – 17:00h |
| • Monday 7th October    | 07:30h – 17:00h |
| • Tuesday 8th October   | 07:30h – 17:00h |
| • Wednesday 9th October | 07:30h – 17:00h |
| • Thursday 10th October | 07:30h – 17:00h |
| • Friday 11th October   | 07:30h – 10:00h |

Onsite registration will be charged at the Standard Rates (see pricing table on the following pages).

### HOW TO REGISTER

#### Online

- All registrations should be made online at [www.eumweek.com](http://www.eumweek.com).
- Delegates can register for one, two or all three of the conferences and workshops.
- Discounts will be given to those registering for two or more conferences.
- Payment can be made online using Amex, Visa, Mastercard, or Bank Transfer.
- Registrants paying by Credit Card will be sent an automatic email confirmation, with a receipt and badge barcode.
- Registrants choosing to pay by Bank Transfer will receive their confirmation, but their receipt and badge barcode will be sent only once payment has been received and cleared by Horizon House.

#### Onsite

- The registration area will be located at the NCC Ost Entrance, Level 0.
- There will be Self Service terminals in the registration area where delegates can enter their details and pay immediately by swiping their credit cards through the readers attached to the terminals.
- Delegates can also choose to 'Pay at Cashier' and then proceed to the Cashier Point and pay using credit cards or cash. Receipts will be given accordingly.

If you have any questions regarding registration procedures and payment, please contact: [eumwreg@itnint.com](mailto:eumwreg@itnint.com).

### BADGE COLLECTION AT FAST TRACK CHECK IN DESK

- All online registrants should bring a printed copy of their email registration receipt with the barcode and a photo ID. At the entry to the convention centre, they may scan the barcode at the Fast Track Check In desks and present their ID to obtain the badge.
- Online registrants without printed emails may also obtain their badges at the Self Service registration terminals (photo ID required).
- All onsite registrants using the Self Service terminals will receive their printed badge upon payment.
- Once you have collected your badge, you can collect the conference proceedings on USB stick and delegate bag for the conferences from the specified delegate bag area by scanning your badge. Processing will be quick and easy but queues may form at busy times, so please arrange to collect your badge well in advance of your first conference session.

### COFFEE BREAKS AND WELCOME RECEPTION

- All delegates must present their badges to be scanned to receive coffee during the coffee breaks. There will be two coffee breaks per day and coffee will only be given to those who have their badges for scanning.
- On Tuesday, Wednesday & Thursday coffee breaks will take place in the Exhibition Hall 7A.
- On Sunday, Monday & Friday, they will take place on levels 2 and 3 within the Convention Centre.
- All delegates must bring their badges with them to the Welcome Reception, which takes place in the Restaurant Vasco da Gama and the Sydney Ball Room on Level 1 of the Convention Centre on Tuesday 8th October at 18:30h. Badges will be scanned to allow entrance and those without a badge will be refused entry.

### CONFERENCE LOCATION

The conferences will be held in different rooms over the conference dates. Please refer to the Conference Matrix at the back of this booklet for a detailed overview. Registration at one conference does not allow any access to other conference sessions.



# CONFERENCE REGISTRATION INFORMATION

## EUROPEAN MICROWAVE WEEK 2013, 6th - 11th October, Nuremberg, Germany

### Register Online at [www.eumweek.com](http://www.eumweek.com)

ONLINE registration is open from 1st June 2013 up to and during the event until 11th October 2013.

ONSITE registration is open from 16:00h on 5th October 2013.

ADVANCE DISCOUNTED RATE (until 6th September) STANDARD RATE (from 7th September & Onsite)

Reduced rates are offered if you have society membership to any of the following: EuMA, GAAS, VDE, IET or IEEE.

EuMA membership costs: Professional € 25/year, Student € 15/year.

Reduced Rates for the conferences are also offered if you are a Student/Senior (Full-time students less than 30 years of age and Seniors 65 or older as of 11th October 2013).

#### ADVANCE REGISTRATION CONFERENCE FEES (UNTIL 6 SEPT)

CONFERENCE FEES	ADVANCE DISCOUNTED RATE			
	Society Member (*any of above)		Non Member	
	Standard	Student/Sr.	Standard	Student/Sr.
1 Conference				
EuMC	€ 420	€ 100	€ 550	€ 130
EuMIC	€ 325	€ 90	€ 430	€ 120
EuRAD	€ 280	€ 80	€ 370	€ 110
2 Conferences				
EuMC + EuMIC	€ 600	€ 190	€ 790	€ 250
EuMC + EuRAD	€ 570	€ 180	€ 740	€ 240
EuMIC + EuRAD	€ 490	€ 170	€ 650	€ 230
3 Conferences				
EuMC + EuMIC + EuRAD	€ 730	€ 270	€ 960	€ 360

#### STANDARD REGISTRATION CONFERENCE FEES (FROM 7 SEPT AND ONSITE)

CONFERENCE FEES	STANDARD RATE			
	Society Member (*any of above)		Non Member	
	Standard	Student/Sr.	Standard	Student/Sr.
1 Conference				
EuMC	€ 550	€ 130	€ 720	€ 170
EuMIC	€ 430	€ 120	€ 560	€ 160
EuRAD	€ 370	€ 110	€ 490	€ 150
2 Conferences				
EuMC + EuMIC	€ 790	€ 250	€ 1030	€ 330
EuMC + EuRAD	€ 740	€ 240	€ 980	€ 320
EuMIC + EuRAD	€ 650	€ 230	€ 850	€ 310
3 Conferences				
EuMC + EuMIC + EuRAD	€ 960	€ 360	€ 1260	€ 480

#### WORKSHOP AND SHORT COURSE FEES (ONE STANDARD RATE THROUGHOUT)

FEES	STANDARD RATE			
	Society Member (*any of above)		Non Member	
	Standard	Student/Sr.	Standard	Student/Sr.
1/2 day WITH Conference registration	€ 80	€ 60	€ 110	€ 80
1/2 day WITHOUT Conference registration	€ 110	€ 80	€ 150	€ 110
Full day WITH Conference registration	€ 120	€ 90	€ 160	€ 110
Full day WITHOUT Conference registration	€ 160	€ 120	€ 210	€ 150

#### Other Items

##### Proceedings on USB Stick

All papers published for presentation at each conference will be on a USB stick, given out FREE with the delegate bags to those attending conferences. For additional USB sticks the cost is € 50.

##### DVD Archive EuMC

DVD Archive EuMC 1969-2003	FREE
DVD Archive EuMC 2004-2008	€ 10

##### Partner Programme and Social Events

Full Details and contacts for the Partner Programme and other Social Events can be obtained via the EuMW website [www.eumweek.com](http://www.eumweek.com).

#### EUROPEAN MICROWAVE WEEK WORKSHOPS & SHORT COURSES

SUNDAY 6th October		
Full Day	W01	EuMIC
Full Day	W02	EuMC
Full Day	W03	EuMC & EuMIC
Half Day	W04	EuMC & EuMIC
Half Day	W05	EuMC
Full Day	W06	EuMC & EuMIC
Full Day	W07	EuMC & EuMIC
Full Day	W08	EuMIC
Full Day	W09	EuMC & EuMIC
Full Day	W10	EuMC & EuMIC
Full Day	W11	EuMC
Full Day	W12	EuMC & EuMIC
Half Day	S01	EuMC & EuMIC
Half Day	S02	EuMC & EuMIC
Full Day	S03	EuMC
Half Day	S04	EuMC
Half Day	S05	EuMC & EuMIC
MONDAY 7th October		
Full Day	W13	EuMC
Half Day	W14	EuMC
Half Day	W15	EuMC & EuMIC
Full Day	W16	EuMC & EuMIC
Half Day	W17	EuMC
Half Day	W18	EuMC
Half Day	W19	EuMC & EuMIC
Half Day	W20	EuMC
Half Day	W21	EuMC
Half Day	W22	EuMC
Half Day	W23	EuMC & EuMIC
Half Day	S06	EuMC
TUESDAY 8th October		
Full Day	W24	EuMC & EuRAD
WEDNESDAY 9th October		
Full Day	W25	EuMC & EuMIC
Full Day	W26	EuRAD
Full Day	W27	EuRAD
FRIDAY 11th October		
Half Day	W28	EuMC
Half Day	W29	EuMC
Full Day	W30	EuMC
Half Day	W31	EuMC
Half Day	W32	EuMC
Half Day	W33	EuMC
Half Day	W34	EuMC
Full Day	W35	EuMC
Half Day	W36	EuRAD
Half Day	W37	EuMC & EuRAD
Half Day	W38	EuMC
Half Day	W39	EuMC & EuRAD
Half Day	S07	EuRAD
Half Day	S08	EuMC & EuRAD
Half Day	S09	EuRAD

#### SPECIAL FORUMS & SESSIONS

Date	Time	Title	Location	No. of Days	Cost
Tues 8th & Weds 9th October	Tues: 13:50h - 17:40h Weds: 08:30h - 17:40h	The Defence & Security Forum	Room St. Petersburg	2	FREE
Mon 7th & Tues 8th October	08:30h - 17:40h	European Microwave Student School	Room Oslo	2	€ 40
Thurs 10th & Fri 11th October	08:30h - 17:40h	European Microwave Doctoral School	Room Oslo	2	€ 80

# EUROPEAN MICROWAVE WEEK WORKSHOPS AND SHORT COURSES

## SUNDAY 6th October

Full Day	W01	EuMIC	Low-power RFIC Frontends and Components
Full Day	W02	EuMC	Wireless Power Transmission – Techniques and Applications
Full Day	W03	EuMC & EuMIC	Energy Harvesting, Circuit and System Advances for Battery-less Radio Frequency Identification (RFID) Systems with Sensing Capability
Half Day	W04	EuMC & EuMIC	Modulators and Power Amplifiers for Power-Efficient Transmitters
Half Day	W05	EuMC	Biomedical Applications of Microwaves: Challenges and New Opportunities
Full Day	W06	EuMC & EuMIC	RFIC Design, Assembly, and Packaging Towards Sub-mm and THz Waves
Full Day	W07	EuMC & EuMIC	RF-MEMS: From Monolithic Device Integration to Circuit and System Design
Full Day	W08	EuMIC	Growing and Designing GaN in Europe
Full Day	W09	EuMC & EuMIC	Future RF Fingerprinting and On-Chip Security
Full Day	W10	EuMC & EuMIC	Microwave Metamaterial Concepts, Circuits and Applications
Full Day	W11	EuMC	Advances in Multilayer Microwave and Millimetre-Wave Technologies and Emerging MCM/SoP Applications
Full Day	W12	EuMC & EuMIC	Terahertz Technologies - From Materials to Devices and Their Applications
Half Day	S01	EuMC & EuMIC	Fundamentals of Microwave Power Amplifier Designs
Half Day	S02	EuMC & EuMIC	Completing the Design Flow – A Short Course Covering Component-Level Modelling and Measurement, Circuit Design and Analysis, and System Modelling
Full Day	S03	EuMC	Substrate Integrated Waveguides
Half Day	S04	EuMC	Near Field Probes: Useful Tools for RF/MW Engineers
Half Day	S05	EuMC & EuMIC	Introduction to Spaceborne SSPA, Requirements and Future Perspectives

## MONDAY 7th October

Full Day	W13	EuMC	RFID Hardware and Physical Layer: Status and Development Directions
Half Day	W14	EuMC	Recent Advances in Miniature Multiband, Tunable and Reconfigurable Filters – Results of the FP7 MultiWaveS Project
Half Day	W15	EuMC & EuMIC	Solid State High Power RF-Amplifiers – Industrial Development Trends in Germany
Full Day	W16	EuMC & EuMIC	RF-MEMS RFIC/MMIC Technologies for Highly Adaptive and Reliable RF Systems - Results of the FP7 NANOTEC Project
Half Day	W17	EuMC	Microwave Sensors and Applications
Half Day	W18	EuMC	IntelliSpektrum Project Overview: Intelligent Spectrum Management for Energy-Efficient and Optimized Access to Flexible Hierarchical Mobile Communication Networks
Half Day	W19	EuMC & EuMIC	Ultra High Speed Wireless Communication: Approaches and Ideas to Achieve Wireless 100Gb/s Communication
Half Day	W20	EuMC	Integrated Radar Sensors for Automotive and Industrial Applications
Half Day	W21	EuMC	Chipless RFID and Wireless Sensing: Technologies Beyond SAW
Half Day	W22	EuMC	RF- and Microwaves as an Enabler for the Internet of Things
Half Day	W23	EuMC & EuMIC	Signal Integrity of Digital and Analogue Systems
Half Day	S06	EuMC	Introduction to Advanced Measurement Techniques for Material Characterization

## TUESDAY 8th October

Full Day	W24	EuMC & EuRAD	Automotive Radar
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## WEDNESDAY 9th October

Full Day	W25	EuMC & EuMIC	High Efficiency Microwave Power Amplifiers and Smart Transmitters
Full Day	W26	EuRAD	Advances in the State-of-the-Art of 76-81 GHz Automotive Radar and Current Issues in Increasing their Commercial Deployment
Full Day	W27	EuRAD	Synthetic Aperture Radar

## FRIDAY 11th October

Half Day	W28	EuMC	What are the Roles of Photonics and Electronics in Millimetre-Wave Multigigabit/s Wireless Communications?
Half Day	W29	EuMC	Technologies for Embedded Wireless Systems
Full Day	W30	EuMC	Photonics: From Devices to Circuits and Systems Including Testing
Half Day	W31	EuMC	Do You Have Confidence in Your RF Waveforms? Developments in Waveform Metrology and Uncertainty Propagation for RF and Digital Signals
Half Day	W32	EuMC	PCB Design up to 67 GHz
Half Day	W33	EuMC	Metamaterials in Communications and Sensing: Reality or Fiction?
Half Day	W34	EuMC	Current and Future Use of Spectrum by PMSE
Full Day	W35	EuMC	THz Systems and Components in Communications, Sensing and Imaging
Half Day	W36	EuRAD	Status and Trends for Active Electronically Scanning Arrays for Radar and Communication
Half Day	W37	EuMC & EuRAD	Radio Intelligence and Reconnaissance
Half Day	W38	EuMC	Software Defined and Reconfigurable Radio
Half Day	W39	EuMC & EuRAD	Introduction to Ultra-Wideband Localization
Half Day	S07	EURAD	Electronic Scanned Arrays Design
Half Day	S08	EuMC & EuRAD	Wide Band RF Technologies and Antennas at Microwave and Millimetre-Wave Frequencies
Half Day	S09	EuRAD	Radar Waveform Design and Analysis



# The 2013 Defence & Security Forum

At European Microwave Week



The resounding success of the EuMW Defence and Security Forum since its inception in 2010 has prompted the joint organisers, the European Microwave Association (EuMA) and Microwave Journal, to continue EuMW's coverage of the defence and security sector with special emphasis on differences and similarities between the two major radar applications today - defence and automotive.

While defence has utilised this sensor technique for years with improved techniques and performance, the automotive radar sensor market has begun to boom and exhibit a tremendous increase in volume. This huge success raises the question, whether both markets exist independently or cross-fertilisation can be expected. This year's EuMW Defence and Security Forum will address such questions and try to provide information from both markets regarding developments, technical requirements, production techniques, quality assurance measures, and future trends.

### Programme

#### Tuesday 8th October 2013, Room St. Petersburg

##### 13:50 - 15:30 Development and Production Requirements for Automotive and Military Radar

Automotive radars as well as modern defence/space radars based on an active phased array approach require the volume manufacturing of complex RF modules/circuits. Although the requirements might be similar the manufacturing approach, including assembly techniques, quality assurance and supplier selection/management might be different. In this session, experts on radar manufacturing from the different markets will present their view on the various volume production aspects and trends for the next generation of radar manufacturing. Methods applied by the different industries for quality assurance will be also addressed.

##### 16:00 - 17:40 EuMIC Closing Session

#### Wednesday 9th October 2013, Room St. Petersburg

##### 08:30 - 10:10 Microwave Journal Industry Panel Session

The session offers an industrial perspective on the key issues facing the defence and security sector. In accordance with the theme for 2013 the Industry Panel will address: Defence and Automotive

Radar – Differences and Commonalities. Speakers will demonstrate how microwave technology is meeting the design and test challenges facing those at the forefront of innovation, including developments that are not only significant today but also those perceived for the future. These initiatives will then be discussed by the Industry Panel who will also take questions from the floor.

##### 10:40 - 12:20 EuRAD Opening Session

##### 12:30 - 13:30 Strategy Analytics Lunch & Learn Session

This session will add a further dimension to the Defence and Automotive Radar theme by offering a market analysis perspective, illustrating the status, development and potential of the market.

##### 13:50 - 15:30 Experience and Future Expectations regarding Automotive and Military Radars

This session reports on the experiences obtained with radar sensors in many different applications. Advantages, weaknesses and further operational aspects will be described by users of highly sophisticated defence radars as well as low cost automotive radars and other applications. It is the purpose of this session to show the remaining challenges for radar development and production.

##### 16:00 - 17:40 Executive Forum

This early evening executive forum will feature executives from defence and security agencies and leading companies as well as experts and executives from companies involved in automotive radars. They will discuss the challenges and trends of the future and will further elaborate on their views regarding the cross-fertilisation, in development and production, between different markets.

##### 17:40 - 19:00 Cocktail Reception

The day's proceedings will conclude with a cocktail reception which will give delegates the unique opportunity to discuss the issues raised in an informal setting.

##### Registration and Programme Updates

Attendance is FREE and open to all EuMW 2013 conference delegates, exhibitors and visitors. Attendees are asked to pre-register. To do so please visit [www.eumweek.com](http://www.eumweek.com), click on the Registration button and select 2013 Defence and Security Forum on the registration form. As information is formalised the Conference Special Events section of the EuMW website will give details of the speakers.

## EuMW 2013 Student Challenge

**Date:** Tuesday 8th until Thursday 10th October 2013

**Location:** Room Tokio

**Organisers:** Matthias Hein, TU Ilmenau, Germany (Chair),  
M. Ruggiano (Advisor), H. Bayer, S. I. Butt, A. Krauß, S. Kühn

The Student Challenge has become a fine tradition at the European Microwave Week and is offered in 2013 for the sixth time. The Student Challenge is an opportunity for bachelor, master, and doctoral students from all over the world with a variety of academic backgrounds, to work together on a specific topic in the wide and challenging field of microwaves. The aim is to promote innovative thinking, teamwork and pro-active behaviour, skills future employers will highly value.

For the EuMW 2013 Student Challenge, several teams shall be formed; each team has to be composed of a maximum of four members, preferably from different institutions and with a variety of backgrounds. The aim for all teams is to present, explain, and defend a fresh, visionary, application-oriented concept by a poster. The poster must be based on at least two papers presented at the EuMW 2013, of which only one paper may be authored by a member of the team. Eventually, each team will give a five-minutes presentation of the innovative concepts they have devised. A technical jury, composed of prominent members of academia and industry, will evaluate the presentation and the poster of each team

according to the following criteria: originality, content, feasibility, and clarity. The winning team will receive a prize with a value of € 1500. All bachelor, master, and doctoral students registered in any one of the EuMW 2013 conferences are eligible for participation in the Student Challenge. Updated information and further details can be found at <http://www.eumweek.com>.

### Registration

To register, please send an e-mail to [challenge@eumw2013.com](mailto:challenge@eumw2013.com) and attach a copy of your student identity card or a confirmation, signed by your responsible professor. The deadline for registration is 30th September 2013.

### Programme

#### Tuesday 8th October 2013

13:50 - 14:50 Kick-off meeting: Theme disclosure, instructions, team formation

#### Thursday 10th October 2013

10:30 Poster submission deadline  
13:50 - 15:00 Poster presentation to jury and audience (corridor between exhibition and conference)  
16:00 - 17:40 Award ceremony during the EuMW/EuMC Closing Session

**THALES**

## EuMW 2013 Student Design Competition

**Organiser:** Chafik Meliani, IHP, Germany

This year, the European Microwave Week will be hosting for the first time a student design competition. The main objective of this event is to encourage students to become involved in the dynamic profession of microwave engineering and to apply their knowledge to practical design use.

Competitors are required to design and if necessary construct and measure hardware solutions for predetermined design requirements. They will be given the opportunity to challenge themselves and other participating students for the best solution!

During EuMW 2013, three student design competitions across diverse technical areas will be organised. For each competition, the winner, as judged by the technical committee (based on the figure of merit published on the website of the conference), will be recognised during the closing session and will receive the EuMW 2013 Student Design Prize with a value of € 1500, sponsored by Agilent Technologies. In addition, the winners will be given the opportunity to submit an article to the EuMA International Journal of Microwave and Wireless Technologies in order to share their

design techniques and experience with the microwave community. Required test equipment, components and computer-aided design software will be provided to the participants. All doctoral, master and bachelor students registered in any one of the EuMW 2013 conferences are welcome to participate.

### Three Design Competitions

- Power Amplifier Design: Efficiency at Back-off
- Tunable Filters
- Power Combining Techniques

### General Competition Rules

- The participants must be full-time students (bachelor, master or PhD students) during the time the work was performed.
- The participants must have a signed statement from their academic advisor that the work is principally the effort of the student(s).
- The student(s) must attend the conference to present their design for evaluation at the specified time and location.
- The student(s) must contact the competition chair in order to submit an entry by 21st July 2013 at [competition@eumw2013.com](mailto:competition@eumw2013.com).

 **Agilent Technologies**



## European Microwave Doctoral School

**Date:** Thursday 10th and Friday 11th October 2013

**Location:** Room Oslo

**Organiser:** Nils Pohl, Fraunhofer FHR, Germany

### About the European Microwave Doctoral School

The intention of the European microwave doctoral school is to cover all needs of a PhD student, which go beyond the normal conference programme. Therefore, the school attracted several excellent scientific speakers from all over the world to give presentations. All of these scientific speakers are well-known researchers, who are Distinguished Microwave Lecturers (DML) of the IEEE Microwave Theory and Techniques Society (MTT-S) or European Microwave Lecturer (EML) of the European Microwave Association (EuMA). In contrast to typical conference presentation, the talks during the school are longer (50min) and will give an overview on various emerging topics in the microwave domain.

Additionally, the school added two talks to address the soft skills of the attendees. The first one is about the founding of start-ups in the Silicon Valley and the second one points out how to impress the audience with scientific presentations. These two full days of technical programme are inspired by the motto of the week MEET EXPERTS, MAKE FRIENDS. Therefore, the technical programme is accompanied by a special dinner event on Thursday.

### Registration

The School is dedicated (but not limited) to PhD students in the microwave domain. Registration is mandatory for all attendees including a fee of € 80 for two full days of programme including coffee breaks and the dinner event on Thursday. To register go to [www.eumweek.com](http://www.eumweek.com). Registration is limited and closes 6th September 2013.

### Programme

#### Thursday 10th October

- 08:00 – 08:10 Introduction
- 08:10 – 09:00 Microwave Engineering: What is it, Where is it Headed, and How it Serves the Mankind  
Madhu Gupta, University of California, San Diego, USA
- 09:00 – 09:50 Towards Greener Smartphones with Microwave Measurements  
Dominique Schreurs, Katholieke Universiteit Leuven, Belgium
- 09:50 – 10:40 Silicon Valley Style – How to Succeed With Extreme Risks  
Earl McCune, Besser Associates, USA

- 10:40 – 11:30 QFN-based Packaging Concepts for Millimeter Wave Transceivers  
Thomas Zwick, Karlsruhe Institute of Technology, Germany
- 11:30 – 12:20 Modern Methods for Microwave Filter Synthesis  
Richard Cameron, ComDev Europe - Consultant, UK
- 12:20 – 13:10 Lunch Break
- 13:10 – 14:00 Circuit Q Factor as a Basic But Still Ambiguous Index for Resonators and Oscillators  
Takashi Ohira, Toyohashi University of Technology, Japan
- 14:00 – 14:50 Network Methods in Electromagnetic Field Computation  
Peter Russer, Technische Universität München, Germany
- 14:50 – 15:40 Possibilities of Cloaking and Invisibility at Microwaves  
Sergei Tretyakov, Aalto University, Finland
- 15:40 – 15:50 Closing Remarks
- Evening Special Dinner Event

#### Friday 11th October

- 08:20 – 08:30 Introduction
- 08:30 – 09:20 Electromagnetic Fields and Nanotechnologies in Medicine and Biology  
Ovidio Bucci, Università degli Studi di Napoli – Federico II, Italy
- 09:20 – 10:10 Implantable Wireless Medical Devices and Systems  
J.C. Chiao, University of Texas at Arlington, USA
- 10:10 – 11:40 Coffee Break
- 10:40 – 11:30 Microwave Near-field Imaging of Human Tissue: Hopes, Challenges, Outlook  
Natalia Nikolova, McMaster University, Canada
- 11:30 – 12:20 OFDM, What it is and isn't  
Earl McCune, Besser Associates, USA
- 12:20 – 13:50 Lunch Break
- 13:50 – 15:30 Scientific Presentation – How to Impress the Audience  
Kathrin Keune, Contec GmbH, Germany
- 15:30 – 16:00 Coffee Break
- 16:00 – 16:50 Microwave Photonics  
Jianpang Yao, University of Ottawa, Canada
- 16:50 – 17:40 Terahertz and Optical Plasmonics: Current and Future Applications  
Tahsin Akalin, University of Sciences and Technologies, Lille, France
- 17:40 – 17:50 Closing Remarks

# 1st European Microwave Student School "Microwave Measurement Techniques"

**Date:** Monday 7th and Tuesday 8th October 2013

**Location:** Room Oslo

**Organisers:** H. Maune, T. Ußmüller, A. Hagelauer

This year's European Microwave Week features the first European Microwave Student School for bachelor and master students from all over Europe. This year's topic is "Microwave Measurement Techniques" which includes topics in the fields of introduction to metrology, spectrum and signal analysis, network analysis, calibration as well as on-wafer measurement techniques. The programme features highly accepted experts from academia and industry. The course will be formed by two intensive days of lectures accompanied with hands-on training on modern measurement equipment. Beside the lecture programme there will be a social event at Monday evening to get in contact with other students and research fellows from universities. The programme is designed to lay the foundations for microwave measurements. It will enable a fundamental understanding of high frequency measurement techniques, and will prepare students to become intelligent users of commercial microwave measurement devices. The School is also open to PhD students who are interested in microwave measurements.

### Earning Credit Points

Certificates will be offered for the European Credit Transfer System (ECTS). If you require an exam please contact your professor to arrange the details of the examination process. By request of your professor to [studentschool@eumw2013.com](mailto:studentschool@eumw2013.com) we will provide an exam sheet for oral or written examination by end of October 2013.

### Programme

#### Monday 7th October 2013

08:30 – 08:40 Introduction  
08:40 – 10:10 Basics of Metrology  
10:10 – 10:40 Coffee Break  
10:40 – 12:20 RF-power Measurements  
12:20 – 13:50 Lunch Break  
13:50 – 15:30 Spectrum and Signal Analysis  
15:30 – 16:00 Coffee Break  
16:00 – 17:40 Spectrum and Signal Analysis (cont'd)  
19:00 Social Get-Together

#### Tuesday 8th October 2013

08:30 – 10:10 Network Analysis  
10:10 – 10:40 Coffee Break  
10:40 – 12:20 Network Analysis (cont'd)  
12:20 – 13:50 Lunch Break  
13:50 – 15:30 Calibration Techniques  
15:30 – 16:00 Coffee Break  
16:00 – 17:40 On-Wafer Network Analysis  
17:40 – 18:00 Closing Ceremony

### Registration

The registration fee is € 40. For registration and further information please visit [www.eumweek.com](http://www.eumweek.com). Registration is limited and closes 6th September 2013.

# Special Forum on Internet of Things and Cyber Physical Systems – a Women in Microwave Engineering Event

**Date:** Tuesday 8th October 2013

**Duration:** 13:50h until 16:30h

**Location:** Room Hongkong

**Organisers:** Ilona Rolfes, University of Bochum, Germany,  
Dominique Schreurs, KU Leuven, Belgium

We continue the tradition to hold a Women in Microwave Engineering event, sponsored by IEEE MTT-S, during the European Microwave Week. Both women and men are welcome. Microwave, electronic, mechanical and software technologies are the key enablers for the realisation of RFID and sensor networks which are a prerequisite for cyber physical system and internet of things applications. This year's forum will focus on the challenges for such enabling technologies imposed by the current developments and future requirements. Four female leaders in the field will discuss the issues that these trends will create.

### Programme

13:50 – 14:20 **Key Note Speech**  
Sabina Jeschke, RWTH Aachen, Germany  
14:20 – 15:10 **Panel Discussion**  
Moderator: Armin Himmelrath, Independent Journalist, Freie Universität Berlin, Germany  
Sabina Jeschke, Vice-Dean, RWTH Aachen, Germany  
Monika Kircher, CEO, Infineon Technologies Austria  
Marion Merklein, Dean, FAU Erlangen-Nürnberg, Germany  
Anna Miskiewicz, Intel Mobile Communications, Munich, Germany  
15:10 – 16:30 **Reception**



### Presidents' Panel on How Can We Do Better for the Microwave Community?

**Date:** Wednesday 9th October 2013

**Duration:** 13:50h until 14:50h

**Location:** Room Oslo

**Organiser:** Robert Weigel, FAU Erlangen-Nuremberg, Germany

Professional associations for engineers like IEEE or VDE have the mission to promote technological and professional advances in their respective field of interest and to foster networking between those engineers in academia and industry. They have defined their visions, missions, goals, strategies, policies, and implemented processes to operate on a national, regional or global scale.

For the advancement of microwave technology such associations have been established in nearly all highly industrialised countries. Today, RF and microwaves is a key enabling technology for numerous technical applications and thus is always on the move.

This, of course, has always been the case, but nowadays things can change much faster than in the past. There are ongoing trends in content distribution, knowledge access, education, in the membership models of scientific societies, in strategic or temporal partnering with other societies or groups, in the way how conferences and exhibitions are organised, in the publication business, in the field of standards, and in the knowledge business that may or will affect their business. "How can we do better for the microwave community?" is the pertinent question for any president of a professional microwave association.

**Panelists:**

Moderator: Werner Wiesbeck, Karlsruhe Institute of Technology

Madhu Gupta, IEEE MTT-S President

Wolfgang Heinrich, EuMA President

Peter Staecker, IEEE President

Ingo Wolff, VDE/ITG President



### Executive Panel Discussion on Production of Electronics in Europe

**Date:** Wednesday 9th October 2013

**Duration:** 16:00h until 17:00h

**Location:** Room Istanbul

**Organisers:** Franz Dielacher, Infineon Technologies Austria, Robert Weigel, FAU Erlangen-Nuremberg, Germany

The capability to develop and manufacture electronic systems (production of electronics) is the key qualification for the industrial production in the 21st century since electronics is and will continue to be a ubiquitous technology which is an essential part of almost all technical systems and, therefore, an essential part of our everyday life. Due to its capability to connect and combine technical systems, it creates completely new and smart technical functions but also mutual dependencies, interactions and possibilities for optimisation.

Today's electronic systems already go beyond monolithically integrated or hybrid systems which combine measurement, data processing and storage functions. The future technical systems will

embed completely integrated smart functions. They will detect, diagnose a situation, describe and qualify, mutually identify and communicate with each other, interact and perform electrical and non-electrical operations, decide and help to decide. These systems are often networked, energy autonomous, miniaturised and highly reliable. They are becoming increasingly complex and will be used in many different application areas.

In recent years, manufacturing and testing capabilities of electronics have been drifting from Europe towards Asia for many comprehensible reasons. However, can Europe afford not to be a leader in the production of such a key enabling technology? This fundamental question and associated issues will be discussed in this panel featuring executive leaders from industry and government bodies.

As information is formalised, details of the speakers will be updated and available on a regular basis; browse occasionally to [www.eumweek.com](http://www.eumweek.com).

### EuMIC Get-Together

Date: Monday 7th October 2013 | Duration: 18:00h until 21:00h  
 Cost: Free to EuMIC delegates  
 Location: NCC Ost in Nuremberg (Foyer St. Petersburg)

All registered EuMIC2013 delegates are invited to a jovial get-together with friends and colleagues. Recover from the first conference day, talk to the speakers and other experts, or enjoy drinks and finger food from a flying buffet. A keynote speech entitled "On-Wafer Measurements up to THz Frequencies" will be given by Dylan Willams of NIST, Boulder, USA. Delegates will need to bring their badge with them to gain entrance.

### Welcome Reception

Date: Tuesday 8th October 2013 | Duration: 18:30h until 22:00h  
 Cost: Free to conference delegates & invited exhibitors  
 Location: NCC Ost in Nuremberg (Restaurant Vasco da Gama/Hall Sydney, Level 1)

All registered conference delegates, as well as invited representatives from companies participating in the exhibition are invited to the EuMW 2013 Welcome Reception, sponsored by Agilent Technologies, Horizon House Publications and EuMA. Delegates will need to bring their badge with them to gain entrance. The evening will begin with a cocktail reception at 18:30h followed by the General Chairs' handover from EuMW 2013, Nuremberg to EuMW 2014, Rome as well as an address from the Platinum Sponsor, Agilent Technologies. The self-service three course buffet will start at 19:00h in the Restaurant Vasco da Gama & Hall Sydney accompanied by a dinner speech on "Microelectronic Roots in Franconia" by Heiner Ryssel from the University of Erlangen-Nuremberg.

### State Reception

Date: Wednesday 9th October 2013 | Duration: 19:30h until 22:00h  
 Cost: Free to oral conference speakers & invited persons  
 Location: Historical City Hall in Nuremberg

The State Reception of the Free State of Bavaria is being organised by the Bavarian Government and in particular by the Bavarian Minister of Economic Affairs, Infrastructure, Transport and Technology. As only limited space is available, it is not possible to invite all conference delegates, exhibitors and visitors; only oral conference speakers and invited persons may attend the reception. Those oral conference speakers who will attend the reception will receive their personal ticket in the registration area (NCC Ost, level 0) on Wednesday 9th October 2013, 8:00h to 14:00h. The Historical City Hall (1332-1340)



is the most important feature of the Old City Halls of Nuremberg. 40 metres long and 12 metres wide, it was considered to be the largest secular hall north of the Alps at the time of its building.

### Pre Conference Tour

Date: Sunday 6th October 2013 | Duration: 11:00h until 16:00h  
 Cost: € 60 per person<sup>1)</sup>  
 Location: Oktoberfest in Munich

For a limited number of people a special lounge has been reserved at the famous Schottenhamel beer tent for those visiting the EuMW2013 and who like to experience the spectacle of Oktoberfest by enjoying its "Bavarian Gemütlichkeit". The Schottenhamel beer hall is the oldest and most traditional one, with the Schottenhamel family being represented at the Oktoberfest since 1867. Annually at noon of the first day of the Oktoberfest, the mayor of Munich traditionally taps the first Oktoberfest-barrel. According to his skills, he mostly only needs three hits, before he can call out the famous words "O'zapft is". Attendees have to arrange to come to the Schottenhamel beer tent by themselves. E.g., when starting from Nuremberg it is convenient to take a high-speed train which takes about 1h from Nuremberg railway station to Munich railway station. Detailed information will be given with the confirmation of your registration.



### Post Conference Tour

Date: Saturday 12th October 2013 | Duration: 14:00h until 23:30h  
 Cost: € 29 per person, minimum 25 participants<sup>2)</sup>  
 Location: Volkach and Wine Festival in Escherndorf

The tour starts with a bus ride to a famous Franconian wine region near Würzburg and the first part of this trip is a guided tour in Volkach. The city was founded in the year 906 and is located at the peak of the "Mainschleife" where the river Main changes its direction. Volkach and wine – the two are inextricably intertwined. Afterwards one picturesque wine village, Escherndorf and its wine festival will be visited. The atmosphere at a wine festival needs to be experienced with the happy, friendly faces, the balmy summer breeze, the music and the relaxing atmosphere.



<sup>1)</sup> The price includes entry to the lounge, two litre of beer and one "Oktoberfest Hendl" (chicken).

<sup>2)</sup> The price includes bus ride, guided tour in English and entrance fees. Lunch is not included and will not be organised. When the minimum number of participants cannot be reached until Friday 13th September 2013 the tour has to be cancelled.



## PARTNER PROGRAMME

### Monday 7th October 2013

#### Discovering Nuremberg's Old Town Above and Below

Duration: 13:00h until 15:00h (part 1), 16:00h until 17:30h (part 2)

Cost: € 12 per person (part 1), € 5 per person (part 2), minimum 18 participants<sup>1)</sup>

Starting with a pleasant walking tour through the Old Town of Nuremberg offers you information and insights on the castle, the fountains and wells, churches and art as well as the city itself past and present (part 1). Afterwards you will be below the city in the Rock-Cut Cellars where through many centuries the citizens of Nuremberg have built vaults and corridors into the bright red sandstone. In all those years the cellars were primarily used for the ripening and storage of beer – mostly the city's famous red beer (part 2). The tour finishes at the brewery "Altstadthof" where you can taste the red beer and other culinary specialities.



### Tuesday 8th October 2013

#### Medieval Sightseeing in Rothenburg ob der Tauber and Open Air Museum Bad Windsheim

Duration: 8:30h until 18:00h

Cost: € 35 per person, minimum 25 participants<sup>2)</sup>

Medieval walls encircle almost half of Rothenburg, the other half of the town sits on a high ridge above the Tauber river. At the centre of the city is the bustling market square dominated by the city hall. Beside other beautiful facets of the town you can see the Master Draught. Out of little windows the figures of General Tilly and former mayor Nusch appear remembering the saving of the city in 1631 during the Thirty Year's War. Afterwards the tour lets you travel back in time as far as the Middle Ages while touring through the Franconian Open Air Museum. The scent of farmland and the realistic aromas that fill the different buildings help to bring the museum alive. It has more than 80 rural buildings that have been moved here to display the cultural heritage of more than six centuries in the region.



### Wednesday 9th October 2013

#### Romantic Sightseeing in Würzburg with Boat Trip to Veitshöchheim Visiting the Rococo Garden

Duration: 8:30h until 19:00h

Cost: € 39 per person, minimum 25 participants<sup>2)</sup>

Take an exciting walking tour through Würzburg's old city and discover the city's historic sights and attractions. Visit romantic alleys and places and get impressive views of the UNESCO World Cultural Heritage Site Residence Palace or the dominating Fortress Marienberg. Subsequent to the guided tour a boat trip on the Main river brings you to Veitshöchheim where the Rococo Garden will be visited. This garden probably has the greatest variety of content and symbolic meaning of any in Southern Germany.



### Thursday 10th October 2013

#### Baroque Sightseeing in Bamberg with Visit of Basilica Vierzehnheiligen and Abbey Banz

Duration: 9:00h until 19:00h

Cost: € 29 per person, minimum 25 participants<sup>2)</sup>

Those with a weakness for baroque architecture should not miss Bamberg for the world with its winding, narrow lanes and romantic facades with extravagant paintwork. The almost completely intact city centre lends a truly unique character to this enchanting Old Town. Following you can find out something about the Fourteen Holy Helpers of the catholic church in the Basilica Vierzehnheiligen. Crossing Main river brings you to Abbey Banz which was domiciled by Benedictine monks in former times. This monastery is said to be a cultural monument of European degree.



<sup>1)</sup> The price includes guided tour in English and entrance fees. The tours are separately bookable.

<sup>2)</sup> The price includes bus ride, (Würzburg tour: boat trip), guided tour in English and entrance fees. Lunch is not included and will not be organised. When the minimum number of participants cannot be reached until Friday 13th September 2013 the tour has to be cancelled.

**Friday 11th October 2013**

### **A Round Trip through the Franconian Switzerland**

Duration: 9:00h until 18:30h

Cost: € 35 per person, minimum 25 participants<sup>2)</sup>

Franconian Switzerland was given its name by Romantic artists and poets in the 19th century who compared its landscape to Switzerland. The Franconian Switzerland is amongst others famous for its high density of traditional breweries. In Pottenstein resides the Devil's Cave which is with 1,500 metres the longest in Germany. The cave is named for the disappearance of livestock in the vicinity of the cave being attributed to the devil. Then you will visit the Basilica Gößweinstein which is the greatest place of pilgrimage for the Holy Trinity in Germany. The tour ends in the Museum of Franconian Switzerland in Tüchersfeld which exhibits important finds of former times. Several collections show all aspects concerning the fascinating landscape "Franconian Switzerland" and provide insights into geology, archaeology and the regional historical development.



### **More possibilities before, during and after the EuMW 2013**

#### **Attractions in Nuremberg**

Imperial Castle  
Documentation Centre Nazi Party Rally Grounds  
Memorium Nuremberg Trials  
Albrecht Dürer House  
German National Museum  
New Museum  
German Railway Museum  
Communications Museum  
Industrial Culture Museum  
Toy Museum  
Tower of Senses  
Zoo with Dolphin Lagoon  
Planetarium  
Historic Art Bunker  
Medieval Dungeons

#### **Tips for sightseeing to nearby locations**

Regensburg, Germany (90 km)  
Munich, Germany (150 km)  
Heidelberg, Germany (170 km)  
Schwangau – Neuschwanstein Castle, Germany (210 km)  
Salzburg, Austria (230 km)  
Prague, Czech Republic (250 km)  
Dresden, Germany (260 km)

#### **Other events right before and after the European Microwave Week**

Autumn Market Nuremberg (12th September to 29th September)  
Oktoberfest Munich (21st September to 6th October)  
Cannstatter Wasen Stuttgart (27th September to 13th October)  
Autumn Festival Dresden (12th October to 3rd November)  
Science Night Nuremberg (19th October)

For more information on sightseeing, visit  
[www.eumweek.com/2013/Sightseeing.asp](http://www.eumweek.com/2013/Sightseeing.asp).

<sup>1)</sup> The price includes guided tour in English and entrance fees. The tours are separately bookable.

<sup>2)</sup> The price includes bus ride, (Würzburg tour: boat trip), guided tour in English and entrance fees. Lunch is not included and will not be organised. When the minimum number of participants cannot be reached until Friday 13th September 2013 the tour has to be cancelled.



## St. Petersburg

## Prag

## Budapest

## Istanbul

### EuMIC01

#### mm-Wave Receiver

Chair: Arttu Luukanen, MilliLab, VTT  
Technical Research Centre of Finland  
Co-Chair: Klaus Beilenhoff, United  
Monolithic Semiconductors GmbH

### EuMIC02

#### Integrated Passive and Tunable Components

Chair: Wolfgang Bösch, Graz University  
of Technology  
Co-Chair: Carlos Camacho-Peñalosa,  
Universidad de Málaga

### EuMIC03

#### Mixed Signal Integrated Circuits

Chair: Fabio Filicori,  
University of Bologna  
Co-Chair: Andreas Thiede,  
University Paderborn

### EuMIC04

#### CMOS Radio Frequency Power Amplifier

Chair: Manfred Berroth,  
University of Stuttgart  
Co-Chair: Udo Karthaus, Focubeam

#### EuMIC01-1

##### 11.5-Gbps 2.4-pJ/bit 60-GHz OOK Demodulator Integrated in a SiGe BiCMOS Technology

U. Yodprasit, C. Carta, F. Ellinger,  
Dresden University of Technology,  
Dresden, Germany

#### EuMIC02-1

##### A MIM-Cap Free Digitally Tunable NMOS Capacitor

A. Thomas<sup>2,1</sup>, W. Bakalski<sup>1</sup>,  
T. Ussmüller<sup>2</sup>, R. Weigel<sup>2</sup>, <sup>1</sup>Infineon  
Technologies, Neubiberg, Germany,  
<sup>2</sup>University of Erlangen-Nuremberg,  
Erlangen, Germany

#### EuMIC03-1

##### A 1 GHz DDFS for Stretch Processing Radar in 130nm BiCMOS Process

J. D. Cali<sup>1</sup>, X. Geng<sup>1</sup>, M. Pukish<sup>1</sup>, F. Zhao<sup>1</sup>,  
F. Dai<sup>1</sup>, A. Aklonis<sup>2</sup>, <sup>1</sup>Auburn University,  
Auburn, United States, <sup>2</sup>U.S. Army  
Research, Aberdeen, United States

#### EuMIC04-1

##### A +32.8 dBm LDMOS Power Amplifier for WLAN in 65 nm CMOS Technology

T. Johansson<sup>1</sup>, O. Bengtsson<sup>2</sup>, S. Lotfi<sup>3</sup>,  
L. Vestling<sup>3,4</sup>, H. Norström<sup>3</sup>, J. Olsson<sup>1</sup>,  
C. Nyström<sup>5</sup>, <sup>1</sup>Linköping University, Linköping,  
Sweden, <sup>2</sup>Leibniz-Institut fuer Hoechstfrequen-  
ztechnik, Berlin, Germany, <sup>3</sup>Uppsala University,  
Uppsala, Sweden, <sup>4</sup>Comheat Microwave AB,  
Sollentuna, Sweden, <sup>5</sup>Samsung Nanoradio  
Design Center AB, Kista, Sweden

#### EuMIC01-2

##### A Wideband Ka-band Receiver Front-End in 90-nm CMOS Technology

Z. Li, J. Cao, Q. Li, Z. Wang, Southeast  
University, Nanjing, China, Nanjing,  
China

#### EuMIC02-2

##### Ultra-Wide Band CPW to Substrate Integrated Waveguide (SIW) Transition Based on a U-Shaped Slot Antenna

G. Gentile, Delft University of  
Technology, Delft, Netherlands

#### EuMIC03-2

##### A 6-GS/s 6-Bit Time Interleaved SAR-ADC

H. Huang, M. Grözing, J. Digel, D.  
Ferenci, F. Lang, M. Berroth, University  
of Stuttgart, Stuttgart, Germany

#### EuMIC04-2

##### High Performance Transformer Based mm-Wave CMOS Power Amplifier

A. Hamidian<sup>1</sup>, A. Malignaggi<sup>1</sup>,  
G. Boeck<sup>1,2</sup>, <sup>1</sup>Berlin Institute of  
Technology, Berlin, Germany,  
<sup>2</sup>Ferdinand-Braun-Institut, Berlin,  
Germany

#### EuMIC01-3

##### A 60 GHz Wide Band Direct Downconversion Receiver in 40 nm CMOS

N. De Clercq, W. Dehaene,  
P. Reynaert, Katholieke Universiteit  
Leuven, Heverlee, Belgium

#### EuMIC02-3

##### Compact Ka Band Filter in 0.13 μm CMOS Using Broadside Coupled Coplanar Stripline

A. Taslimi, K. Mouthaan, National  
University of Singapore, Singapore,  
Singapore

#### EuMIC03-3

##### Optical Switching Matrix as Time Domain Demultiplexer in Photonic ADC

L. Pierno<sup>1</sup>, A. Bogoni<sup>2</sup>, A. Fiorello<sup>1</sup>,  
P. Ghelfi<sup>2</sup>, F. Laghezza<sup>2</sup>,  
<sup>1</sup>Selex Electronic Systems, Roma,  
Italy, <sup>2</sup>CNIT, Pisa, Italy

#### EuMIC04-3

##### A Compact 60GHz Power Amplifier Using Slow-Wave Transmission lines in 65nm CMOS

A. Larie<sup>1,2</sup>, E. Kerhervé<sup>2</sup>, B. Martineau<sup>1</sup>,  
D. Belot<sup>1</sup>, <sup>1</sup>STMicroelectronics, Crolles,  
France, <sup>2</sup>University of Bordeaux, Talence,  
France

#### EuMIC01-4

##### A CMOS 77 GHz Radar Receiver Front-end

H. V. Le<sup>1</sup>, H. T. Duong<sup>2</sup>, A. T. Huynh<sup>1</sup>,  
R. J. Evans<sup>2,1</sup>, E. Skafidas<sup>2,1</sup>, <sup>1</sup>National  
ICT Australia, Melbourne,  
Australia, <sup>2</sup>The University of Melbourne,  
Melbourne, Australia

#### EuMIC03-4

##### A Highly Linear Transimpedance Amplifier in InP Technology for Application in 100 Gbit/s Fiber Optical Data Communication

D. Ferenci<sup>1,2</sup>, M. Grözing<sup>1,2</sup>, M. Berroth<sup>1,2</sup>,  
R. Makon<sup>1,2</sup>, R. Driad<sup>1,2</sup>, J. Rosenzweig<sup>1,2</sup>,  
M. Schlechtweg<sup>1,2</sup>, <sup>1</sup>University of Stuttgart,  
Stuttgart, Germany, <sup>2</sup>Fraunhofer, Freiburg,  
Germany

#### EuMIC04-4

##### Design of a High Gain Power Amplifier for 77 GHz Radar Automotive Applications in 65-nm CMOS

H. T. Duong<sup>1</sup>, H. V. Le<sup>2</sup>, A. T. Huynh<sup>2</sup>, R. J.  
Evans<sup>1,2</sup>, E. Skafidas<sup>1,2</sup>, <sup>1</sup>The University  
of Melbourne, Melbourne, Australia,  
<sup>2</sup>National ICT Australia, Melbourne,  
Australia

#### EuMIC01-5

##### A Compact Sub-Harmonic Pumped Integrated 18 to 30GHz Balanced Image Reject Down Converter Based on E/D Mode PHEMT

H. T. Morkner, M/A-COM Technology  
Solutions, Lowell, United States

#### EuMIC03-5

##### A Viterbi Equalizer Chip for 40 Gb/s Optical Communication Links

T. Veigel, T. Alpert, F. Lang,  
M. Grözing, M. Berroth, University  
of Stuttgart, Stuttgart, Germany

#### EuMIC04-5

##### 133GHz CMOS Power Amplifier with 16dB Gain and +8dBm Saturated Output Power for Multi-Gigabit Communication

K. Katayama, M. Motoyoshi,  
K. Takano, L. Chen Yang,  
M. Fujishima, Hiroshima University,  
Higashi-Hiroshima, Japan

08:30h - 08:50h

08:50h - 09:10h

09:10h - 09:30h

09:30h - 09:50h

09:50h - 10:10h



## Helsinki

### EuMIC05

#### Novel Circuits for Millimetre-Wave Frequency Signal Generation and Transmission

Chair: Frank van den Bogaart, TNO  
Co-Chair: Ingmar Kallfass, University of Stuttgart

08:30h - 08:50h

#### **EuMIC05-1** **High Power SiGe E-Band Transmitter for Broadband Communication**

R. Ben Yishay, R. Carmon, O. Katz, B. Sheinman, D. Elad, R. Levinger, N. Mazor, IBM Haifa Research Lab, Haifa, Israel

08:50h - 09:10h

#### **EuMIC05-2** **Dual Band 18.5 Gbps Transmitter at 60 GHz and 80 GHz in 65 nm CMOS**

A. Rubin, E. Socher, Tel Aviv University, Tel Aviv, Israel

09:10h - 09:30h

#### **EuMIC05-3** **160-GHz SiGe-Based Transmitter and Receiver With Highly Directional Antennas in Package**

A. Hamidipour<sup>1</sup>, A. Fischer<sup>1,2</sup>, M. Jahn<sup>1</sup>, A. Stelzer<sup>1,2</sup>, <sup>1</sup>Johannes Kepler University of Linz, Linz, Austria, <sup>2</sup>Johannes Kepler University of Linz, Linz, Austria

09:30h - 09:50h

#### **EuMIC05-4** **A Single-Chip 15-32 GHz Signal Source in SiGe Bipolar Technology**

J. Nehring, I. Nasr, G. Fischer, R. Weigel, D. Kissinger, University of Erlangen-Nuremberg, Erlangen, Germany

09:50h - 10:10h

#### **EuMIC05-5** **A 50 to 100 GHz Frequency Synthesizer with 17 dB Side-Band Suppression Using a Single VCO Core**

I. Nasr, R. Weigel, D. Kissinger, University of Erlangen-Nuremberg, Erlangen, Germany



## St. Petersburg

### EuMIC06

#### EuMIC Opening Session

Chair: Manfred Berroth, EuMIC2013 Chair  
Co-Chair: Andreas Thiede, EuMIC2013 TPC Chair

10:40h - 10:50h

#### **Welcome Address**

#### **Opening of the European Microwave Integrated Circuits Conference 2013**

Manfred Berroth, EuMIC2013 Chair

10:50h - 11:35h

#### **Shaping Future RF Solutions**

Hermann Eul, Vice President, General Manager, Mobile and Communications Group, Intel, Santa Clara, USA

As mobile broadband technologies evolve, mobile devices need to support 2G, 3G, 4G LTE and WIFI technologies as well as navigation in the same device in order to provide the best possible data, voice and user experience. Data revenue increases and the huge data demand issues operators a challenge. The available non-congested spectrum is a rare resource and new frequency bands and aggregation of spectrum is focus topic in standardization while RF efficiency, coexistence and performance is getting more and more important.

The wireless industry faces the challenge of a broad product portfolio, which covers low cost handheld to high performance PC applications, frequencies from several MHz to 60 GHz, and the design challenges of monolithic integration. The key note is focusing on requirements for today's and tomorrow's RF solutions, and architectural breakthroughs which enable low cost high performance solutions and system end to end optimization.

11:35h - 12:20h

#### **From 1Tb per Carrier to 1THz. The Next Challenge**

Sorin Voinigescu, University of Toronto, Canada

During the last few years we have witnessed an exciting convergence of mm-wave, high-speed digital, antennas, and photonics components and techniques on a silicon die. This has been enabled by revolutionary SiGe (SOI) CMOS and BiCMOS technologies with ever increasing transistor cut-off frequencies. Is this trend going to continue? Are there any limitations in sight? The talk will provide a realistic overview of recent and expected progress in nanoscale silicon-based transistor technology and discuss the challenges that lie ahead in its application to THz sensing and to wireless and electro-optical systems for communication links at up to 1Tb/s per wavelength and per carrier. System architectures, antenna and silicon-photonics component integration approaches, and low-power serial 100+ Gb/s digital logic circuit topologies will be compared, and examples of proof-of-concept critical building blocks and entire transceivers in SOI CMOS and SiGe BiCMOS technologies will be given.

12:20h - 12:30h

#### **EuMIC Forecast**

Andreas Thiede, EuMIC2013 TPC Chair



## Riga

### EuMIC07

#### CMOS and BiCMOS ICs for Frequency Generation

Chair: Patrice Gamand, NXP  
Co-Chair: Giovanni Ghione, Politecnico di Torino, DET

13:50h - 14:10h

#### **EuMIC07-1** **A Transformer-Based Current-Reuse QVCO with a Capacitor Coupling Technique in 180 nm CMOS**

S. Ikeda, T. Kamimura, S. Lee, H. Ito, N. Ishihara, K. Masu, Tokyo Institute of Technology, Yokohama, Japan

14:10h - 14:30h

#### **EuMIC07-2** **Ku-Band High Output Power Multiphase Rotary Travelling-Wave VCO in SiGe BiCMOS**

K. T. Ansari, C. Plett, Carleton University, Ottawa, Canada

14:30h - 14:50h

#### **EuMIC07-3** **A Sub-harmonic Injection-locked Oscillator with Auto Aligned Multiple Pulse Injection**

K. Tsutsumi, M. Tsuru, E. Taniguchi, Mitsubishi Electric Corporation, 5-1-1, Ofuna Kamakura, Japan

14:50h - 15:10h

#### **EuMIC07-4** **High-Efficiency Low-Voltage 24 GHz VCO in 130nm CMOS for FMCW Radar Applications**

M. Hossain<sup>1,2</sup>, U. Pursche<sup>1,2</sup>, C. Melian<sup>2,1</sup>, W. Heinrich<sup>1,2</sup>, <sup>1</sup>Ferdinand-Braun-Institut (FBH), Leibniz-Institut für Höchstfrequenztechnik, Berlin, Germany, <sup>2</sup>Innovations for High Performance Microelectronics (IHP), Leibniz-Institut für Innovative Mikroelektronik, Frankfurt (Oder), Germany

15:10h - 15:30h

#### **EuMIC07-5** **A Constant-Current-Controlled Class-C VCO using a Self-Adjusting Replica Biasing Scheme**

T. Siriburanon, W. Deng, K. Okada, A. Matsuzawa, Tokyo Institute of Technology, Meguro, Japan





## Krakau

## Prag

## Budapest

## Helsinki

### EuMIC08

#### Focused Session - Sub-Millimeterwave Monolithic Integrated Circuits

Chair: Ingmar Kallfass,  
University of Stuttgart  
Co-Chair: Ehsan Afshari,  
Cornell University

### EuMIC09

#### mm-Wave Circuits

Chair: Frank van Vliet, TNO  
Co-Chair: Marc van Heijningen, TNO

### EuMIC10

#### Power Amplifier Integrated Circuits

Chair: Franco Giannini,  
Università di Roma Tor Vergata  
Co-Chair: Yevhen Yashchysyn,  
Warsaw University of Technology

### EuMIC11

#### Focused Session - High Frequency Technologies

Chair: Manfred Berroth,  
University of Stuttgart  
Co-Chair: Andreas Thiede,  
University of Paderborn

#### EuMIC08-1 A 115-155GHz Quadrature Up-Converting MMIC Mixer in InP DHBT Technology

S. Carpenter<sup>1</sup>, M. Abbasi<sup>2</sup>, H. Zirath<sup>1</sup>,  
<sup>1</sup>Chalmers University of Technology,  
Göteborg, Sweden, <sup>2</sup>gotmic AB,  
Göteborg, Sweden

#### EuMIC09-1 Compact 110-170 GHz Amplifier in 50 nm mHEMT Technology with 25 dB Gain

T. Merkle<sup>1</sup>, A. Leuther<sup>2</sup>, <sup>1</sup>Sony  
Deutschland GmbH, Stuttgart,  
Germany, <sup>2</sup>Fraunhofer Institute of  
Applied Solid State Physics (IAF),  
Freiburg, Germany

#### EuMIC10-1 A SiGe-Based High-Gain Power Amplifier for E-Band Communication Systems

M. Furqan, M. Jahn, A. Stelzer, Johannes  
Kepler University, Linz, Austria

#### EuMIC11-1 High Speed Technologies at Fraunhofer IAF

M. Mikulla<sup>1</sup>, A. Leuther<sup>1</sup>, P. Brückner<sup>1</sup>,  
D. Schwantuschke<sup>1</sup>, A. Tessmann<sup>1</sup>,  
M. Schlechtweg<sup>1</sup>, O. Ambacher<sup>1</sup>,  
M. Caris<sup>2</sup>, <sup>1</sup>Fraunhofer IAF, Freiburg,  
Germany, <sup>2</sup>Fraunhofer FHR, Wachtberg,  
Germany

#### EuMIC08-2 Progress Towards mW-Power Generation in CMOS THz Signal Sources

E. Afshari, R. Han, Cornell University,  
Ithaca, United States

#### EuMIC09-2 E-band Medium Power Amplifiers with Gain Control and Output Power Detector

A. Couturier<sup>1,2</sup>, E. Byk<sup>1,2</sup>, C. Auvinet<sup>1,2</sup>, S.  
Tranchant<sup>1,2</sup>, P. Auxemery<sup>1,2</sup>, M. Camiade<sup>1,2</sup>,  
C. Teyssandier<sup>1,2</sup>, M. Hosch<sup>2,1</sup>, H. Stieglauer<sup>2,1</sup>,  
<sup>1</sup>United Monolithic Semiconductors SAS,  
Villebon sur Yvette, France, <sup>2</sup>United Monolithic  
Semiconductors GmbH, Ulm, Germany

#### EuMIC10-2 A High-efficiency PA with Peak PAE of 32.9% and 12.7 dBm P1dB for 60 GHz Beamforming Applications in SiGe

S. Glisic, M. Elkhoully, C. Meliani, IHP,  
Frankfurt Oder, Germany

#### EuMIC11-2 High-Speed SiGe BiCMOS Technologies for Applications beyond 100 GHz

G. G. Fischer, B. Heinemann, M. Kaynak,  
H. Rücker, IHP, Frankfurt (Oder),  
Germany

#### EuMIC08-3 Subharmonic 245 GHz SiGe Receiver with Antenna

K. Schmalz<sup>1</sup>, J. Borngräber<sup>1</sup>, W. Debski<sup>2</sup>,  
W. Winkler<sup>2</sup>, R. Wang<sup>1</sup>, C. Meliani<sup>1</sup>,  
<sup>1</sup>IHP, Frankfurt (Oder), Germany, <sup>2</sup>Silicon  
Radar, Frankfurt (Oder), Germany

#### EuMIC09-3 An F-band Fundamental Mixer Using 75-nm InP HEMTs for Precise Spectrum Analysis

S. Shiba<sup>1,2</sup>, M. Sato<sup>1,2</sup>, H. Matsumura<sup>1,2</sup>,  
T. Takahashi<sup>1,2</sup>, T. Suzuki<sup>1,2</sup>, Y. Nakasha<sup>2,1</sup>,  
N. Hara<sup>1,2</sup>, <sup>1</sup>Fujitsu Limited, Atsugi,  
Japan, <sup>2</sup>Fujitsu Laboratories Ltd., Atsugi,  
Japan

#### EuMIC10-3 A Linear 4 W Power Amplifier at K-Band using 250 nm AlGaIn/GaN HEMTs

C. Friesicke<sup>1</sup>, R. Quay<sup>2</sup>, B. Rohrdantz<sup>1</sup>,  
A. F. Jacob<sup>1</sup>, <sup>1</sup>TU Hamburg-Harburg,  
Hamburg, Germany, <sup>2</sup>Fraunhofer  
Institute for Applied Solid-State Physics,  
Freiburg, Germany

#### EuMIC11-3 Enabling GaN High Speed Devices: Microwave Meets Power Electronics – and vice versa

J. Wuertl, Ferdinand-Braun-Institut,  
Berlin, Germany

#### EuMIC08-4 Signal Generation and Amplification Up to 600 GHz Using Metamorphic HEMT Technology

U. J. Lewark<sup>1</sup>, A. Tessmann<sup>2</sup>, A. Leuther<sup>2</sup>,  
I. Kallfass<sup>3</sup>, <sup>1</sup>Karlsruhe Institute of  
Technology (KIT), Karlsruhe, Germany,  
<sup>2</sup>Fraunhofer Institute of Applied Solid  
State Physics (IAF), Freiburg, Germany,  
<sup>3</sup>University of Stuttgart, Stuttgart,  
Germany

#### EuMIC09-4 Characterization of a DC to 40 GHz SPDT Switch Based on GaAs mHEMT Technology at Cryogenic Temperature

B. Baldischweiler, D. Bruch, I. Kallfass,  
M. Seelmann-Eggebert, A. Leuther, D.  
Peschel, M. Schlechtweg, O. Ambacher,  
Fraunhofer Institute for Applied Solid  
State Physics IAF, Freiburg, Germany

#### EuMIC10-4 A 20W Multi-Band Multi-Mode MMIC Power Amplifier for Base Station Applications

X. Moronval<sup>1</sup>, A. Déchansiaud<sup>1</sup>, R.  
Abdoelgafoer<sup>2</sup>, <sup>1</sup>NXP, Colomiers, France,  
<sup>2</sup>NXP, Nijmegen, Netherlands

#### EuMIC11-4 A GaN on SiC Process with High Power Density and Efficiency

R. Giofrè<sup>1</sup>, P. Colantonio<sup>1</sup>, F. Giannini<sup>1</sup>,  
A. Pantellini<sup>2</sup>, A. Nanni<sup>2</sup>, M. Dispensa<sup>2</sup>,  
C. Lanzieri<sup>2</sup>, <sup>1</sup>University of Roma Tor  
Vergata, Roma, Italy, <sup>2</sup>Selex ES, Roma,  
Italy

#### EuMIC09-5 An Asymmetrical 60-90 GHz Single-Pole Double Throw Switch MMIC

A. Dyskin<sup>1</sup>, N. Peleg<sup>1</sup>, S. Wagner<sup>2</sup>, D.  
Ritter<sup>1</sup>, I. Kallfass<sup>3</sup>, <sup>1</sup>Technion - Israel  
Institute of Technology, Haifa, Israel, <sup>2</sup>Fraun-  
hofer Institute for Applied Solid State  
Physics, Freiburg, Germany, <sup>3</sup>University  
of Stuttgart, Stuttgart, Germany

#### EuMIC10-5 Analog Compensation of AM-AM and AM-PM Effects for High-Efficiency Stacked-FET Power Amplifiers in 65-nm Standard CMOS

A. Zohny<sup>1</sup>, S. Leuschner<sup>2</sup>, J. Rascher<sup>1</sup>,  
S. Pinarello<sup>2</sup>, T. Ussmueller<sup>1</sup>, J. Mueller<sup>2</sup>, G.  
Fischer<sup>1</sup>, R. Weigel<sup>1</sup>, <sup>1</sup>Friedrich-Alexander-  
University Erlangen-Nuremberg, Erlangen,  
Germany, <sup>2</sup>Intel, Munich, Germany

#### EuMIC11-5 Individual Source Vias for GaN HEMT Power Bars

M. Mußer, F. van Raay, P. Brückner, W.  
Bronner, R. Quay, Fraunhofer Institute  
of Applied Solid-State Physics (IAF),  
Freiburg, Germany

13:50h - 14:10h

14:10h - 14:30h

14:30h - 14:50h

14:50h - 15:10h

15:10h - 15:30h



## Riga

## Prag

### EuMIC12

#### CMOS and SiGe Mixers, Phase Shifters, Attenuators and Circulators

Chair: Franz Dielacher, Infineon  
Co-Chair: Teresa Martin-Guerrero, University of Malaga

### EuMIC13

#### Sub-mm Wave MMICs: Technologies and Applications

Chair: Gilles Dambrine, IEMN-CNRS  
Co-Chair: Gottfried Magerl, TU Wien

16:00h - 16:20h

#### EuMIC12-1

##### Passive X-Band Double Balanced Mixer Utilizing Diode Connected SiGe HBTs

R. S. Michaelsen<sup>1,2</sup>, T. K. Johansen<sup>1</sup>, K. Tamborg<sup>2</sup>, V. Zhurbenko<sup>1</sup>, <sup>1</sup>Technical University of Denmark, Lyngby, Denmark, <sup>2</sup>Weibel Scientific, Allerød, Denmark

#### EuMIC13-1

##### Direct Quadrature Modulator MMIC for Future Terahertz Communications at 300 GHz

H. Song, J. Kim, K. Ajito, M. Yaita, N. Kukutsu, NTT Corporation, Atsugi, Japan

16:20h - 16:40h

#### EuMIC12-2

##### UWB Down-Conversion Mixer in CMOS 130 nm Technology for Wireless Sensor Network Applied to Aerospace Application

A. Kara-Omar<sup>1</sup>, D. Dragomirescu<sup>2,3</sup>, A. Coustou<sup>2,3</sup>, R. Plana<sup>2,3</sup>, <sup>1</sup>Centre de Développement des Satellites, Oran, Algeria, <sup>2</sup>Cnrs ; Laas, Toulouse, France, <sup>3</sup>Université de Toulouse, Toulouse, France

#### EuMIC13-2

##### Bow-Tie-Antenna-Coupled Terahertz Detectors using GaN/AlGaIn Field-Effect Transistors with 0.25 Micrometer Gate Length

M. Bauer<sup>1</sup>, A. Lisauskas<sup>1</sup>, S. Boppel<sup>1</sup>, M. Mundt<sup>1</sup>, V. Krozer<sup>1,2</sup>, H. G. Roskos<sup>1</sup>, S. Shevchenko<sup>2</sup>, J. Würfl<sup>2</sup>, W. Heinrich<sup>2</sup>, G. Tränkle<sup>2</sup>, <sup>1</sup>Johann Wolfgang Goethe Universität, Frankfurt am Main, Germany, <sup>2</sup>Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik, Berlin, Germany

16:40h - 17:00h

#### EuMIC12-3

##### A 0.75-2.67 GHz 5-bit Vector-Sum Phase Shifter

T. Yan, W. Lin, C. Kuo, National Chiao-Tung University, Hsinchu, Taiwan

#### EuMIC13-3

##### A 440 GHz Balanced Active Frequency Multiplier-by-Four SMMIC

U. J. Lewark<sup>1</sup>, H. Theveneau<sup>1</sup>, A. Tessmann<sup>2</sup>, H. Massler<sup>2</sup>, A. Leuther<sup>2</sup>, T. Zwick<sup>1</sup>, I. Kallfass<sup>3</sup>, <sup>1</sup>Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany, <sup>2</sup>Fraunhofer Institute of Applied Solid State Physics (IAF), Freiburg, Germany, <sup>3</sup>University of Stuttgart, Stuttgart, Germany

17:00h - 17:20h

#### EuMIC12-4

##### X-type Attenuator in CMOS with Novel Control Linearization, Very Low Phase Variations and Automatic Matching

J. Wagner, U. Mayer, M. Wickert, R. Wolf, N. Joram, A. Strobel, F. Ellinger, TU Dresden, Dresden, Germany

#### EuMIC13-4

##### A 243 GHz Low-Noise Amplifier Module for Use in Next-Generation Direct Detection Radiometers

A. Tessmann<sup>1</sup>, V. Hurm<sup>1</sup>, A. Leuther<sup>1</sup>, H. Massler<sup>1</sup>, R. Weber<sup>1</sup>, M. Kuri<sup>1</sup>, M. Riessle<sup>1</sup>, H. Stulz<sup>1</sup>, M. Zink<sup>1</sup>, M. Schlechtweg<sup>1</sup>, O. Ambacher<sup>1</sup>, T. Narhi<sup>2</sup>, <sup>1</sup>Fraunhofer IAF, Freiburg, Germany, <sup>2</sup>European Space Research and Technology Center (ESA/ESTEC), Noordwijk, Netherlands

17:20h - 17:40h

#### EuMIC12-5

##### Multi Octave Wideband CMOS Circulator using 0.11 um Process

S. Kim, Y. Kim, GIST, Gwangju, Republic of Korea

#### EuMIC13-5

##### Low Noise Amplifier Modules from 220-270 GHz

A. Fung<sup>1</sup>, T. Reck<sup>1</sup>, M. Varonen<sup>1</sup>, C. Lee<sup>1</sup>, M. Soria<sup>1</sup>, G. Chattopadhyay<sup>1</sup>, L. Samoska<sup>1</sup>, S. Sarkozy<sup>2</sup>, R. Lai<sup>2</sup>, <sup>1</sup>Jet Propulsion Laboratory, Pasadena, United States, <sup>2</sup>Northrop Grumman Corporation, Redondo Beach, United States



Budapest

Helsinki

**EuMIC14**

**Semiconductor Devices and Characterization**

Chair: Marc Rocchi, OMMIC  
Co-Chair: Herbert Zirath,  
Chalmers University

**EuMIC15**

**Silicon mm-Wave Circuits**

Chair: Michael Schlechtweg,  
Fraunhofer IAF  
Co-Chair: Tapani Närhi, ESA-ESTEC

**EuMIC14-1**  
**Triple Barrier Resonant Tunneling Diodes for Microwave Signal Generation and Detection**

G. Keller<sup>1</sup>, A. Tchegho<sup>1</sup>,  
B. Muenstermann<sup>1</sup>, W. Prost<sup>1</sup>,  
F. J. Tegude<sup>1</sup>, M. Suhara<sup>2</sup>, <sup>1</sup>University of  
Duisburg-Essen, Duisburg, Germany,  
<sup>2</sup>Tokyo Metropolitan University, Tokyo,  
Japan

**EuMIC15-1**  
**A 164 GHz Hetero-Integrated Source in InP-on-BiCMOS Technology**

T. Jensen<sup>1</sup>, T. Al-Sawaf<sup>1</sup>, M. Lisker<sup>2</sup>, S. Glisic<sup>2</sup>,  
M. Elkhoully<sup>2</sup>, T. Kraemer<sup>1</sup>, I. Ostermay<sup>1</sup>, C.  
Meliani<sup>2</sup>, B. Tillack<sup>2</sup>, V. Krozer<sup>1</sup>, W. Heinrich<sup>1</sup>,  
<sup>1</sup>Ferdinand-Braun-Institut, Leibniz  
-Institut für Höchstfrequenztechnik, Berlin,  
Germany, <sup>2</sup>IHP GmbH, Frankfurt (Oder),  
Germany

16:00h - 16:20h

**EuMIC14-2**  
**Electro-Thermal-Stress Analysis of A LDMOS FET Breakdown under High Power Microwave Pulses**

Z. Cheng<sup>1</sup>, W. Zhou<sup>1</sup>, L. Zhou<sup>1</sup>,  
W. Yin<sup>1,2</sup>, <sup>1</sup>Shanghai Jiao Tong  
University, Shanghai, China, <sup>2</sup>Zhejiang  
University, Hangzhou, China

**EuMIC15-2**  
**A SiGe:C BiCMOS 140 GHz Wideband Frequency Multiplier-by-8 with Differential Output**

S. Yuan, H. Schumacher, Ulm University,  
Ulm, Germany

16:20h - 16:40h

**EuMIC14-3**  
**Investigation of Gate and Drain Leakage Currents of AlGaIn/GaN HEMTs at Sub-threshold Regime for Temperature Range 300K – 400K**

M. Rzin<sup>1</sup>, A. Curutchet<sup>1</sup>, N. Labat<sup>1</sup>,  
N. Malbert<sup>1</sup>, L. Brunel<sup>2,1</sup>, B. Lambert<sup>2</sup>,  
<sup>1</sup>IMS laboratory, Talence, France, <sup>2</sup>UMS  
society, Villebon-sur-Yvette, France

**EuMIC15-3**  
**A 76-81 GHz Active Phase Shifter for Phased Array Automotive Radar in 65nm CMOS**

T. Shimura, Y. Ohashi, T. Ohshima,  
Fujitsu Laboratories Ltd., Kawasaki,  
Japan

16:40h - 17:00h

**EuMIC14-4**  
**Analysis of Barrier Inhomogeneities in AlGaIn/GaN HEMTs' Schottky Diodes by I-V-T measurements**

S. Karboyan<sup>1</sup>, J. Tartarin<sup>1</sup>, B. Lambert<sup>2</sup>,  
<sup>1</sup>LAAS - CNRS and University of  
Toulouse, Toulouse, France, <sup>2</sup>UMS,  
Villebon sur Yvette, France

**EuMIC15-4**  
**A Novel Millimeter-wave PLL Synthesizer with Cascaded Phase Detectors**

H. Matsumura<sup>1,2</sup>, Y. Kawano<sup>1</sup>, M.  
Sato<sup>1,2</sup>, T. Ohshima<sup>1,2</sup>, T. Shimura<sup>1,2</sup>, T.  
Suzuki<sup>1,2</sup>, Y. Ohashi<sup>1,2</sup>, N. Hara<sup>1</sup>, <sup>1</sup>Fujitsu  
Laboratories Ltd., Kanagawa, Japan,  
<sup>2</sup>Fujitsu Limited, Kanagawa, Japan

17:00h - 17:20h

**EuMIC15-5**  
**Analytical Study and Performance Comparison of mm-Wave CMOS LNAs**

A. Malignaggi<sup>1</sup>, A. Hamidian<sup>1</sup>, R.  
Shu<sup>1</sup>, M. K. Ali<sup>1</sup>, G. Boeck<sup>1,2</sup>, <sup>1</sup>Berlin  
Institute of Technology, Berlin,  
Germany, <sup>2</sup>Leibniz-Institut für  
Höchstfrequenztechnik, Berlin,  
Germany

17:20h - 17:40h

## EuMIC/EuMC Poster Session

Chair: Alexander Kölpin, University of Erlangen Nürnberg  
Co-Chair: Dietmar Kissinger, University of Erlangen Nürnberg

10:00h - 18:00h

The posters are on display from 10:00h - 18:00h

The authors are present for discussion from 10:00h – 11:00h, 12:15h – 14:00h and 15:15h – 16:15h



Exhibition Hall	Exhibition Hall	Exhibition Hall	Exhibition Hall
<p><b>EuMIC/EuMC Poster01-1</b> <b>Antenna Design and Characterization for a 61 GHz Transceiver in eWLB Package</b> M. Pourmousavi<sup>1</sup>, M. Wojnowski<sup>2</sup>, R. Agethen<sup>1</sup>, G. Sommer<sup>2</sup>, R. Weigel<sup>1</sup>, A. Hagelauer<sup>1</sup>, <sup>1</sup>University of Erlangen-Nuremberg, Erlangen, Germany, <sup>2</sup>Infineon Technologies, Neubiberg, Germany</p>	<p><b>EuMIC/EuMC Poster01-7</b> <b>A New Fail-Safe Switch for Fast Ethernet Networks with a Defined State In Case of DC-Power Loss: Design and Test</b> M. Balducci<sup>1,4</sup>, S. Schneele<sup>4</sup>, W. Fischer<sup>2</sup>, P. Klose<sup>2</sup>, R. Sorrentino<sup>3</sup>, V. Ziegler<sup>4</sup>, <sup>1</sup>University of Ulm, Ulm, Germany, <sup>2</sup>Airbus Deutschland, Hamburg, Germany, <sup>3</sup>University of Perugia, Perugia, Italy, <sup>4</sup>EADS Innovation Works, Munich, Germany</p>	<p><b>EuMIC/EuMC Poster01-13</b> <b>Extension of the Load-Line Theory by Investigating the Impact of the Knee-Voltage on Output-Power and Efficiency</b> S. Pinarello<sup>1,2</sup>, J. Mueller<sup>1</sup>, R. Weigel<sup>2</sup>, <sup>1</sup>Intel Mobile Communications, Neubiberg, Germany, <sup>2</sup>University of Erlangen-Nuremberg, Erlangen, Germany</p>	<p><b>EuMIC/EuMC Poster01-19</b> <b>Design Methodology for Distributed Power Amplifier in Software-Defined Radio Applications</b> D. Palombini, A. Bentini, M. Palomba, S. Dibello, E. Limiti, Università degli Studi di Roma «Tor Vergata», Rome, Italy</p>
<p><b>EuMIC/EuMC Poster01-2</b> <b>Transmission Lines on Flexible Substrates with Minimized Dispersion and Losses</b> H. Wolf, H. Gieser, L. Maurer, Fraunhofer EMFT, Munich, Germany</p>	<p><b>EuMIC/EuMC Poster01-8</b> <b>Resonant Substrate-Integrated Near-Field Sensors with Improved Sensitivity</b> N. Haase, A. F. Jacob, Technische Universität Hamburg-Harburg, Hamburg, Germany</p>	<p><b>EuMIC/EuMC Poster01-14</b> <b>High-Efficiency Power Amplifier MMICs in 100 nm GaN Technology at Ka-Band Frequencies</b> J. Chéron<sup>1</sup>, M. Campovecchio<sup>1</sup>, R. Quéré<sup>1</sup>, D. Schwantuschke<sup>2</sup>, R. Quay<sup>2</sup>, O. Ambacher<sup>2</sup>, <sup>1</sup>XLIM - UMR CNRS, Limoges, France, <sup>2</sup>Fraunhofer Institute for Applied Solid State Physics (IAF), Freiburg, Germany</p>	<p><b>EuMIC/EuMC Poster01-20</b> <b>Microwave Watt-Level Rectifiers for Power Recycling Applications</b> J. Xu<sup>1</sup>, W. Tai<sup>2</sup>, D. S. Ricketts<sup>1</sup>, <sup>1</sup>Massachusetts Institute of Technology, Cambridge, United States, <sup>2</sup>Carnegie Mellon University, Pittsburgh, United States</p>
<p><b>EuMIC/EuMC Poster01-3</b> <b>Liquid Crystal and Infrared Thermography on Coated SAW Devices</b> C. Huck<sup>1,2</sup>, H. P. Zidek<sup>2</sup>, T. Ebner<sup>2</sup>, K. C. Wagner<sup>2</sup>, A. Wixforth<sup>1</sup>, <sup>1</sup>University of Augsburg, Augsburg, Germany, <sup>2</sup>TDK Corporation / EPCOS AG, Munich, Germany</p>	<p><b>EuMIC/EuMC Poster01-9</b> <b>Terahertz Range Diode Based on Electron Field Emission of AlGaIn Microcathode</b> N. M. Goncharuk, V. V. Malyshko, V. A. Orehovskiy, RI Orion, Kiev, Ukraine</p>	<p><b>EuMIC/EuMC Poster01-15</b> <b>A Robust Ku-Band Low Noise Amplifier using an Industrial 0.25-um AlGaIn/GaN on SiC Process</b> D. Resca<sup>1</sup>, F. Scappaviva<sup>1</sup>, C. Florian<sup>2</sup>, S. Rochette<sup>3</sup>, J. Muraro<sup>3</sup>, V. Di Giacomo-Brunel<sup>4</sup>, C. Chang<sup>4</sup>, D. Baglieri<sup>4</sup>, <sup>1</sup>MEC srl, Bologna, Italy, <sup>2</sup>University of Bologna, Bologna, Italy, <sup>3</sup>TAS France, Toulouse, France, <sup>4</sup>UMS sas, Villebon-sur-Yvette, France</p>	<p><b>EuMIC/EuMC Poster01-21</b> <b>Efficiency Enhancement of an Envelope Tracking Power Amplifier Combining Supply Shaping and Dynamic Biasing</b> F. F. Tafuri<sup>1</sup>, D. Sira<sup>2</sup>, O. K. Jensen<sup>1</sup>, T. Larsen<sup>1</sup>, <sup>1</sup>Aalborg University, Aalborg, Denmark, <sup>2</sup>Intel Mobile Communications GmbH, Neubiberg, Germany</p>
<p><b>EuMIC/EuMC Poster01-4</b> <b>A Novel Method to Improve the Power Capabilities of Microwave Components</b> R. Wang<sup>1</sup>, Y. Li<sup>1</sup>, N. Zhang<sup>1</sup>, M. Ye<sup>2</sup>, Y. He<sup>2</sup>, W. Cui<sup>1</sup>, <sup>1</sup>China Academy of Space Technology (Xi'an), Xi'an, China, <sup>2</sup>Xi'an Jiaotong University, Xi'an, China</p>	<p><b>EuMIC/EuMC Poster01-10</b> <b>Flexible Polyethylene Terephthalate-Based Inkjet Printed CPW fed Monopole Antenna for 60 GHz ISM Applications</b> K. Hettak, Communications Research Center, Ottawa, Canada</p>	<p><b>EuMIC/EuMC Poster01-16</b> <b>Nonlinear Transistor Modeling for Industrial 0.25-μm AlGaIn-GaN HEMTs</b> C. Chang<sup>1</sup>, V. Di Giacomo-Brunel<sup>1</sup>, D. Floriot<sup>1</sup>, J. Grünenpütt<sup>2</sup>, M. Hosch<sup>2</sup>, H. Blanck<sup>2</sup>, <sup>1</sup>United Monolithic Semiconductors SAS, Villebon Sur Yvette, France, <sup>2</sup>United Monolithic Semiconductors GmbH, Ulm, Germany</p>	<p><b>EuMIC/EuMC Poster01-22</b> <b>Wideband High Efficiency Multi-Band, Multi-Mode (LTE/WCDMA/GSM) Power Amplifier for Mobile Terminals</b> J. C. Clifton<sup>1</sup>, A. Lawrenson<sup>1</sup>, H. Motoyama<sup>2</sup>, K. Kohama<sup>2</sup>, <sup>1</sup>Sony Europe Ltd, Basingstoke, United Kingdom, <sup>2</sup>Sony Corporation, Atsugi, Japan</p>
<p><b>EuMIC/EuMC Poster01-6</b> <b>Microwave Characterization of Ferroelectric Thin Films for Novel Compact Tunable BST Filters</b> R. De Paolis<sup>1,4</sup>, F. Coccetti<sup>1,4</sup>, S. Payan<sup>2</sup>, A. Rousseau<sup>2</sup>, M. Maglione<sup>2</sup>, G. Guegan<sup>3</sup>, <sup>1</sup>LAAS, Toulouse, France, <sup>2</sup>ICMCB, Pessac, France, <sup>3</sup>ST Microelectronics, Tours, France, <sup>4</sup>Univ de Toulouse, Toulouse, France</p>	<p><b>EuMIC/EuMC Poster01-11</b> <b>Pneumatically Switched Microwave and Antenna Structures</b> W. S. Rowe, X. Tang, RMIT University, Melbourne, Australia</p>	<p><b>EuMIC/EuMC Poster01-17</b> <b>A Novel Topology of Matching Network for Realizing Broadband High Efficiency Continuous Class-F Power Amplifiers</b> R. Tong, S. He, B. Zhang, Z. Jiang, X. Hou, University of Electronic Science and Technology of China, Chengdu, China</p>	<p><b>EuMIC/EuMC Poster01-23</b> <b>A Low Phase Noise Quadrature Ring Oscillator using 0.5 mm GaIn-on-Si HEMT</b> F. Huang, G. Lee, H. Chiu, Chang Gung University, Kwei-Shan, Taoyuan, Taiwan</p>
	<p><b>EuMIC/EuMC Poster01-12</b> <b>Towards a Large-Signal Noise Model for GaN HEMT Devices</b> M. Rudolph<sup>1,2</sup>, R. Doerner<sup>2</sup>, <sup>1</sup>Brandenburgische Technische Universität, Cottbus, Germany, <sup>2</sup>Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik, Berlin, Germany</p>	<p><b>EuMIC/EuMC Poster01-18</b> <b>A Simplified Procedure for the Design of Continuous Class-F Power Amplifiers</b> B. M. Merrick, J. B. King, T. J. Brazil, University College Dublin, Dublin, Ireland</p>	<p><b>EuMIC/EuMC Poster01-24</b> <b>Variable Gain Amplifier Architecture with Constant Matching and Insertion Phase</b> M. Palomba<sup>1</sup>, A. Bentini<sup>1</sup>, R. Cleriti<sup>1</sup>, E. Limiti<sup>1</sup>, M. Ferrari<sup>2</sup>, <sup>1</sup>Università degli Studi di Roma Tor Vergata, Rome, Italy, <sup>2</sup>Elettronica S.p.A., Rome, Italy</p>



**EuMIC/EuMC Poster Session**

Chair: Alexander Kölpin, University of Erlangen Nürnberg  
Co-Chair: Dietmar Kissinger, University of Erlangen Nürnberg



EuMIC  
2013

43<sup>rd</sup> EUROPEAN MICROWAVE CONFERENCE 2013

**10:00h - 18:00h**

The posters are on display from 10:00h - 18:00h

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**Exhibition Hall**

**EuMIC/EuMC Poster01-25**  
**A 159-169 GHz Frequency**  
**Source with 1.26 mW Peak**  
**Output Power in 65 nm**  
**CMOS**

B. Khamaisi, E. Socher, Tel-Aviv  
University, Tel-Aviv, Israel

**EuMIC/EuMC Poster01-26**  
**A Monolithic DC-70-GHz**  
**Broadband Distributed**  
**Amplifier Using 90-nm**  
**CMOS Process**

S. Chen, S. Weng, Y. Liu, H. Chang,  
National Central University, Jhongli,  
Taiwan

**EuMIC/EuMC Poster01-27**  
**Criteria for Maximum**  
**Spurious Free Dynamic**  
**Range of a Receiver**  
**System**

J. R. Magers, National Instruments,  
Santa Rosa, United States

**EuMIC/EuMC Poster01-28**  
**Integrated RF Tunable**  
**Filter Based on Recursive**  
**Architecture and its**  
**Application**

T. Omori<sup>1</sup>, S. Nishiuma<sup>1</sup>, K. Seo<sup>1</sup>, C. Ahn<sup>1</sup>,  
K. Hashimoto<sup>1</sup>, M. Kamada<sup>2</sup>  
<sup>1</sup>Chiba University, Inage-ku, Chiba,  
Japan, <sup>2</sup>Asahi Kasei Microdevices,  
Corp., Atsugi, Japan

**EuMIC/EuMC Poster01-29**  
**Concurrent Dual-band**  
**1-bit Digital Transmitter**  
**Using Band-Pass Delta-**  
**Sigma Modulator**

T. Maehata<sup>1</sup>, K. Totani<sup>1</sup>, N. Suematsu<sup>2</sup>,  
S. Kameda<sup>2</sup>, <sup>1</sup>Sumitomo Electric  
Industries, 1-1-3 Shimaya Konohana-  
ku, Japan, <sup>2</sup>Research Institute of  
Electrical Communication, 2-1-1  
Karahira,  
Aoba-ku, Japan

**EuMIC/EuMC Poster01-30**  
**Blind Nonlinear**  
**Compensation Technique**  
**for RF Receiver Front-End**

Y. Ma, Y. Yamao, the University of  
Electro-Communications, Tokyo, Japan

**Exhibition Hall**

**EuMIC/EuMC Poster01-31**  
**Design of a 24 GHz**  
**Analog Frontend for an**  
**Optically Powered RFID**  
**Transponder for the**  
**Integration into Metallic**  
**Components**

J. Meyer, Q. H. Dao, B. Geck, Leibniz  
Universität Hannover, Hannover,  
Germany

**EuMIC/EuMC Poster01-32**  
**Frequency Enhancement**  
**of a 40-nm CMOS Static**  
**Frequency Divider by**  
**Negative Capacitance**

V. E. Issakov<sup>1</sup>, G. Mangraviti<sup>1,2</sup>,  
V. Szortyka<sup>1,2</sup>, V. Vidojkovic<sup>1</sup>,  
G. Vandersteen<sup>2</sup>, P. Wambacq<sup>1,2</sup>,  
<sup>1</sup>IMEC, Leuven, Belgium, <sup>2</sup>Vrije  
Universiteit Brussel, Brussels, Belgium

**EuMIC/EuMC Poster01-33**  
**InP DHBT TIA-DMUX**  
**Integrated Circuit**  
**for 100-Gb/s Optical**  
**Communication Systems**

J. Y. Dupuy<sup>1</sup>, A. Konczykowska<sup>1</sup>, F. Jorge<sup>1</sup>,  
M. Riet<sup>1</sup>, P. Berdaguer<sup>1</sup>, V. Nodjiadjim<sup>1</sup>,  
J. Godin<sup>1</sup>, A. Ouslimani<sup>2</sup>, <sup>1</sup>Alcatel-Lucent  
Bell Labs, Marcoussis, France, <sup>2</sup>ENSEA,  
Cergy, France

**EuMIC/EuMC Poster01-34**  
**Design and Breakdown**  
**Behavior of 77 GHz**  
**Variable Gain Power**  
**Amplifiers in SiGe-**  
**Technology**

K. Borutta<sup>1</sup>, B. Laemmle<sup>1</sup>, C. Wagner<sup>2</sup>,  
L. Maurer<sup>2</sup>, D. Kissinger<sup>1</sup>, R. Weigel<sup>1</sup>,  
<sup>1</sup>Friedrich-Alexander-University,  
Erlangen, Germany, <sup>2</sup>Danube Integrated  
Circuit Engineering, Linz, Austria

**EuMIC/EuMC Poster01-35**  
**180 GHz Frequency**  
**Doubler in Transferred-**  
**Substrate InP HBT**  
**Technology with 4 dBm**  
**Output Power**

T. Jensen, T. Kraemer, V. Krozer,  
W. Heinrich, Ferdinand-Braun-  
Institut, Leibniz-Institut für  
Hochfrequenztechnik, Berlin,  
Germany

**Exhibition Hall**

**EuMIC/EuMC Poster01-36**  
**An Efficient SiGe Double-**  
**Balanced Mixer with a**  
**Differential Rat-Race**  
**Coupler**

H. J. Ng<sup>1</sup>, M. Jahn<sup>2</sup>, R. Feger<sup>1</sup>,  
C. Wagner<sup>3</sup>, A. Stelzer<sup>1,2</sup>,  
<sup>1</sup>Christian Doppler Laboratory for  
Integrated Radar Sensors, Johannes  
Kepler University, Linz, Austria,  
<sup>2</sup>Institute for Communications  
Engineering and RF-Systems, Johannes  
Kepler University, Linz, Austria, <sup>3</sup>Danube  
Integrated Circuit Engineering, Linz,  
Austria

**EuMIC/EuMC Poster01-37**  
**A 60-GHz High-Gain,**  
**Low-Power, 3.7-dB**  
**Noise-Figure Low-Noise**  
**Amplifier in 90-nm CMOS**

H. Kuo, H. Chuang, National Cheng  
Kung University, Tainan, Taiwan

**EuMIC/EuMC Poster01-38**  
**E-Band Receiver and**  
**Transmitter Modules With**  
**Simply Reflow-Soldered**  
**3-D WLCSP MMIC's**

K. Tsukashima<sup>1</sup>, M. Kubota<sup>1</sup>, O. Baba<sup>1</sup>,  
T. Kawasaki<sup>1</sup>, A. Yonamine<sup>1</sup>,  
T. Tokumitsu<sup>1</sup>, Y. Hasegawa<sup>2</sup>,  
<sup>1</sup>Sumitomo Electric Industries LTD,  
1, Taya-cho, Sakae-ku, Yokohama,  
Japan, <sup>2</sup>Sumitomo Electric Device  
Innovations Inc, 1000, Kamisukiawara,  
showa-cho, Nakakoma-gun, Japan

**EuMIC/EuMC Poster01-39**  
**An Improved Switched**  
**Injection-Locked**  
**Oscillator for Ranging and**  
**Communication Systems**

A. Esswein<sup>1</sup>, C. Carlowitz<sup>2</sup>, M. Vossiek<sup>2</sup>,  
R. Weigel<sup>1</sup>, T. Ussmueller<sup>1</sup>, <sup>1</sup>University  
of Erlangen-Nuremberg, Erlangen,  
Germany, <sup>2</sup>University of Erlangen-  
Nuremberg, Erlangen, Germany

**EuMIC/EuMC Poster01-40**  
**Next-Generation CMOS-**  
**on-Insulator Multi-**  
**Element Network For**  
**Broadband Antenna**  
**Tuning**

T. Ranta, R. Whatley, C. Cheng,  
M. Facchini, Peregrine Semiconductor  
Corp., San Diego, United States



## Helsinki

### EuMIC16

#### Advanced Transceiver Building Blocks

Chair: Shmuel Auster, Elta Systems Ltd.  
Co-Chair: Ingmar Kallfass, University of Stuttgart

## Neu-Delhi

### EuMIC17

#### Device Modeling and Simulation

Chair: Giorgio Vannini, University of Ferrara  
Co-Chair: Rüdiger Quay, Fraunhofer IAF

## Hongkong

### EuMC01

#### Bridging RFID and Nanotechnology

Chair: Luca Pierantoni, Università Politecnica delle Marche  
Co-Chair: Apostolos Georgiadis, Centre Tecnològic de Telecomunicacions de Catalunya

## St. Petersburg

### EuMC02

#### Novel Filter Geometries

Chair: Richard V. Snyder, RS Microwave Co, Inc.  
Co-Chair: Hadia El Hennawy, Ain Shams University

08:30h - 08:50h

#### **EuMIC16-1** **An Ultra-Wideband 15-35 GHz Phase-Shifter for Beamforming Applications**

S. P. Sah, D. Heo, Washington State University, Pullman, United States

#### **EuMIC17-1** **Modeling of InP HBTs in Transferred-Substrate Technology for Millimeter-Wave Applications**

T. K. Johansen<sup>1</sup>, M. Rudolph<sup>2,3</sup>, T. Jensen<sup>3</sup>, T. Kraemer<sup>3</sup>, N. Weimann<sup>3</sup>, F. Schnieder<sup>3</sup>, V. Krozer<sup>3</sup>, W. Heinrich<sup>3</sup>, <sup>1</sup>Technical University of Denmark, Kgs. Lyngby, Denmark, <sup>2</sup>Brandenburg University of Technology, Cottbus, Germany, <sup>3</sup>Ferdinand-Braun-Institut (FBH), Berlin, Germany

#### **EuMC01-1** **Design Rules for Innovative Nano-Rectennas in the Infrared Region**

M. Aldrigo<sup>1</sup>, D. Masotti<sup>1</sup>, A. Costanzo<sup>2</sup>, V. Rizzoli<sup>1</sup>, <sup>1</sup>University of Bologna, Bologna, Italy, <sup>2</sup>University of Bologna, Cesena, Italy

#### **EuMC02-1** **Comparison of Two Approaches for the Design of Microstrip Lossy Filters**

A. Basti<sup>1</sup>, S. Bila<sup>1</sup>, S. Verdeyme<sup>1</sup>, A. Perigaud<sup>1</sup>, H. Leblond<sup>3</sup>, L. Estagerie<sup>2</sup>, <sup>1</sup>Xlim umr cnrs, Limoges, France, <sup>2</sup>CNES, Toulouse, France, <sup>3</sup>Thales Alenia Space, Toulouse, France

08:50h - 09:10h

#### **EuMIC16-2** **A Low Phase Error X-band Eight-Channel SiGe PIN Diode Phased Array Receiver**

Y. You<sup>1</sup>, S. Zhu<sup>1</sup>, K. F. Warnick<sup>2</sup>, D. Heo<sup>1</sup>, <sup>1</sup>Washington State University, Pullman, United States, <sup>2</sup>Brigham Young University, Provo, United States

#### **EuMIC17-2** **A Fully Scalable Compact Small-Signal Modeling Approach for 100 nm AlGaIn/GaN HEMTs**

D. Schwantuschke<sup>1</sup>, M. Seelmann-Eggebert<sup>1</sup>, P. Brückner<sup>1</sup>, R. Quay<sup>1</sup>, M. Mikulla<sup>1</sup>, O. Ambacher<sup>1</sup>, I. Kallfass<sup>2</sup>, <sup>1</sup>Fraunhofer Institute for Applied Solid State Physics (IAF), Freiburg, Germany, <sup>2</sup>Universität Stuttgart, Stuttgart, Germany

#### **EuMC01-2** **Planar MOSFET Devices on Graphene Substrate Using Graphene Oxide Film as Gate Dielectric**

L. Valentini<sup>1</sup>, J. M. Kenny<sup>1</sup>, F. Alimenti<sup>2</sup>, L. Roselli<sup>2</sup>, <sup>1</sup>University of Perugia, Terni, Italy, <sup>2</sup>University of Perugia, Perugia, Italy

#### **EuMC02-2** **A Compact High Selectivity Dual-band Bandstop Filter Using Bent L-Resonators**

Y. Luo, Q. Chu, School of Electronic and Information Engineering, Guangzhou, China

09:10h - 09:30h

#### **EuMIC16-3** **Wideband VGA in 0.13-μm CMOS with Phase Reversal for 360° Vector-Sum Phase Shifters**

Z. Hu, K. Mouthaan, National University of Singapore, Singapore

#### **EuMIC17-3** **Integral Transform and State Modeling of 0.1 μm AlGaIn/GaN HEMTs for Pulsed-RF and CW Operation**

F. van Raay, R. Quay, M. Seelmann-Eggebert, Fraunhofer Institute of Applied Solid-State Physics, Freiburg, Germany

#### **EuMC01-3** **A Novel Inkjet Printed Carbon Nanotube-Based Chipless RFID Sensor for Gas Detection**

A. Vena<sup>1</sup>, L. Sydänheimo<sup>1</sup>, M. Tentzeris<sup>2</sup>, L. Ukkonen<sup>1</sup>, <sup>1</sup>Tampere University of Technology, Tampere, Finland, <sup>2</sup>Georgia Tech, Atlanta, United States

#### **EuMC02-3** **Substrate Integrated Waveguide Filters with Face-to-Face Broadside-Coupled Complementary Split Ring Resonators**

L. Huang<sup>1</sup>, I. D. Robertson<sup>1</sup>, N. Yuan<sup>2</sup>, <sup>1</sup>University of Leeds, Leeds, United Kingdom, <sup>2</sup>National University of Defense Technology, Changsha, China

09:30h - 09:50h

#### **EuMIC16-4** **Harmonic-Injection Divider Based on Feedback Through a Nonlinear Transmission Line**

F. Ramirez, A. Suarez, University of Cantabria, Santander, Spain

#### **EuMIC17-4** **A New Simulation Method for Nonlinear Characteristics of SAW Device**

R. Nakagawa, T. Suzuki, H. Shimizu, H. Kyoya, K. Nako, Murata Manufacturing Co., Ltd., Nagaokakyo, Japan

#### **EuMC01-4** **Monolithic Paper-Based & Inkjet-Printed Technology for Conformal Stepped-FMCW GPR Applications**

A. Traill<sup>1</sup>, A. Coustou<sup>1</sup>, H. Aubert<sup>1</sup>, S. Kim<sup>2</sup>, M. M. Tentzeris<sup>2</sup>, <sup>1</sup>CNRS, Toulouse, France, <sup>2</sup>Georgia Institute of Technology, Atlanta, United States

#### **EuMC02-4** **Substrate Integrated Waveguide Bandpass Filter with Novel Cascaded Complementary Electric-LC Resonators**

L. Huang<sup>1</sup>, I. D. Robertson<sup>1</sup>, N. Yuan<sup>2</sup>, <sup>1</sup>University of Leeds, Leeds, United Kingdom, <sup>2</sup>National University of Defense Technology, Changsha, China

09:50h - 10:10h

#### **EuMC01-5** **Novel Techniques for Performance Enhancement of Inkjet-Printed Graphene-Based Thin Films for Wireless Sensing Platform**

T. Le<sup>1</sup>, Z. Lin<sup>2</sup>, V. Lakafosis<sup>1</sup>, Y. Fang<sup>2</sup>, C. Wong<sup>2</sup>, M. Tentzeris<sup>1</sup>, <sup>1</sup>Georgia Institute of Technology, Atlanta, United States, <sup>2</sup>Georgia Institute of Technology, Atlanta, United States

#### **EuMC02-5** **A Novel Bandstop Filter Design with CPW-Fed Microstrip Square Loop Resonator**

E. Gunturkun<sup>1</sup>, A. Gorur<sup>1</sup>, C. Karpuz<sup>1,2</sup>, <sup>1</sup>Nigde University, Nigde, Turkey, <sup>2</sup>Pamukkale University, Denizli, Turkey

Stockholm

Kiew

Riga

Istanbul

**EuMC03**

**Integrated and Millimeter Wave Antennas 1**

Chair: Christian Waldschmidt, University Ulm  
Co-Chair: Bart Smolders, Technische Universiteit Eindhoven

**EuMC/EuMIC01**

**Switch-Mode Power Amplifiers**

Chair: Marc van Heijningen, TNO  
Co-Chair: Denis Barataud, XLIM

**EuMC/EuMIC02**

**RF MEMS Based Components**

Chair: Larissa Vietzorreck, TU Munich  
Co-Chair: Lluis Pradell, Polytech. University of Catalonia

**EuMC/EuMIC03**

**Ferroelectric Materials and Modeling**

Chair: Francisco Medina, University of Seville  
Co-Chair: Rolf Jakoby, TU Darmstadt

**EuMC03-1  
Via-Fence Antennas on LTCC for Radar Applications at 122 GHz**

C. Heine, S. Beer, C. Rusch, T. Zwick, Karlsruhe Institute of Technology, Karlsruhe, Germany

**EuMC/EuMIC01-1  
Concurrent Dual-Band High Efficiency Class-E Power Amplifier**

F. Norouzian, P. Gardner, University of Birmingham, Birmingham, United Kingdom

**EuMC/EuMIC02-1  
High Power GaN Monolithically Integrated RF MEMS Switches**

A. M. Mahmoud Mohamed<sup>1</sup>, I. Zine-El-Abidine<sup>2</sup>, S. Boumaiza<sup>1</sup>, R. Mansour<sup>1</sup>,  
<sup>1</sup>University of Waterloo, Waterloo, Canada, <sup>2</sup>CMC Microsystems Canada, Kingston, Canada

**EuMC/EuMIC03-1  
Tunable FBARs Based on Sol-Gel Grown PMN-PT Films**

A. Vorobiev<sup>1</sup>, S. Gevorgian<sup>1</sup>, M. Spreitzer<sup>2</sup>, A. Veber<sup>2</sup>, D. Suvorov<sup>2</sup>,  
<sup>1</sup>Chalmers University of Technology, Gothenburg, Sweden, <sup>2</sup>Jozef Stefan Institute, Ljubljana, Slovenia

**EuMC03-2  
A 79-GHz LTCC Microstrip Half-Grid Array Antenna Using a Laminated Waveguide Feed**

X. Wang, Z. Tong, A. Stelzer, Johannes Kepler University of Linz, Linz, Austria

**EuMC/EuMIC01-2  
Wideband Class-E Power Amplifier Covering the Whole UHF Broadcast Band**

J. Zhou<sup>1</sup>, K. Morris<sup>1</sup>, G. Watkins<sup>2</sup>, K. Yamaguchi<sup>3</sup>, <sup>1</sup>University of Bristol, Bristol, United Kingdom, <sup>2</sup>Toshiba Research Europe Limited, Bristol, United Kingdom, <sup>3</sup>Toshiba Corporation, Kawasaki, Japan

**EuMC/EuMIC02-2  
Characterization of High-Q Laterally Moving RF MEMS Tunable Capacitor**

U. Shah, J. Oberhammer, KTH Royal Institute of Technology, Stockholm, Sweden

**EuMC/EuMIC03-2  
Loss Balance in Tunable Ferroelectric FBARs**

S. Gevorgian, A. Vorobiev, Chalmers University, Gothenburg, Sweden

**EuMC03-3  
End-fire Antenna-in-package Solution for Millimeter-wave Applications in a Teflon-based PCB Technology**

A. Enayati<sup>1</sup>, W. D. Raedt<sup>1</sup>, G. A. Vandenbosch<sup>2</sup>, <sup>1</sup>IMEC, Leuven, Belgium, <sup>2</sup>KU Leuven, Leuven, Belgium

**EuMC/EuMIC01-3  
Statistical Harmonic Load Termination Analysis of Switch-Mode Power Amplifiers Employing Bandpass-Pulse-Length Modulation**

S. Krause<sup>1</sup>, S. Maroldt<sup>1</sup>, C. Zech<sup>1</sup>, R. Quay<sup>1</sup>, K. Blau<sup>2</sup>, M. A. Hein<sup>2</sup>, <sup>1</sup>Fraunhofer Institute for Applied Solid State Physics, Freiburg im Breisgau, Germany, <sup>2</sup>Ilmenau University of Technology, Ilmenau, Germany

**EuMC/EuMIC02-3  
High Capacitance Ratio RF MEMS Dielectric-Less Switched Capacitor**

M. Fall<sup>1</sup>, S. Fouladi<sup>2</sup>, F. Domingue<sup>1</sup>, C. Dieppedale<sup>3</sup>, B. Reig<sup>3</sup>, R. R. Mansour<sup>2</sup>,  
<sup>1</sup>Université du Québec à Trois-rivières, Trois-rivières, Canada, <sup>2</sup>University of Waterloo, Waterloo, Canada, <sup>3</sup>Commissariat à l'énergie atomique et aux énergies alternatives, Grenoble, France

**EuMC/EuMIC03-3  
Lateral Mode Intrinsically Switchable Barium Titanate Film Bulk Acoustic Wave Resonators**

V. Lee<sup>1</sup>, S. A. Sis<sup>1</sup>, S. Lee<sup>1</sup>, X. Zhu<sup>2</sup>, A. Mortazawi<sup>1</sup>, <sup>1</sup>University of Michigan, Ann Arbor, United States, <sup>2</sup>Shanghai Jiao Tong University, Shanghai, China

**EuMC03-4  
On-Chip Integrated Antennas on Ultra-Thin and on High-Impedance Si Substrate**

H. Yordanov<sup>1</sup>, E. Angelopoulos<sup>2</sup>, <sup>1</sup>Technical University Sofia, Sofia, Bulgaria, <sup>2</sup>Institut für Mikroelektronik Stuttgart, Stuttgart, Germany

**EuMC/EuMIC01-4  
Supply Modulator for Envelope-Tracking Operation of Dual-Mode Handset Power Amplifier**

J. Kim<sup>1</sup>, Y. Cho<sup>2</sup>, D. Kim<sup>1</sup>, D. Kang<sup>3</sup>, B. Park<sup>2</sup>, K. Moon<sup>1</sup>, B. Kim<sup>1</sup>, <sup>1</sup>Postech, Pohang, Republic of Korea, <sup>2</sup>Postech, Pohang, Republic of Korea, <sup>3</sup>Broadcom corporation, Maitland, United States

**EuMC/EuMIC02-4  
A Novel Self Collapsed Corrugated MEMS Phase Shifter**

M. Bakri-Kassem<sup>1</sup>, R. Mansour<sup>2</sup>,  
<sup>1</sup>American University in Sharjah, Sharjah, United Arab Emirates, <sup>2</sup>University of Waterloo, Waterloo, Canada

**EuMC/EuMIC03-4  
Thick-Film Barium-Strontium-Titanate Varactors for RF Power Transistors**

A. Wiens<sup>1</sup>, O. Bengtsson<sup>2</sup>, H. Maune<sup>1</sup>, M. Sazegar<sup>1</sup>, W. Heinrich<sup>2</sup>, R. Jakoby<sup>1</sup>,  
<sup>1</sup>Technische Universität Darmstadt, Darmstadt, Germany, <sup>2</sup>Leibniz-Institut für Höchstfrequenztechnik, Berlin, Germany

**EuMC03-5  
Antennas in Package With Stacked Metallization**

A. Hamidipour<sup>1</sup>, A. Fischer<sup>1,2</sup>, L. Maurer<sup>4</sup>, W. Hartner<sup>3</sup>, A. Stelzer<sup>1,2</sup>, <sup>1</sup>Johannes Kepler University of Linz, Linz, Austria, <sup>2</sup>Johannes Kepler University of Linz, Linz, Austria, <sup>3</sup>Infineon Technologies AG, Regensburg, Germany, <sup>4</sup>Universität der Bundeswehr, Munich, Germany

**EuMC/EuMIC02-5  
Reliability of Nanocrystalline Diamond MEMS Capacitive Switches**

L. Michalas<sup>1</sup>, S. Saada<sup>2</sup>, M. Koutsourelis<sup>1</sup>, C. Mer<sup>2</sup>, A. Leuliet<sup>3</sup>, P. Martins<sup>3</sup>, S. Bansropun<sup>3</sup>, G. Papaioannou<sup>1</sup>, P. Bergonzo<sup>2</sup>, A. Ziaei<sup>3</sup>,  
<sup>1</sup>National Kapodistrian University of Athens, Athens, Greece, <sup>2</sup>Cea - List, Gif-sur-Yvette, Paris, France, <sup>3</sup>Thales Research and Technology, Palaiseau, Paris, France

**EuMC/EuMIC03-5  
A Simple Nonlinear mBVD Model Parameter Extraction Method for Intrinsically Switchable Ferroelectric FBARs**

S. Lee, V. Lee, S. A. Sis, A. Mortazawi, University of Michigan, Ann Arbor, United States

08:30h - 08:50h

08:50h - 09:10h

09:10h - 09:30h

09:30h - 09:50h

09:50h - 10:10h

TUESDAY



## Kopenhagen

### EuMC/EuMIC04

#### Nonlinear Device Characterisation

Chair: Dominique Schreurs, KU Leuven  
Co-Chair: Johannes Benedikt, Cardiff University

08:30h - 08:50h

#### EuMC/EuMIC04-1 Benefits and Validation of 4-Dummies De-embedding Method for Characterisation of SiGe HBT in G-band

M. Deng<sup>1</sup>, D. Gloria<sup>2</sup>, N. Derrier<sup>2</sup>, P. Chevalier<sup>2</sup>, S. Lepilliet<sup>1</sup>, F. Danneville<sup>1</sup>, G. Dambrine<sup>1</sup>, <sup>1</sup>IEMN, Villeneuve-d'Ascq, France, <sup>2</sup>STMicroelectronics, Crolles, France

08:50h - 09:10h

#### EuMC/EuMIC04-2 On High Resolution, Pulse-Profiled mm-Wave Intermodulation Measurements

J. Martens, Anritsu, Morgan Hill, United States

09:10h - 09:30h

#### EuMC/EuMIC04-3 Low Cost AM/AM and AM/PM Characterisation Setup Based on Scalar Measurements

R. Danieli, L. Piazzon, R. Giofrè, P. Colantonio, F. Giannini, University of Roma Tor Vergata, Rome, Italy

09:30h - 09:50h

#### EuMC/EuMIC04-4 94-GHz Load Pull Measurements of SiGe HBT by Extracting Output Power Density in W-Band

I. Hasnaoui<sup>1</sup>, E. Canderle<sup>2</sup>, P. Chevalier<sup>2</sup>, D. Gloria<sup>1</sup>, C. Gaquiere<sup>5</sup>, <sup>1</sup>Institut d'électronique de microélectronique et de nanotechnologie, Villeneuve d'ascq, France, <sup>2</sup>STMicroelectronics, Crolles, France, <sup>3</sup>STMicroelectronics, Crolles, France, <sup>4</sup>Institut d'électronique de microélectronique et de nanotechnologie, Villeneuve d'ascq, France

09:50h - 10:10h

#### EuMC/EuMIC04-5 Nonlinear Charge Trapping Effects on Pulsed I/V Characteristics of GaN FETs

A. Santarelli<sup>1</sup>, R. Cignani<sup>1</sup>, G. Gibiino<sup>1,2</sup>, D. Niessen<sup>1</sup>, P. Traverso<sup>1</sup>, C. Florian<sup>1</sup>, C. Lanzieri<sup>3</sup>, A. Nanni<sup>3</sup>, D. Schreurs<sup>2</sup>, F. Filicori<sup>1</sup>, <sup>1</sup>Univ. of Bologna, Bologna, Italy, <sup>2</sup>KU Leuven, Leuven, Belgium, <sup>3</sup>Selex ES, Roma, Italy

## Tokio

### EuMW01

#### EuMW/EuMC Opening Session

Chair: Robert Weigel, EuMW2013 General Chair  
Co-Chair: Lorenz-Peter Schmidt, EuMC2013 Chair  
Co-Chair: Alexander Yarovoy, EuMA Awards Chair

10:40h - 11:10h

#### Welcome Addresses

#### Opening of the European Microwave Week 2013

Robert Weigel, EuMW2013 General Chair

#### EuMA Welcome Address

Wolfgang Heinrich, EuMA President

#### Opening of the European Microwave Conference 2013

Lorenz-Peter Schmidt, EuMC2013 Chair

#### Greetings from IEEE

Peter Staecker, IEEE President

#### Greetings from IEEE MTT-S

Madhu Gupta, IEEE MTT-S President

11:10h - 11:45h

#### Overall Trends in the Semiconductor Industry and How Infineon will Shape the RF World

Reinhard Ploss, Chief Executive Officer, Infineon Technologies, Munich, Germany

RF is a key enabler for a connected and smart world. Demand for easy to use solutions is increasing and essential for fast growth of new applications. Infineon has a long and successful history in RF in general but also specific, which is shown in new applications with innovative products providing leading cost-performance. A broad range of RF technologies combined with advanced packaging concepts and advanced design methodologies are the base, while the "product to system" concept is the way to achieving high-end system performance with simplified PCB-Design and assembly processes.

11:45h - 12:05h

#### Awards Ceremony

Chair: Alexander Yarovoy, EuMA Awards Chair

#### EuMA Distinguished Service Award

#### EuMA Outstanding Career Award

12:05h - 12:40h

#### The Impact of Radar Sensors on Driver Assistance Systems - Today and Tomorrow

Ralf G. Herrtwich, Director Driver Assistance and Chassis Systems, Group Research and Advanced Engineering, Daimler, Böblingen, Germany

Radars have become key sensors for implementing driver assistance systems in modern vehicles; from advanced cruise control to blind spot monitoring, today's range of driver support is unthinkable without the underlying environment perception achieved with radar. Increasingly, radar is used in combination with other sensors such as cameras or laser scanners - both to leverage the complementary capabilities of these sensors and to achieve redundancy to compensate for their individual shortfalls. Any argument whether one of these sensor technologies will eventually make the others obsolete seems quite misguided: advances in one sensor technology only seem to spur the next round of innovation for the others - and in combination this leads to ever improving reconstruction capabilities for the vehicle environment. This holds particularly true for radar as new frequencies and bandwidths get allocated and signal processing capabilities advance at a rapid pace. All this is desperately needed as vehicle manufacturers worldwide prepare for unleashing the next round of innovations in the driver assistance space: self-driving vehicles. In this talk, we focus on the role of radar in comparison to other vehicle sensors in today's driver assistance systems and explain the role of future radar capabilities to enable autonomous driving.

12:40h - 12:50h

#### EuMC2013 Forecast

Thomas Zwick, EuMC2013 TPC Chair





## Istanbul

### EuMIC18

#### CMOS Transceiver Circuits

Chair: Richard Ranson,  
Radio System Design Ltd  
Co-Chair: Shmuel Auster,  
Elta Systems Ltd.

## Helsinki

### EuMIC19

#### MEMS and FBAR Tunable Devices

Chair: Hans Hartnagel, TU Darmstadt  
Co-Chair: Larissa Vietzoreck,  
TU München

## Kopenhagen

### EuMC04

#### Novel Measurement Techniques and Evaluation

Chair: Peter Zwamborn, TNO and TU/e  
Co-Chair: Johannes Benedikt,  
Cardiff University

## Stockholm

### EuMC05

#### Integrated and Millimeter Wave Antennas 2

Chair: Jozef Modelski,  
Warsaw University of Technology  
Co-Chair: Hendrik Rogier,  
Universiteit Gent

#### EuMIC18-1

##### A 5Gb/s F-band ASK Transmitter in 45nm LP CMOS

N. Defern<sup>1</sup>, J. F. Osorio<sup>2</sup>, A. de Graauw<sup>2</sup>,  
P. Reynaert<sup>1</sup>, <sup>1</sup>KU Leuven, Leuven,  
Belgium, <sup>2</sup>NXP Semiconductors,  
Eindhoven, Netherlands

#### EuMIC19-1

##### High-Q 3D Tunable RF MEMS Filter with a Constant Fractional Bandwidth

R. Stefanini<sup>2</sup>, A. Pothier<sup>1</sup>, M. Chatras<sup>1</sup>,  
P. Blondy<sup>1</sup>, <sup>1</sup>XLIM, Limoges, France,  
<sup>2</sup>AirMems, Limoges, France

#### EuMC04-1

##### A Novel Factor Verification Technique for One-Port Vector Network Analyzer

A. A. Savin, Tomsk State University of  
Control Systems and Radio Electronics,  
Tomsk, Russian Federation

#### EuMC05-1

##### Scanning Capability of Reconfigurable Plasma Reflector Antenna

M. T. Jusoh<sup>1,2</sup>, O. Lafond<sup>1</sup>, F. Colombel<sup>1</sup>,  
M. Himdi<sup>1</sup>, <sup>1</sup>Université de Rennes  
1, Rennes, France, <sup>2</sup>National Defence  
University of Malaysia (NDUM), Kuala  
Lumpur, Malaysia

#### EuMIC18-2

##### A 60-GHz CMOS Direct-Conversion Transmitter with Injection-Locking I/Q Calibration

S. Kondo, T. Yamaguchi, Y. Tsukui,  
R. Minami, Y. Takeuchi, A. Musa,  
K. Okada, A. Matsuzawa, Tokyo  
Institute of Technology, Meguro-ku,  
Japan

#### EuMIC19-2

##### Electrical Tuning of Dielectric Resonators with LIGA-MEMS

C. Rusch<sup>1</sup>, M. Börner<sup>1</sup>, J. Mohr<sup>1</sup>, T.  
Zwick<sup>1</sup>, Y. Chen<sup>2</sup>, H. J. De Los Santos<sup>3</sup>,  
<sup>1</sup>Karlsruhe Institute of Technology,  
Karlsruhe, Germany, <sup>2</sup>Christian-  
Albrechts-Universität zu Kiel, Kiel,  
Germany, <sup>3</sup>NanoMEMS Research,  
Irvine, United States

#### EuMC04-2

##### Comparative Analysis of Linear Six-Port Receiver Calibration Techniques

A. Hasan, M. Helaoui, University of  
Calgary, Calgary, Canada

#### EuMC05-2

##### Multibeam Antenna Array for RFID Applications

L. Weisgerber, A. E. Popugaeu,  
Fraunhofer Institute for Integrated  
Circuits, Erlangen, Germany

#### EuMIC18-3

##### A 2.4-μA 868-MHz Low Latency Wake-Up Receiver for Strong Interference Channels

H. Milosiu<sup>1</sup>, F. Oehler<sup>1</sup>, R. Weigel<sup>2</sup>,  
<sup>1</sup>Fraunhofer IIS, Erlangen, Germany,  
<sup>2</sup>University of Erlangen-Nuremberg,  
Erlangen, Germany

#### EuMIC19-3

##### A Widely Tunable Filter Configuration Composed of High Q RF Resonators and Variable Capacitors

M. Inaba, K. Hashimoto, T. Omori, C.  
Ahn, Chiba University, Chiba, Japan

#### EuMC04-3

##### Differential Impedance Measurement Method of RFID Transponder Chips at UHF

M. Frank<sup>1,2</sup>, M. Ferndahl<sup>2</sup>, M. Thorsell<sup>2</sup>,  
P. Enoksson<sup>2</sup>, <sup>1</sup>Sato Techno Lab Europe  
AB, Göteborg, Sweden, <sup>2</sup>Chalmers  
University of Technology, Göteborg,  
Sweden

#### EuMC05-3

##### Effect of Sewing Types on Flexible Embroidery Antennas in UHF Band

Y. Huang, Temasek Laboratory,  
Singapore, Singapore

#### EuMIC18-4

##### Frequency-Tunable Antenna by Input-Impedance-Tunable CMOS RF-Frontend

N. Haider<sup>1</sup>, M. S. Oude Alink<sup>2</sup>,  
D. Caratelli<sup>1</sup>, E. A. Klumperink<sup>2</sup>,  
A. G. Yarovoy<sup>1</sup>, <sup>1</sup>Delft University  
of Technology, Delft, Netherlands,  
<sup>2</sup>University of Twente, Enschede,  
Netherlands

#### EuMIC19-4

##### RF MEMS Variable Matching Networks for Multi-Band and Multi-Mode GaN Power Amplifiers

S. A. Figur<sup>1</sup>, F. van Raay<sup>2</sup>, R. Quay<sup>2</sup>,  
L. Vietzoreck<sup>3</sup>, V. Ziegler<sup>1</sup>, <sup>1</sup>EADS  
Deutschland GmbH, Munich, Germany,  
<sup>2</sup>Fraunhofer Institute of Applied Solid-State  
Physics (IAF), Freiburg, Germany, <sup>3</sup>TU  
München, Munich, Germany

#### EuMC04-4

##### Evaluation of a Microwave Based Contact-Free Testing Method for Mechanical Sensitivity Analysis of MEMS for Inline Integration of On-Wafer Measurements

F. Oesterle, M. Gardill, R. Weigel,  
A. Koelpin, University of Erlangen-  
Nuremberg, Erlangen, Germany

#### EuMC05-4

##### Comparison of Models for Multiple Nonlinear Power Amplifiers in Active Antenna Arrays

J. Dooley, K. Finnerty, R. Farrell,  
National University of Ireland  
Maynooth, Maynooth, Ireland

#### EuMIC19-5

##### Reconfigurable Multimodal Bandpass Filter Based on RF-MEMS Switchable CPW Air-Bridges

A. Contreras<sup>1</sup>, L. Pradell<sup>1</sup>, J. Casals-Terré<sup>1</sup>,  
F. Giacomozzi<sup>2</sup>, J. Iannacci<sup>2</sup>, M. Ribó<sup>3</sup>,  
<sup>1</sup>Technical University of Catalonia (UPC),  
Barcelona, Spain, <sup>2</sup>Fondazione Bruno  
Kessler (FBK), Povo, Italy, <sup>3</sup>La Salle –  
Ramon Llull University, Barcelona, Spain

#### EuMC04-5

##### In-Situ Measurement of Dielectric Material Properties: Perspectives for Integrated Digitally Calibrated Built-In-Self-Sensor Solutions

L. Leyssenne<sup>1</sup>, S. Wane<sup>2</sup>, R. Coq  
Germanicus<sup>1</sup>, P. Descamps<sup>1</sup>, D. Pasquet<sup>1</sup>,  
<sup>1</sup>LaMIPS Laboratory, Colombelles,  
France, <sup>2</sup>NXP Semiconductors,  
Colombelles, France

#### EuMC05-5

##### Differentially Fed Multilayer Antennas with Harmonic Filtering for Push-pull Class B Power Amplifier Integration

F. Zubir<sup>1,2</sup>, P. Gardner<sup>1</sup>, <sup>1</sup>University of  
Birmingham, Birmingham, United  
Kingdom, <sup>2</sup>Universiti Teknologi  
Malaysia, Johor Bahru, Malaysia

13:50h - 14:10h

14:10h - 14:30h

14:30h - 14:50h

14:50h - 15:10h

15:10h - 15:30h

TUESDAY

## Neu-Delhi

### EuMC06

**Electromagnetic Simulation and its Impact on Microwave Design - Special Session to Honour Ingo Wolff on the Occasion of his 75th Birthday**  
Chair: Wolfgang Heinrich, Ferdinand-Braun-Institut (FBH)  
Co-Chair: Marian Pospieszalski, University of Virginia

**EuMC06-1 Efficient Electromagnetic Field Simulation of Large and Complex Systems**  
I. Wolff, IMST, Kamp-Lintfort, Germany

**EuMC06-2 FD-TD Method After Two Decades of Fast Development**  
W. Gwarek, QWED Sp. z o.o., Warsaw, Poland

**EuMC06-3 A Brief History of Applied Planar Electromagnetic Analysis**  
J. C. Rautio, Sonnet Software, North Syracuse, United States

**EuMC06-4 Design Approaches for Automotive Radar Antennas**  
W. Menzel, Ulm University, Ulm, Germany

## Singapur

### EuMC07

**Advanced RF Interconnect Technologies**  
Chair: Alexander Kölpin, University of Erlangen Nürnberg  
Co-Chair: Mario Pauli, Karlsruhe Institute of Technology

**EuMC07-1 Integrated Passive Device Process for High Quality Factor Passive Components and Modules**  
T. Vähä-Heikkilä, J. Sajjets, P. Rantakari, H. Ronkainen, R. Tuovinen, J. Holmberg, VTT Technical Research Centre of Finland, Espoo, Finland

**EuMC07-2 Broad Frequency LTCC Vertical Interconnect Transition for MultiChip Modules and System On Package Applications**  
E. Decrossas<sup>1,2</sup>, M. D. Glover<sup>3</sup>, K. Porter<sup>2</sup>, T. Cannon<sup>2</sup>, H. A. Mantooth<sup>2</sup>, M. C. Hamilton<sup>3</sup>, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, United States, <sup>2</sup>University of Arkansas, Fayetteville, United States, <sup>3</sup>Auburn University, Auburn, United States

**EuMC07-3 Low-Loss Millimeter-Wave Power Divider Based on a Synthesized Insulated Image Guide**  
N. Dolatsha<sup>1</sup>, J. Hesselbarth<sup>2</sup>, <sup>1</sup>Swiss Federal Institute of Technology, Zurich, Switzerland, <sup>2</sup>University of Stuttgart, Stuttgart, Germany

**EuMC07-4 Millimeterwave LTCC Wafer Probe-to-Stripline Transition Using Transverse Inductive Slots**  
D. M. Nair<sup>1</sup>, W. E. McKinzie III<sup>2</sup>, B. A. Thrasher<sup>1</sup>, M. A. Smith<sup>1</sup>, E. D. Hughes<sup>1</sup>, J. M. Parisi<sup>1</sup>, <sup>1</sup>DuPont, Research Triangle Park, United States, <sup>2</sup>Wemtec Inc, Fulton, United States

**EuMC07-5 Broadband Interconnect Design for Silicon-Based System-in-Package Applications up to 170 GHz**  
E. Topak<sup>1</sup>, J. Choi<sup>2</sup>, T. Merkle<sup>1</sup>, <sup>1</sup>Sony Deutschland GmbH, Stuttgart, Germany, <sup>2</sup>Avago Technologies GmbH, Munich, Germany

## Kiew

### EuMC/EuMIC05

**Innovative Design Approaches for GaN Power Amplifiers**  
Chair: Ernesto Limiti, University of Rome  
Co-Chair: Renato Negra, RWTH

**EuMC/EuMIC05-1 L-band GaN Power Amplifier with Protection Against Load Mismatch**  
M. Van Heijningen, G. Van der Bent, E. Van der Houwen, F. Van Vliet, TNO, Den Haag, Netherlands

**EuMC/EuMIC05-2 A 65 - 100 GHz Impedance Transforming Hybrid Coupler for a V-/W-Band AlGaN/GaN MMIC**  
P. Pahl<sup>1</sup>, S. Diebold<sup>1</sup>, D. Schwantuschke<sup>2</sup>, S. Wagner<sup>2</sup>, R. Lozar<sup>2</sup>, R. Quay<sup>2</sup>, I. Kallfass<sup>2</sup>, T. Zwick<sup>1</sup>, <sup>1</sup>Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany, <sup>2</sup>Fraunhofer Institute of Applied Solid-State Physics (IAF), Freiburg, Germany, <sup>3</sup>University of Stuttgart, Stuttgart, Germany

**EuMC/EuMIC05-3 Load-Modulated GaN Power Amplifier Implementing Tunable Thick Film BST Components**  
M. Arnous<sup>1</sup>, A. Wiens<sup>2</sup>, S. Preis<sup>1</sup>, H. Maune<sup>2</sup>, K. Bathich<sup>1</sup>, M. Nikfalazar<sup>2</sup>, R. Jakoby<sup>2</sup>, G. Boeck<sup>1,3</sup>, <sup>1</sup>Berlin Institute of Technology, Berlin, Germany, <sup>2</sup>Technische Universität Darmstadt, Darmstadt, Germany, <sup>3</sup>Leibniz-Institut für Höchstfrequenztechnik, Berlin, Germany

**EuMC/EuMIC05-4 Class-BJ Power Amplifier Modes: The IMD Behavior of Reactive Terminations**  
V. Carrubba, S. Maroldt, R. Quay, O. Ambacher, Fraunhofer Institute for Applied Solid State Physics (IAF), Freiburg, Germany

**EuMC/EuMIC05-5 Wideband High Efficiency High Power GaN Amplifiers Using MIC and Quasi-MMIC Technologies**  
C. Berrached<sup>1,2</sup>, D. Bouw<sup>1</sup>, M. Camiade<sup>1</sup>, D. Barataud<sup>2</sup>, <sup>1</sup>United Monolithic Semiconductors SAS, Villebon-Sur-Yvette, France, <sup>2</sup>XLIM-UMR 6172, Université de Limoges / CNRS, Limoges, France

## Riga

### EuMC/EuMIC06

**III-V Transceiver Circuits**  
Chair: Ingmar Kallfass, University of Stuttgart  
Co-Chair: Rüdiger Quay, Fraunhofer IAF

**EuMC/EuMIC06-1 QFN-Packaged Highly-Linear Cascode GaN LNA MMIC from 0.5 to 3 GHz**  
S. Maroldt<sup>1</sup>, B. Aja<sup>2</sup>, F. van Raay<sup>1</sup>, S. Krause<sup>1</sup>, P. Brueckner<sup>1</sup>, R. Quay<sup>1</sup>, <sup>1</sup>Fraunhofer Institute for Applied Solid-State Physics IAF, Freiburg, Germany, <sup>2</sup>University of Cantabria, Santander, Spain

**EuMC/EuMIC06-2 A 0-Level Packaged RF-MEMS Switched Wideband GaAs LNA MMIC**  
A. Gustafsson<sup>1</sup>, C. Samuelsson<sup>6,1</sup>, R. Malmqvist<sup>1</sup>, S. Seok<sup>2</sup>, M. Fryziel<sup>2</sup>, N. Rolland<sup>2</sup>, B. Grandchamp<sup>3</sup>, T. Vähä-Heikkilä<sup>4</sup>, R. Baggen<sup>5</sup>, <sup>1</sup>Swedish Defence Research Establishment, FOI, Linköping, Sweden, <sup>2</sup>CNRS, Villeneuve d'ascq, France, <sup>3</sup>OMMIC, Limeil-Brevannes, France, <sup>4</sup>VTT, Espoo, Finland, <sup>5</sup>IMST, Kamp-Lintfort, Germany, <sup>6</sup>SAAB, Linköping, Sweden

**EuMC/EuMIC06-3 A Compact 94 GHz FMCW Radar MMIC Based on 100 nm InGaAs mHEMT Technology with Integrated Transmision Signal Conditioning**  
C. Zech<sup>1</sup>, A. Hülsmann<sup>1</sup>, R. Weber<sup>1</sup>, A. Tessimann<sup>1</sup>, S. Wagner<sup>1</sup>, M. Schlechtweg<sup>1</sup>, A. Leuther<sup>1</sup>, O. Ambacher<sup>1,2</sup>, <sup>1</sup>Fraunhofer Institute for Applied Solid State Physics (IAF), Freiburg im Breisgau, Germany, <sup>2</sup>Department of Microsystems Engineering - IMTEK, University of Freiburg, Freiburg im Breisgau, Germany

**EuMC/EuMIC06-4 A 240 GHz Quadrature Receiver and Transmitter for Data Transmission up to 40 Gbit/s**  
D. Lopez-Diaz<sup>1</sup>, S. Koenig<sup>2</sup>, J. Antes<sup>2</sup>, F. Boes<sup>2</sup>, F. Kurz<sup>3</sup>, R. Henneberger<sup>4</sup>, A. Tessimann<sup>1</sup>, A. Leuther<sup>1</sup>, S. Wagner<sup>1</sup>, M. Schlechtweg<sup>1</sup>, O. Ambacher<sup>1</sup>, I. Kallfass<sup>5</sup>, <sup>1</sup>Fraunhofer Institute for Applied Solid State Physics IAF, Freiburg, Germany, <sup>2</sup>Karlsruhe Institute of Technology, Karlsruhe, Germany, <sup>3</sup>Siemens AG, Munich, Germany, <sup>4</sup>Radiometer Physics GmbH, Meckenheim, Germany, <sup>5</sup>University of Stuttgart, Stuttgart, Germany

13:50h - 14:10h

14:10h - 14:30h

14:30h - 14:50h

14:50h - 15:10h

15:10h - 15:30h



## St. Petersburg

**EuMIC20****EuMIC Closing Session**

Chair: Manfred Berroth, EuMIC2013 Chair

Co-Chair: Andreas Stelzer, EuMW2013 Awards Chair

**Part of The Defence and Security Forum****16:00h - 17:00h****Foundry Session**

Chair: Massimo Comparini, Thales Alenia Space, Italia

Several key representatives of RF and microwave semiconductor foundries will give short presentations of their foundry capabilities with respect to micro- and millimeter-wave integrated circuits. This includes details of current fully released and commercially available processes and processes in development and/or planned with expected release dates and current statuses. There will also be opportunity for questions and answers during this interactive session.

**17:00h - 17:30h****R&D of MMICs and M<sup>3</sup>ICs in China**

Zhi-Gong Wang, Institute of RF- and OE-ICs, Southeast University, Nanjing, China

The researching and development of MMICs (monolithic microwave ICs) and M<sup>3</sup>ICs (monolithic millimeter-wave ICs) in China will be introduced, includes the main projects supported by the Ministry of Science and Technology and the National Nature Science Foundation of China, the main researching teams in universities, institutes, and industries, the talent training, the EDA-tools used for the design, the foundry processes for IC manufacture, the chip packaging, and the system testing. As example, the design environment, the projects, and the results of the Institute of RF- & OE-ICs, Southeast University will be presented in some detail.

**17:30h - 17:45h****EuMIC Awards Ceremony**

Chair: Andreas Stelzer, EuMW2013 Awards Chair

**EuMIC Prize****EuMIC Young Engineer Prize****GAAS Association Student Fellowships****17:45h - 17:50h****Announcement of EuRaMIG**

Franz Dielacher, Infineon Technologies Austria

**17:50h - 18:00h****Closing of EuMIC2013**

Manfred Berroth, EuMIC2013 Chair

**Invitation to EuMIC2014**

Franco Giannini, EuMIC2014 Chair

16:00h - 18:00h

TUESDAY

## Kiew

### EuMC08

#### Recent Advances in RF-ID Systems and Circuits

Chair: Alessandra Costanzo,  
DEI - University of Bologna  
Co-Chair: Joy Laskar, InSite Partners

## Riga

### EuMC09

#### Recent Advances on Power Dividers

Chair: Christian Person,  
Labsticc/Telecom-Bretagne  
Co-Chair: Marco Pasian,  
University of Pavia

## Istanbul

### EuMC10

#### Recent Advances in Filter Technology

Chair: Giuseppe Macchiarella,  
Politecnico di Milano  
Co-Chair: Roberto Gomez-Garcia,  
University of Alcala

## Kopenhagen

### EuMC11

#### Millimeter and High-Power Measurement Techniques

Chair: Johannes Benedikt,  
Cardiff University  
Co-Chair: Peter Zwamborn,  
TNO and TU/e

16:00h - 16:20h

#### EuMC08-1 Performance Degradation of WPAN System due to UHF RFID Interference

H. Yoon<sup>1</sup>, J. Lee<sup>2</sup>, B. Jang<sup>2</sup>, <sup>1</sup>Myongji College, Seoul, Republic of Korea, <sup>2</sup>Kookmin University, Seoul, Republic of Korea

#### EuMC09-1 Dual-Band Unequal Power-Divider Miniaturized by Fully Printed CRLH Phase-Shift Lines

I. Yang<sup>1</sup>, S. Kahng<sup>1</sup>, K. Kahng<sup>1</sup>, J. Lee<sup>1</sup>, D. Eom<sup>2</sup>, <sup>1</sup>University of Incheon, Incheon, Republic of Korea, <sup>2</sup>LG Electronics, Pyongtech, Republic of Korea

#### EuMC10-1 Compact Folded Substrate Integrated Waveguide Filter With Non-Resonating Nodes for High-Selectivity Bandpass Applications

M. Salehi<sup>1,2</sup>, J. Bornemann<sup>1</sup>, E. Mehrshahi<sup>2</sup>, <sup>1</sup>University of Victoria, Victoria, Canada, <sup>2</sup>Shahid Behehti University, Tehran, Iran

#### EuMC11-1 Broadband Channel Measurements in a Typical Office Environment at Frequencies between 50 GHz and 325 GHz

M. A. Salihi<sup>1</sup>, T. Kleine-Ostmann<sup>1</sup>, T. Schrader<sup>1</sup>, M. Kannicht<sup>2</sup>, S. Priebe<sup>2</sup>, T. Kümer<sup>2</sup>, <sup>1</sup>Physikalisch-Technische Bundesanstalt Department High Frequency, Braunschweig, Germany, <sup>2</sup>Technische Universität Braunschweig, Braunschweig, Germany

16:20h - 16:40h

#### EuMC08-2 On the Use of the Intermodulation Communication Towards Zero Power Sensor Nodes

J. Song<sup>1</sup>, N. Pesonen<sup>1</sup>, V. Viikari<sup>2</sup>, H. Seppä<sup>1</sup>, <sup>1</sup>VTT Technical Research Centre of Finland, Espoo, Finland, <sup>2</sup>Aalto University, Espoo, Finland

#### EuMC09-2 Planar Dual-Frequency Three-Way Wilkinson Power Dividers with Open-Circuited Stubs

I. Sakagami<sup>1</sup>, X. Wang<sup>2</sup>, M. Fujii<sup>1</sup>, M. Tahara<sup>1</sup>, <sup>1</sup>University of Toyama, Toyama, Japan, <sup>2</sup>Kyushu University, Kasugaya, Japan

#### EuMC10-2 Response Surface Modeling of Microwave Filters Using Coupling Matrices

O. Glubokov, S. Koziel, Reykjavik University, Reykjavik, Iceland

#### EuMC11-2 Planar Zero Bias Schottky Diode Detector Operating in the E- and W-Band

M. Hrobak<sup>1</sup>, M. Sterns<sup>2</sup>, M. Schramm<sup>1</sup>, W. Stein<sup>1</sup>, L. Schmidt<sup>1</sup>, <sup>1</sup>Friedrich-Alexander University of Erlangen-Nuremberg, Erlangen, Germany, <sup>2</sup>Rohde & Schwarz GmbH & Co. KG, Munich, Germany

16:40h - 17:00h

#### EuMC08-3 Antenna Design for a UHF RFID Sensor Tag Inside a Switchgear

M. Heiss, R. Hildebrandt, Fraunhofer IPMS, Dresden, Germany

#### EuMC09-3 Wide-band Quadrature Power Divider with $\pi$ -type Compensation Circuit

H. Tae, W. Lee, S. Khang, K. Oh, J. Yu, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Republic of Korea

#### EuMC10-3 A Triple-Mode Ring Dielectric Resonator Band-Pass Filter Using Substrate Integrated Waveguide (SIW)

D. Zhang<sup>1</sup>, L. Zhou<sup>1</sup>, J. Mao<sup>1</sup>, W. Yin<sup>1,2</sup>, <sup>1</sup>Shanghai Jiao Tong University, Shanghai, China, <sup>2</sup>Zhejiang University, Hangzhou, China

#### EuMC11-3 Calibration Method for Near-Field Measurement used in Reflectarray Characterization

S. M. Mäkelä, A. Tamminen, J. Ala-Laurinaho, A. V. Räisänen, Aalto University School of Electrical Engineering, Espoo, Finland

17:00h - 17:20h

#### EuMC08-4 Nanostructured RFID Technology: Attack-Response and Temperature-Robustness Investigations

M. S. Kheir, H. Kreft, R. Knöchel, Christian-Albrechts-University of Kiel, Kiel, Germany

#### EuMC09-4 Compact Broadband Couplers Based on the Waveguide Magic-T Junction

C. A. Leal-Sevillano<sup>1</sup>, J. A. Ruiz-Cruz<sup>2,2</sup>, J. R. Montejo-Garai<sup>1</sup>, J. M. Rebollar<sup>1</sup>, <sup>1</sup>Universidad Politécnica de Madrid, Madrid, Spain, <sup>2</sup>Universidad Autonoma de Madrid, Madrid, United States

#### EuMC10-4 Technology for High Quality Factor Membrane Filters in Organic Multilayer PCBs

M. A. Hitzler<sup>1</sup>, T. Baras<sup>2</sup>, W. Menzel<sup>1</sup>, <sup>1</sup>University of Ulm, Ulm, Germany, <sup>2</sup>Cassidian, Ulm, Germany

#### EuMC11-4 Development of Terahertz Spatial-Harmonic Magnetrons

N. I. Avtomonov, V. D. Naumenko, D. M. Vavriv, Institute of Radio Astronomy of NASU, Kharkov, Ukraine

17:20h - 17:40h

#### EuMC08-5 Active Frequency Selective Surface for Time-domain UWB RFID Applications

A. Lazaro, R. Villarino, A. Ramos, D. Girbau, Universitat Rovira i Virgili, Tarragona, Spain

#### EuMC10-5 A New Method For Efficient Bandwidth Control of Narrowband Planar Filters

B. Alicioğlu<sup>1</sup>, G. Boyacioğlu<sup>1</sup>, N. Yıldırım<sup>1,2</sup>, S. Oruç<sup>1</sup>, C. Yavuz<sup>1</sup>, <sup>1</sup>Aselsan Inc, Ankara, Turkey, <sup>2</sup>METU, Ankara, Turkey

#### EuMC11-5 Electrically Driven Wideband Sources for Equipment Vulnerability Tests

A. A. Gurinovich<sup>1,2</sup>, V. G. Baryshevsky<sup>1,2</sup>, D. V. Baryshevsky<sup>1,2</sup>, A. E. Borisevich<sup>1,2</sup>, S. I. Agafonov<sup>1,2</sup>, A. M. Belov<sup>1,2</sup>, I. I. Vasiliev<sup>1,2</sup>, V. A. Evdokimov<sup>1,2</sup>, <sup>1</sup>Research Institute for Nuclear Problems of Belarusian State University, Minsk, Belarus, <sup>2</sup>Electrophysical Laboratory, Minsk, Belarus



## Stockholm

### EuMC12

#### Antennas - Applications and Concepts

Chair: Ilona Rolfes,  
Ruhr-University Bochum  
Co-Chair: Anders Rydberg,  
Uppsala University

#### *EuMC12-1 Implementation of Dual-Frequency Longitudinal Slot Array Antenna on Substrate Integrated Waveguide at X-Band*

S. Mukherjee, K. V. Srivastava,  
A. Biswas, Indian Institute of  
Technology, Kanpur, Kanpur, India

#### *EuMC12-2 X-Band SIW Cavity-Backed Patch Antenna for Radar Applications*

O. Losito<sup>1</sup>, L. Mescia<sup>1</sup>, M. Chiapperino<sup>1</sup>,  
T. Castellano<sup>1</sup>, G. Venanzoni<sup>1</sup>,  
D. Mencarelli<sup>1</sup>, G. Angeloni<sup>2</sup>, P. Carta<sup>2</sup>,  
E. M. Starace<sup>2</sup>, F. Prudeniano<sup>1</sup>,  
<sup>1</sup>Politecnico di Bari, Bari, Italy, <sup>2</sup>Somacis  
spa, Castelfidardo, Italy

#### *EuMC12-3 Effect of a Finite Ground Plane on the Axial Ratio of Circularly-Polarized Microstrip Arrays*

A. B. Smolders, R. M. Mestrom,  
A. C. Reniers, A. Zamanifekri,  
Eindhoven University of Technology,  
Eindhoven, Netherlands

#### *EuMC12-4 Tunable Electromagnetic Band Gap Slits for Mutual Coupling Reduction*

M. Mavridou, A. P. Feresidis, P. Gardner,  
P. S. Hall, University of Birmingham,  
Birmingham, United Kingdom

#### *EuMC12-5 Novel K-Band Prime Focus Reflector-Coupled Focal Plane Array*

L. Locke<sup>1,2</sup>, J. Bornemann<sup>1</sup>, S. Claude<sup>2</sup>,  
<sup>1</sup>University of Victoria, Victoria, Canada,  
<sup>2</sup>Herzberg Institute of Astrophysics,  
Victoria, Canada

## Helsinki

### EuMC13

#### 3-D Integration and Packaging

Chair: John Papapolymerou,  
Georgia Tech  
Co-Chair: Jan Hesselbarth,  
University of Stuttgart

#### *EuMC13-1 3D Integration Technologies for a Planar Dual Band Active Array in Ka-band*

E. Meniconi<sup>1</sup>, T. Chaloun<sup>2</sup>, R.  
Sorrentino<sup>2</sup>, V. Ziegler<sup>1</sup>, <sup>1</sup>EADS  
Deutschland GmbH, Muenchen,  
Germany, <sup>2</sup>Università degli Studi di  
Perugia, Perugia, Italy, <sup>3</sup>University of  
Ulm, Ulm, Germany

#### *EuMC13-2 Impact of the Packaging Technology on a SiGe:C Ku-Band Low Noise Converter for Satellite Reception*

P. Gamand, O. Tesson, NXP  
Semiconductors, Caen, France

#### *EuMC13-3 Ka-Band 2-Stacked Flip-Chip Chip-Scale-Package Using GaAs PA MMIC with Hot-Via Interconnections for Spacecraft Applications*

S. Yoshida<sup>1</sup>, G. Fukuda<sup>2</sup>, T. Noji<sup>3</sup>, Y. Kobayashi<sup>1</sup>,  
S. Kawasaki<sup>1</sup>, <sup>1</sup>Japan Aerospace Exploration  
Agency, Sagami-hara, Japan, <sup>2</sup>Tokyo Univ.  
of Science, Shinjyuku, Japan, <sup>3</sup>Tokyo  
Metropolitan University, Tokyo, Japan

#### *EuMC13-4 Ultra Wideband D-Band Antenna Integrated in a LTCC based QFN Package using a Flip-Chip Interconnect*

B. Göttel, S. Beer, M. Pauli, T. Zwick,  
Karlsruhe Institute of Technology,  
Karlsruhe, Germany

#### *EuMC13-5 300-GHz LTCC Horn Antennas Based on Antenna-in-package Technology*

T. Tajima, H. Song, M. Yaita, K. Ajito,  
N. Kukutsu, Nippon Telegraph and  
Telephone Corporation, Atsugi-shi,  
Japan

## Neu-Delhi

### EuMC14

#### Focused Session - Time Domain Electromagnetics

Chair: Ludger Klinkenbusch,  
University of Kiel  
Co-Chair: Thomas Weiland,  
Darmstadt University of Technology

#### *EuMC14-1 Time Domain Methods for 3D Electromagnetic Simulation at Microwave Frequencies*

I. Munteanu<sup>1,2</sup>, <sup>1</sup>CST – Computer  
Simulation Technology AG, Darmstadt,  
Germany, <sup>2</sup>Technische Universität  
Darmstadt, Darmstadt, Germany

#### *EuMC14-2 DGTD Method for Microwave Propagation in Dispersive Media with Applications to Bioelectromagnetics*

M. Klemm<sup>1</sup>, S. Lanteri<sup>2</sup>, C. Scheid<sup>3,2</sup>,  
<sup>1</sup>University of Bristol, Bristol, United  
Kingdom, <sup>2</sup>INRIA, Sophia Antipolis,  
France, <sup>3</sup>University of Nice-Sophia  
Antipolis, Nice, France

#### *EuMC14-3 Performance Analysis of Eigenvalue Extraction from Time-Domain Computations*

T. Banova<sup>1,2</sup>, W. Ackermann<sup>1</sup>, T.  
Weiland<sup>1</sup>, <sup>1</sup>Technische Universität  
Darmstadt, Darmstadt, Germany,  
<sup>2</sup>Technische Universität Darmstadt,  
Darmstadt, Germany

#### *EuMC14-4 Time-Domain Spherical-Multipole Analysis of the Poynting Vector of Radiated Electromagnetic Fields*

L. Klinkenbusch, University of Kiel,  
Kiel, Germany

## Singapur

### EuMC15

#### Large Signal Device and Circuit Characterisation for Accurate Modelling and Precise Design Verification

Chair: Jan-Erik Müller,  
Intel Mobile Communications  
Co-Chair: Thomas Ußmüller,  
University of Erlangen Nürnberg

#### *EuMC15-1 A Multi-harmonic Behavioral Model Taking into Account Coupling Effects of Long and Short-Term Memory*

C. Mazière, E. Gatard, C. Enguehard,  
A. Xiong, D. Gapillout, T. Gasselung,  
AMCAD Engineering, Limoges, France

#### *EuMC15-2 Device Characterization for LTE Applications with Wideband Baseband, Fundamental and Harmonic Impedance Control*

A. K. Manjanna<sup>1</sup>, M. Marchetti<sup>1</sup>, K.  
Buisman<sup>2</sup>, M. Spirito<sup>2</sup>, M. J. Pelk<sup>2</sup>, L.  
C. de Vreede<sup>2</sup>, <sup>1</sup>Anteverta-mw B.V.,  
Delft, Netherlands, <sup>2</sup>Delft University of  
Technology, Delft, Netherlands

#### *EuMC15-3 Evaluation of HBT Device Linearity Using Advanced Measurement Techniques*

K. Buisman<sup>1</sup>, M. Marchetti<sup>2</sup>, M. P. van der  
Heijden<sup>3</sup>, P. J. Zampardi<sup>4</sup>, L. C. de Vreede<sup>1</sup>,  
<sup>1</sup>Delft University of Technology, Delft,  
Netherlands, <sup>2</sup>Anteverta Microwave,  
Delft, Netherlands, <sup>3</sup>NXP Semiconductors,  
Eindhoven, Netherlands, <sup>4</sup>RFMD, Westlake  
Village, United States

#### *EuMC15-4 Impedance Synthesis Algorithms for Hybrid Harmonic Load Pull*

B. Hosein, T. Beauchamp, Focus  
Microwaves Inc., Dollard des Ormeaux,  
Canada

#### *EuMC15-5 Hybrid Measurement-based Extraction of Consistent Large-Signal Models for Microwave FETs*

I. Angelov<sup>1</sup>, G. Avolio<sup>2</sup>, A. Raffo<sup>3</sup>, M.  
Thorsell<sup>1</sup>, D. Kuylenstierna<sup>1</sup>, G. Vannini<sup>3</sup>,  
D. Schreurs<sup>2</sup>, <sup>1</sup>Chalmers University of  
Technology, Gothenburg, Sweden, <sup>2</sup>KU  
Leuven, Leuven, Belgium, <sup>3</sup>Università  
di Ferrara, Ferrara, Italy

16:00h - 16:20h

16:20h - 16:40h

16:40h - 17:00h

17:00h - 17:20h

17:20h - 17:40h

TUESDAY

## Kiew

### EuMC16

#### Doherty-Based PA Design

Chair: Steve Nightingale,  
Cobham Technical Services  
Co-Chair: Wolfgang Eckl, Alcatel Lucent

## Istanbul

### EuMC17

#### New Concepts for Passive Couplers

Chair: Luca Perregini,  
University of Pavia  
Co-Chair: Hervé Aubert, LAAS

## Oslo

### EuMC18

#### Material Characterisation

Chair: Andy Gibson,  
University Manchester  
Co-Chair: Peter Hoogeboom,  
Delft University/TNO

## Kopenhagen

### EuMC19

#### Localisation Algorithms

Chair: Martin Vossiek,  
University Erlangen-Nürnberg  
Co-Chair: Andreas Ziroff, Siemens CT

08:30h - 08:50h

#### EuMC16-1 A Highly Efficient Wideband Asymmetric Doherty Power Amplifier with 10 dB Output Power Back-Off

X. Nghiem, R. Negra, RWTH Aachen University, Aachen, Germany

#### EuMC17-1 Microwave 3-dB Four-Conductor Quadrature Coupler Based on Asymmetrical CPW Coupled Lines

Y. Chen<sup>1</sup>, C. Chang<sup>2</sup>, C. Tseng<sup>3</sup>, <sup>1</sup>National Taiwan University of Science and Technology, Taipei, Taiwan, <sup>2</sup>National Taiwan University of Science and Technology, Taipei, Taiwan, <sup>3</sup>National Taiwan University of Science and Technology, Taipei, Taiwan

#### EuMC18-1 Substrate-Integrated Half-Mode Resonant Near-Field Sensor for Liquid Characterization

N. Haase, A. F. Jacob, Technische Universität Hamburg-Harburg, Hamburg, Germany

#### EuMC19-1 NLOS Influence on 60 GHz Indoor Localization Based on a New TDOA Extraction Approach

A. Jafari<sup>1</sup>, J. Sarrazin<sup>1</sup>, L. Petrillo<sup>2</sup>, D. Lautru<sup>1</sup>, P. De Doncker<sup>2</sup>, A. Benlarbi-Deläi<sup>1</sup>, <sup>1</sup>UPMC Univ Paris 06, UR2 L2E, Paris, France, <sup>2</sup>Ecole polytechnique de Bruxelles, Bruxelles, Belgium

08:50h - 09:10h

#### EuMC16-2 Line-up Efficiency Improvement Using Dual Path Doherty Power Amplifier

A. Ahmed<sup>1</sup>, Y. Wei<sup>1</sup>, J. Staudinger<sup>1</sup>, S. De Meyer<sup>2</sup>, D. Scatamacchia<sup>2</sup>, B. Branger<sup>2</sup>, <sup>1</sup>Freescale Semiconductor, Tempe, United States, <sup>2</sup>Freescale Semiconductor, Toulouse, France

#### EuMC17-2 Ultra-Wideband Loose Coupling Directional Couplers With High Directivity

H. Mextorf, R. Knöchel, University of Kiel, Kiel, Germany

#### EuMC18-2 Biochemical Liquids Permittivity Characterization Technique Based on Whispering-Gallery Mode Resonator With Microfluidic Channel

A. I. Gubin<sup>1</sup>, A. A. Barannik<sup>1</sup>, I. A. Protsenko<sup>1</sup>, N. T. Cherpak<sup>1</sup>, A. Offenhaeusser<sup>2</sup>, S. Vitusevich<sup>2</sup>, <sup>1</sup>Institut für Radiophysik und Elektronik NAS of Ukraine, Kharkiv, Ukraine, <sup>2</sup>Peter Grünberg Institute, Forschungszentrum Juelich, Juelich, Germany

#### EuMC19-2 Experimental Validation of the Cooperative Localization Algorithm in Wireless Sensor Network

A. Maali<sup>1</sup>, L. Zeroukhi<sup>1</sup>, A. Guerfi<sup>1</sup>, G. Baudoin<sup>2</sup>, H. Mimoun<sup>2</sup>, <sup>1</sup>Military Polytechnic School, Bordj El Bahri, Algiers, Algeria, <sup>2</sup>Université Paris Est, ESIEE Paris, Noisy-le-Grand, France

09:10h - 09:30h

#### EuMC16-3 Design of 200 W Wideband Doherty Amplifier with 34 % Bandwidth

K. Bathich<sup>1</sup>, G. Boeck<sup>1,2</sup>, <sup>1</sup>Berlin Institute of Technology, Berlin, Germany, <sup>2</sup>Ferdinand-Braun-Institut (FBH), Leibniz-Institut für Höchstfrequenztechnik, Berlin, Germany

#### EuMC17-3 Parallel Ring-Lines Type Rat-Race Circuit for Loose Coupling Utilizing Composite Right-/Left-Handed Transmission Lines

T. Kawai<sup>1</sup>, Y. Sumitomo<sup>1</sup>, A. Enokihara<sup>1</sup>, I. Ohta<sup>2</sup>, K. Satoh<sup>2</sup>, Y. Suzuki<sup>2</sup>, H. Okazaki<sup>2</sup>, S. Narahashi<sup>2</sup>, <sup>1</sup>University of Hyogo, Himeji, Japan, <sup>2</sup>University of Hyogo, Kobe, Japan, <sup>3</sup>NTT DOCOMO, Inc., Yokosuka, Japan

#### EuMC18-3 Parasitic Effects and Measurement Uncertainties in Multi-Layer Thin-Film Structures

G. N. Phung, F. J. Schmueckle, W. Heinrich, Ferdinand-Braun-Institut (FBH), Berlin, Germany

#### EuMC19-3 SwarmNet: A Distributed Navigation Network using Ultra Wideband Ranging and Communications

B. S. Dewberry<sup>1</sup>, A. Petroff<sup>2</sup>, <sup>1</sup>Time Domain, Huntsville, United States, <sup>2</sup>Time Domain, Huntsville, United States

09:30h - 09:50h

#### EuMC16-4 A Packaged 86 W GaN Varactor-based Dynamic Load Modulation

C. M. Andersson<sup>1</sup>, M. Ozen<sup>1</sup>, D. Gustafsson<sup>1</sup>, K. Yamanaka<sup>2</sup>, E. Kuwata<sup>2</sup>, H. Otsuka<sup>2</sup>, M. Nakayama<sup>2</sup>, Y. Hirano<sup>2</sup>, I. Angelov<sup>1</sup>, C. Fager<sup>1</sup>, N. Rorsman<sup>1</sup>, <sup>1</sup>Chalmers University of Technology, Gothenburg, Sweden, <sup>2</sup>Mitsubishi Electric Corporation, Ofuna, Japan

#### EuMC17-4 A Quad-band Rat-Race Coupler Based on the Generalized Negative Refractive Index Transmission Line Concept

A. C. Papanastasiou<sup>1,2</sup>, G. E. Georgiou<sup>1,2</sup>, G. V. Eleftheriades<sup>2,1</sup>, <sup>1</sup>University of Cyprus, Nicosia, Cyprus, <sup>2</sup>University of Toronto, Toronto, Canada

#### EuMC18-4 Microwave Characterisation of Low Volume Materials in the ISM Band

J. Rammal, O. Tantot, N. Delhote, S. Verdeyme, M. Aubourg, XLIM, Limoges, France

#### EuMC19-4 Scenario-Based Energy Estimation of Heterogeneous Integrated Systems at System Level

S. Glock<sup>1</sup>, R. Rosales<sup>2</sup>, F. Reutelhuber<sup>1</sup>, G. Fischer<sup>1</sup>, M. Glass<sup>2</sup>, J. Teich<sup>2</sup>, R. Weigel<sup>1</sup>, T. Ussmüller<sup>1</sup>, <sup>1</sup>Friedrich-Alexander University Erlangen-Nuremberg, Erlangen, Germany, <sup>2</sup>Friedrich-Alexander University Erlangen-Nuremberg, Erlangen, Germany

09:50h - 10:10h

#### EuMC16-5 An Analysis of the Suitability of Using CW-theory when Designing Doherty PAs for Wideband or Concurrent Multi-Band Operation

D. Gustafsson, C. M. Andersson, C. Fager, Chalmers University of Technology, Gothenburg, Sweden

#### EuMC17-5 Schwinger Coupler for Substrate Integrated Circuits and Systems

A. Doghri<sup>1</sup>, T. Djerfai<sup>1</sup>, A. Ghiotto<sup>2</sup>, K. Wu<sup>1</sup>, <sup>1</sup>École Polytechnique de Montréal, Montreal, Canada, <sup>2</sup>Université de Bordeaux, Talence, France

#### EuMC18-5 Development of New Technologies Using Foam Materials for RF Device Integration

S. Chen<sup>1</sup>, J. Coupe<sup>1</sup>, F. Karpus<sup>2</sup>, B. Toulblanc<sup>2</sup>, <sup>1</sup>Telecom Bretagne, Brest, France, <sup>2</sup>GTID - Protecno, Brest, France

#### EuMC19-5 Impact of Polarization Impurity on Compact Antenna Array Receiver for Satellite Navigation Systems

S. I. Butt<sup>1</sup>, E. Schäfer<sup>2</sup>, M. Sgammini<sup>3</sup>, R. Stephan<sup>1</sup>, M. A. Hein<sup>1</sup>, <sup>1</sup>Ilmenau University of Technology, Ilmenau, Germany, <sup>2</sup>Institut für Mikroelektronik- und Mechatronik-Systeme gemeinnützige GmbH, Erfurt, Germany, <sup>3</sup>German Aerospace Center (DLR), Weßling, Germany

## Stockholm

### EuMC20

#### Focused Session - Focusing Antenna Systems at mm and Sub-Millimeterwave

Chair: Artem V. Boriskin, Institut d'électronique et de télécommunications de Rennes  
Co-Chair: Peter Gardner, University of Birmingham

#### *EuMC20-1 A Loaded Sectoral Horn Antenna Using Near-Field Focusing Technique*

S. Clauzier<sup>1</sup>, S. Avrillon<sup>2</sup>, L. Le Coq<sup>2</sup>, M. Himdi<sup>2</sup>, F. Colombel<sup>2</sup>, E. Rochefort<sup>1</sup>, <sup>1</sup>CMN, Cherbourg, France, <sup>2</sup>IETR, Rennes, France

#### *EuMC20-2 Leaky Lens Antennas and Kinetic Inductance Detectors - The Solution for THz Integration*

A. Neto<sup>1</sup>, N. Llombart<sup>1</sup>, I. E. Lager<sup>1</sup>, J. J. Baselmans<sup>2</sup>, A. Baryshev<sup>2</sup>, S. Yates<sup>2</sup>, <sup>1</sup>Delft University of Technology, Delft, Netherlands, <sup>2</sup>SRON Netherlands Institute of Space Research, Utrecht, Netherlands

#### *EuMC20-3 Design of a Submillimetre Wave Fabry-Perot Cavity Antenna*

K. Konstantinidis, A. P. Feresidis, M. J. Lancaster, P. S. Hall, P. Gardner, University of Birmingham, Birmingham, United Kingdom

#### *EuMC20-4 High Gain Lens Antennas for 71-86 GHz Point-to-Point Applications*

A. Artemenko<sup>1,2</sup>, A. Mozharovskiy<sup>1,2</sup>, A. Sevastyanov<sup>1,2</sup>, V. Ssorin<sup>1,2</sup>, R. Maslennikov<sup>1,2</sup>, <sup>1</sup>Radio Gigabit LLC, Nizhny Novgorod, Russian Federation, <sup>2</sup>Lobachevski State University of Nizhny Novgorod, Nizhny Novgorod, Russian Federation

#### *EuMC20-5 Focusing Choke Ring Antenna for a Short-Range Millimeter-Wave Exposure System*

A. V. Boriskin<sup>1</sup>, M. Zhadobov<sup>1</sup>, R. Sauleau<sup>1</sup>, C. Person<sup>2</sup>, <sup>1</sup>IETR, Université de Rennes <sup>1</sup>, Rennes, France, <sup>2</sup>Lab-STICC, Telecom Bretagne, Brest, France

## Helsinki

### EuMC21

#### Focused Session - Advances on Carbon-based Nano-Antennas

Chair: Luca Pierantoni, Università Politecnica delle Marche  
Co-Chair: Julien Perruisseau-Carrier, Swiss Federal Institute of Technology in Lausanne EPFL

#### *EuMC21-1 Graphene Antennas: Can Integration and Reconfigurability Compensate for the Loss?*

J. Perruisseau-Carrier, M. Tamagnone, J. Gomez Diaz, E. Carrasco, Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland

#### *EuMC21-2 Surface Conductivity Evaluation of CVD Graphene Up to 2.5 THz*

A. Katsounaros, Y. Hao, Queen Mary University of London, London, United Kingdom

#### *EuMC21-3 Horizontal and Vertical Carbon-Nanotube-Array-Based Antenna Designs*

C. Brun<sup>1,2</sup>, P. Franck<sup>1,2</sup>, C. Wai Leong<sup>1,3</sup>, P. Coquet<sup>1</sup>, D. Baillargeat<sup>1,2</sup>, B. Tay<sup>3</sup>, <sup>1</sup>Cintra Umi 3288, Singapore, Singapore, <sup>2</sup>Xlim Umr 7252, Limoges, France, <sup>3</sup>Nanyang Technological University, Singapore, Singapore

#### *EuMC21-4 Analysis of a Microwave Graphene-Based Patch Antenna*

L. Pierantoni<sup>1,2</sup>, D. Mencarelli<sup>1</sup>, <sup>1</sup>Università Politecnica delle Marche, Ancona, Italy, <sup>2</sup>Istituto Nazionale di Fisica Nucleare, Frascati, Italy

## Shanghai

### EuMC22

#### Special Session Eastern Europe 1 - Microwave Spectroscopy and Broadband Systems

Chair: Vadim Ilyushin, Institute of Radio Astronomy NASU  
Co-Chair: Irina Naidionova, Geozondas Ltd.

#### *EuMC22-1 Evaluation of Combined Ground Penetrating and Through-the-Wall Surveillance UWB Technology*

V. Ivashchuk<sup>1</sup>, V. Prokhorenko<sup>1</sup>, A. Pitersev<sup>2</sup>, F. J. Yanovsky<sup>2</sup>, <sup>1</sup>Transient Technologies LLC, Kiev, Ukraine, <sup>2</sup>National Aviation University, Kiev, Ukraine

#### *EuMC22-2 UWB System for Time Domain Near Field Antenna Measurement*

B. Levitas<sup>1</sup>, M. Drozdov<sup>1</sup>, I. Naidionova<sup>1</sup>, S. Jefremov<sup>1</sup>, S. Malyshev<sup>2</sup>, A. Chizh<sup>2</sup>, <sup>1</sup>Geozondas Ltd., Vilnius, Lithuania, <sup>2</sup>Optoelectronics Stepanov Institute of Physics, Minsk, Belarus

#### *EuMC22-3 High-precision Fast Scan Millimeter- and Submillimeter-wave Spectroscopy*

E. Alekseev<sup>1</sup>, R. Motiyenko<sup>2</sup>, L. Margulès<sup>2</sup>, <sup>1</sup>Institute of Radio Astronomy NASU, Kharkov, Ukraine, <sup>2</sup>Université de Lille 1, Villeneuve d'Ascq, France

#### *EuMC22-4 Modern THz Resonator Spectroscopy*

V. V. Parshin, M. Y. Tretyakov, M. A. Koshelev, E. A. Serov, Institute of Applied Physics of RAS, Nizhny Novgorod, Russian Federation

#### *EuMC22-5 Intramolecular Large Amplitude Motions as a Probe of a Possible Proton-to-Electron Mass Ratio Variation*

V. Ilyushin, Institute of Radio Astronomy of NASU, Kharkiv, Ukraine

## Kiew

### EuMC23

#### DPD Techniques for Power Amplifiers

Chair: Georg Fischer, University Erlangen-Nürnberg  
Co-Chair: Telmo Cunha, Universidade de Aveiro

#### *EuMC23-1 A Novel Method to Perform Adaptive Memoryless Polynomial Digital Predistortion*

A. Farabegoli<sup>1,2</sup>, B. Sogl<sup>1</sup>, J. Mueller<sup>1</sup>, R. Weigel<sup>2</sup>, <sup>1</sup>Intel Mobile Communications GmbH, Neubiberg, Germany, <sup>2</sup>University of Erlangen-Nuremberg, Erlangen, Germany

#### *EuMC23-2 Digital Predistortion Based on a Compressed-Sensing Approach*

J. Reina-Tosina, M. Allegue-Martínez, M. J. Madero-Ayora, C. Crespo-Cadenas, S. Cruces, University of Seville, Seville, Spain

#### *EuMC23-3 Digital Pre-distortion for Multiple Antenna Transmitters*

P. M. Suryasarnan, M. Hoflehner, A. Springer, Johannes Kepler University, Linz, Austria

#### *EuMC23-4 A Parameter Identification Algorithm for Multi-stage Digital Predistorter*

V. A. Bohara, M. A. Hussein, O. Venard, ESIEE Paris, Cite Descartes, Noisy-Le-Grand, France

#### *EuMC23-5 Digital Predistortion Optimization using Normalization Gain Adjustment in Wideband Systems*

L. Aladrén, P. García-Dúcar, P. Carro, J. de Mingo, University of Zaragoza, Maria de Luna Street, 1, Zaragoza, Spain

## Istanbul

### EuMC24

#### Novel Technologies for Passive Components

Chair: Philippe Ferrari, IMEP-LAHC  
Co-Chair: Michal Mrozowski,  
Gdansk University of Technology

## Oslo

### EuMC25

#### Network Analysis and Frequency Measurement

Chair: Dietmar Kissinger,  
University of Erlangen Nürnberg  
Co-Chair: Jiasheng Hong,  
Heriot Watt University

## Kopenhagen

### EuMC26

#### Microwave Bio-Sensing

Chair: Rolf Jakoby,  
University of Darmstadt  
Co-Chair: Tuami Lasri,  
University Lille1/IEMN

## Stockholm

### EuMC27

#### Focused Session - Leaky Wave Antennas

Chair: Wolfgang Menzel,  
University of Ulm  
Co-Chair: C-K Clive Tzuang,  
Tianjin University NTU

10:40h - 11:00h

#### EuMC24-1 Design and Fabrication of Pneumatically Controlled Capacitive Switches

B. Wu<sup>1</sup>, M. Okoniewski<sup>1</sup>, C. Hayden<sup>2</sup>,  
<sup>1</sup>University of Calgary, Calgary, Canada,  
<sup>2</sup>University of Calgary, Calgary, Canada

#### EuMC25-1 A New Switch Correction Method for a Single-Receiver VNA

M. Schramm, M. Hrobak, J. Schür,  
L. Schmidt, University Erlangen-  
Nuremberg, Erlangen, Germany

#### EuMC26-1 Optimized Electromagnetic Interaction Microwave Resonator/Microfluidic Channel for Enhanced Liquid Bio-Sensor

T. Chretiennot<sup>1,2</sup>, D. Dubuc<sup>1,2</sup>,  
K. Grenier<sup>1,2</sup>, <sup>1</sup>Laas-CNRS, Toulouse,  
France, <sup>2</sup>Université de Toulouse, UPS,  
Toulouse, France

#### EuMC27-1 Planar Leaky-Wave Antennas - Early Concepts and Actual Results

W. Menzel, University of Ulm,  
Ulm, Germany

11:00h - 11:20h

#### EuMC24-2 A Light-Weight Tunable Liquid Crystal Phase Shifter for an Efficient Phased Array Antenna

C. Weickhmann<sup>1</sup>, N. Nathrath<sup>2</sup>,  
R. Gehring<sup>3</sup>, A. Gaebler<sup>1</sup>, M. Jost<sup>1</sup>,  
R. Jakoby<sup>1</sup>, <sup>1</sup>Technische Universität  
Darmstadt, Darmstadt, Germany,  
<sup>2</sup>Nathrath-Truemper-Partner Ingenieure  
GmbH, Neubiberg, Germany, <sup>3</sup>EADS  
Astrium GmbH, Taufkirchen, Germany

#### EuMC25-2 Speeding Up N-port VNA Calibration Eliminating One-Port Calibrations

F. Verbeyst, M. Vanden Bossche,  
National Instruments, Zaventem,  
Belgium

#### EuMC26-2 Microwave Dielectric Bio-Sensing for Precise and Repetitive Living Cells Suspension Analysis

F. Artis<sup>1,2</sup>, D. Dubuc<sup>1,2</sup>, J. Fournie<sup>3</sup>,  
M. Poupot<sup>3</sup>, K. Grenier<sup>1,2</sup>, <sup>1</sup>Laas-CNRS,  
Toulouse, France, <sup>2</sup>Univ. de Toulouse,  
Toulouse, France, <sup>3</sup>CRCT-Inserm,  
Toulouse, France

#### EuMC27-2 A Planar Leaky Wave Antenna Operating in Two Frequency Bands

J. Machac, M. Polivka, Czech Technical  
University in Prague, Prague 6, Czech  
Republic

11:20h - 11:40h

#### EuMC24-3 Compact Tunable Phase Shifter based on Inkjet Printed BST Thick-Films for Phased-Array Application

M. Nikfalazar<sup>1</sup>, M. Sazegar<sup>1</sup>, Y. Zheng<sup>1</sup>,  
A. Wiens<sup>1</sup>, R. Jakoby<sup>1</sup>, A. Friederich<sup>2</sup>,  
C. Kohler<sup>2</sup>, J. Binder<sup>2</sup>, <sup>1</sup>Technische  
Universität Darmstadt, Darmstadt,  
Germany, <sup>2</sup>Karlsruhe Institute of  
Technology, Eggenstein-Leopoldshafen,  
Germany

#### EuMC25-3 Calibrated RF Time-Domain Measurement of Non-Linear Devices in Digital Polar Transmitter Architecture

K. El-Akhdar, S. Ahmed, G. Neveux,  
D. Barataud, J. M. Nebus, University of  
Limoges, XLIM, UMR n°7252, Limoges,  
France

#### EuMC26-3 CMOS Lab on Chip Device for Dielectric Characterization of Cell Suspensions Based on a 6 GHz Oscillator

S. Guha, F. I. Jamal, K. Schmalz,  
C. Wenger, C. Meliani, IHP  
Microelectronics, Frankfurt (Oder),  
Germany

#### EuMC27-3 Substrate Integrated Waveguide Leaky-Wave Antenna with Reduced Beam Squint

J. L. Gomez-Tornero<sup>1</sup>, A. Martinez-  
Ros<sup>1</sup>, A. Alvarez-Melcon<sup>1</sup>, F. Mesa<sup>2</sup>,  
F. Medina<sup>2</sup>, <sup>1</sup>Technical University  
of Cartagena, Cartagena, Spain,  
<sup>2</sup>University of Seville, Seville, Spain

11:40h - 12:00h

#### EuMC24-4 LTCC Material Properties after High Temperature Treatment

S. Brosius, A. F. Jacob, Technische  
Universität Hamburg-Harburg,  
Hamburg, Germany

#### EuMC25-4 Varactor-Tuned Dual-Mode Frequency Discriminator for Instantaneous Frequency Measurements

A. Moscoso-Mártir<sup>1</sup>, J. Hong<sup>2</sup>, I. Molina-  
Fernández<sup>1</sup>, <sup>1</sup>E.T.S.I. Telecomunicación  
University of Málaga, Málaga, Spain,  
<sup>2</sup>Heriot-Watt University, Edinburgh,  
United Kingdom

#### EuMC26-4 Coplanar Stripline Microchamber for Electrical Detection of Live and Dead Biological Cells

Y. Ning<sup>1</sup>, C. Palego<sup>1</sup>, C. Merla<sup>1,2</sup>,  
C. Multari<sup>1</sup>, X. Cheng<sup>1</sup>, D. Molinero<sup>1</sup>,  
X. Luo<sup>1</sup>, J. C. Hwang<sup>1</sup>, <sup>1</sup>Lehigh University,  
Bethlehem, United States, <sup>2</sup>National  
Agency for New Technologies, Energy, and  
Sustainable Economic Development, Rome,  
Italy

#### EuMC27-4 A Tour on Recent Developments and Discoveries of Crucial Practical Importance in Leaky-Wave Antennas

C. Caloz<sup>1</sup>, S. Otto<sup>2</sup>, <sup>1</sup>École Polytechnique  
de Montréal, Montréal, Canada,  
<sup>2</sup>University of Duisburg-Essen,  
Duisburg, Germany

12:00h - 12:20h

#### EuMC24-5 Electromagnetic Field Analysis with Advanced Structural Modeling of Microstrips on Porosified LTCC

A. Talai<sup>1</sup>, B. Gmeiner<sup>2</sup>, F. Steinhäuber<sup>3</sup>,  
A. Bittner<sup>3</sup>, U. Rüde<sup>2</sup>, U. Schmid<sup>3</sup>, R. Weigel<sup>1</sup>,  
A. Koelpin<sup>1</sup>, <sup>1</sup>Friedrich-Alexander University  
Erlangen-Nuremberg, Erlangen, Germany,  
<sup>2</sup>Friedrich-Alexander University Erlangen-  
Nuremberg, Erlangen, Germany, <sup>3</sup>Vienna  
University of Technology, Vienna, Austria

#### EuMC25-5 Instantaneous Frequency Measurement Based on Low-Cost Six-Port Technology

S. Lindner, G. Vinci, F. Barbon, S. Linz,  
S. Mann, R. Weigel, A. Koelpin,  
University of Erlangen-Nuremberg,  
Erlangen, Germany

#### EuMC26-5 Planar Microwave Sensor for Thermal Ablation of Organic Tissue

M. Puentes, F. Bashir, M. Maasch,  
M. Schüßler, R. Jakoby, Technische  
Universität Darmstadt, Darmstadt,  
Germany

#### EuMC27-5 Monolithic Synthetic Transmission-Line Leaky-Mode Antenna at THz

C. C. Tzuang, H. Wu, X. Li, J. Ma,  
Tianjin University, Tianjin, China



## Helsinki

### EuMC28

#### Far-Field and Near-Field Techniques for Wireless Power Transfer and Energy Harvesting

Chair: Joy Laskar, InSite Partners  
Co-Chair: Alessandra Costanzo, DEI - University of Bologna

#### EuMC28-1

##### Mutual Coupling Effect on Rectenna Array for RF Energy Harvesting

H. Kamoda, M. Hanazawa, S. Kitazawa, H. Ban, K. Kobayashi, Advanced Telecommunications Research Institute International, Seika-cho, Japan

#### EuMC28-2

##### High-Efficiency Rectifier Circuit at 2.45 GHz for Low-Input-Power Energy Harvesting

B. R. Franciscatto<sup>1,2</sup>, V. Freitas<sup>1,2</sup>, J. Duchamp<sup>1</sup>, C. Defay<sup>2,2</sup>, T. P. Vuong<sup>1</sup>,  
<sup>1</sup>Université Grenoble-Alpes, IMEP-LAHC laboratory, Grenoble, France,  
<sup>2</sup>Multitoll Solutions, Asnières, France

#### EuMC28-3

##### A New Family of Passive Wireless RF Harvesters Based on R-C-Quartz Oscillators

A. Nimo, D. Grigic, T. Ugan, L. M. Reindl, University of Freiburg, Freiburg, Germany

#### EuMC28-4

##### Optimization of Wireless Power Transfer for Mobile Receivers Using Automatic Digital Capacitance Tuning

D. S. Ricketts<sup>1</sup>, M. J. Chabalko<sup>2</sup>, A. Hillenius<sup>2</sup>, <sup>1</sup>North Carolina State University, Raleigh, United States,  
<sup>2</sup>Carnegie Mellon University, Pittsburgh, United States

#### EuMC28-5

##### A Moving Field Inductive Power Transfer System for Electric Vehicles

J. A. Russer<sup>1</sup>, M. Dionigi<sup>2</sup>, M. Mongiardo<sup>2</sup>, P. Russer<sup>1</sup>,  
<sup>1</sup>Technical University, Munich, Germany, <sup>2</sup>Università Di Perugia, Perugia, Italy

## Shanghai

### EuMC29

#### Special Session Eastern Europe 2 - Emerging Materials for Microwave Applications

Chair: Oksana Shramkova, Queen's University Belfast  
Co-Chair: Jozef Modelski, Warsaw University of Technology

#### EuMC29-1

##### Highly Resistive GaN Substrates for High Frequency Electronics

R. Dwilinski<sup>1</sup>, R. Doradzinski<sup>1</sup>, L. Sierzputowski<sup>1</sup>, R. Kucharski<sup>1</sup>, M. Zajac<sup>1</sup>, J. Krupka<sup>2</sup>, <sup>1</sup>Ammono S.A., Warsaw, Poland, <sup>2</sup>Warsaw University of Technology, Warsaw, Poland

#### EuMC29-2

##### Comparison of SiC and GaN Substrates Used for Epitaxy of HEMT Structures

M. Leszczynski<sup>1,2</sup>, P. Prystawko<sup>1,2</sup>, P. Kruszewski<sup>1,2</sup>, I. Kasalynas<sup>3</sup>, R. Dwilinski<sup>4</sup>, J. Plesiewicz<sup>2</sup>, M. Zajac<sup>4</sup>, R. Kucharski<sup>4</sup>,  
<sup>1</sup>Institute of High Pressure Physics, Warsaw, Poland, <sup>2</sup>TopGaN, Warsaw, Poland, <sup>3</sup>University Wilnus, Wilnus, Lithuania, <sup>4</sup>Ammono, Warsaw, Poland

#### EuMC29-3

##### The Electromagnetic Properties of Graphene in the Microwave and Millimeterwave Spectrum

M. Dragoman<sup>1</sup>, D. Neculoiu<sup>1</sup>, A. Cosmaru<sup>1</sup>, A. Stefanescu<sup>1</sup>, A. Dinescu<sup>1</sup>, D. Dragoman<sup>2</sup>, <sup>1</sup>IMT Bucharest, Bucharest, Romania,  
<sup>2</sup>University of Bucharest, Bucharest-Magurele, Romania

#### EuMC29-4

##### Microwave Metamaterials with Competing Light-Controllable Nonlinear Response

P. V. Kapitanova<sup>1</sup>, A. P. Slobozhanyuk<sup>1</sup>, P. A. Belov<sup>1</sup>, I. V. Shadrivov<sup>2</sup>, Y. S. Kivshar<sup>2</sup>,  
<sup>1</sup>National Research University of Information Technologies, Mechanics and Optics (NRU ITMO), Saint-Petersburg, Russian Federation,  
<sup>2</sup>Australian National University, Canberra, Australia

#### EuMC29-5

##### Nonlinear Planar Metamaterials Sustained a Trapped-Mode Resonant Regime

V. Khardikov<sup>2,1</sup>, P. Mladonov<sup>1</sup>, S. Prosvirnin<sup>1,2</sup>, V. Tuz<sup>1,2</sup>, <sup>1</sup>Institute of Radioastronomy of National Academy of Sciences of Ukraine, Kharkiv, Ukraine, <sup>2</sup>Karazin Kharkiv National University, Kharkiv, Ukraine

## St. Petersburg

### EuRAD Opening Session

Chair: Arne Jacob, EuRAD2013 Chair  
Co-Chair: Reinhard Knöchel, EuRAD2013 TPC Chair

#### Part of The Defence and Security Forum

#### 10:40h - 10:50h

##### Welcome Address

**Opening of the European Radar Conference 2013**  
Arne Jacob, EuRAD2013 Chair

#### 10:50h - 11:30h

##### A Paradigm Shift for Spaceborne Synthetic Aperture Radar (SAR) Systems

Alberto Moreira, Director, Microwave and Radar Institute, German Aerospace Center (DLR), Oberpfaffenhofen, Germany

Spaceborne Synthetic Aperture Radar (SAR) provides high-resolution, day-and-night and weather-independent images for a multitude of applications ranging from geoscience and climate change research, environmental monitoring, global 2-D and 3-D mapping, change detection, 4-D mapping (space and time), security-related applications up to planetary exploration. With the launch of the German bi-static radar satellites TerraSAR-X and TanDEM-X (X-band), the Italian COSMO-SkyMed constellation (X-band) as well as the Canadian Radarsat-2 (C-band) a new class of SAR satellites was introduced providing images with resolution in the meter regime. A paradigm shift is however taking place in spaceborne SAR systems. By means of the development of new digital beamforming and waveform diversity technologies in combination with large reflector antennas, future SAR systems will outperform the imaging capacity of current systems by two orders of magnitude. This talk provides an overview of the state of the art in spaceborne SAR and describes the technological developments that will open the door to a future global remote sensing system for the continuous observation of dynamic processes over the Earth surface.

#### 11:30h - 12:10h

##### Ultra-Wideband Short-Range Sensing: The Road to new Radar Applications

Jürgen Sachs, Ilmenau University of Technology, Ilmenau, Germany

Low power ultra-wideband (UWB) sensors deal with very wideband signals in the lower microwave range. They combine high range resolution with good wave penetration into many materials. The sensing devices are of small dimensions and of potentially low costs. These are the key points to open up new radar applications in non-destructive testing, supervision, health care and medical engineering, industrial sensing, process control and many others. After a short introduction of some specifics of UWB-radar compared to narrowband approaches, various UWB-radar concepts will be summarised. The presentation will however mainly focus on application fields which are less typical for radar so far.

#### 12:10h - 12:20h

##### EuRAD2013 Forecast

Reinhard Knöchel, EuRAD2013 TPC Chair

10:40h - 11:00h

11:00h - 11:20h

11:20h - 11:40h

11:40h - 12:00h

12:00h - 12:20h

10:40h - 12:20h

## EuMC Poster Session

Chair: Yoke Leen Sit, KIT

Co-Chair: Christian Friesicke, TU Hamburg-Harburg

**10:00h - 18:00h**

*The posters are on display from 10:00h - 18:00h*

*The authors are present for discussion from 10:00h - 11:00h, 12:15h - 14:00h and 15:15h - 16:15h*

Exhibition Hall	Exhibition Hall	Exhibition Hall	Exhibition Hall
<p><b>EuMC Poster01-1</b> <i>Modeling of Interaction of Microwaves with Nanocomposites and 3D Nanostructures Based on Magnetic Nanoparticle-Filled Carbon Nanotube Arrays</i> G. S. Makeeva, O. A. Golovanov, Penza State University, Penza, Russian Federation</p>	<p><b>EuMC Poster01-6</b> <i>Properties of Ferrite - Ferroelectric Structures for Devices Tunable in the Microwave and High-Frequency Ranges</i> A. A. Semenov<sup>1</sup>, A. I. Dedyk<sup>1</sup>, P. Y. Belavsky<sup>1</sup>, A. A. Nikitin<sup>1</sup>, Y. V. Pavlova<sup>1</sup>, I. L. Mylnikov<sup>1</sup>, O. V. Pakhomov<sup>2</sup>, <sup>1</sup>Saint Petersburg State Electrotechnical University, Saint Petersburg, Russian Federation, <sup>2</sup>National Research University of Information Technologies, Mechanics and Optics, Saint Petersburg, Russian Federation</p>	<p><b>EuMC Poster01-11</b> <i>Ku/Ka-Band Compact Orthomode Junction with Low Pass Filters for High Power Applications</i> H. Yukawa, K. Yoshida, T. Mizuno, T. Owada, M. Miyazaki, Mitsubishi Electric Corporation, 5-1-1 Ofuna, Kamakura, Japan</p>	<p><b>EuMC Poster01-17</b> <i>Design of a Switchable Selectivity Bandpass Filter Based on Diode-Loaded Resonators</i> P. Deng<sup>1</sup>, Y. Chen<sup>1</sup>, S. Chao<sup>1,2</sup>, L. Dai<sup>1,3</sup>, R. Liu<sup>1</sup>, <sup>1</sup>National University of Kaohsiung, Kaohsiung, Taiwan, <sup>2</sup>National Kaohsiung Marine University, Kaohsiung, Taiwan, <sup>3</sup>Chung Shan Institute of Science and Technology, Taoyuan, Taiwan</p>
<p><b>EuMC Poster01-2</b> <i>Complementary Double Spiral Resonators Localized on Embedded Capacitance for Ultra-Wideband Suppression of Simultaneous Switching Noise</i> H. Zhu, J. Mao, Shanghai Jiao Tong University, Shanghai, China</p>	<p><b>EuMC Poster01-7</b> <i>All Dielectric Metamaterials at Millimeter Wavelengths Using Single-Size TiO<sub>2</sub> Resonators : Simulation and Experiments</i> V. Vigneras<sup>1</sup>, R. Yahiaoui<sup>1,2</sup>, P. Mounaix<sup>2</sup>, U. Chung Seu<sup>3</sup>, C. Elissalde<sup>3</sup>, M. Maglione<sup>3</sup>, <sup>1</sup>University of Bordeaux, Pessac, France, <sup>2</sup>University of Bordeaux, Talence, France, <sup>3</sup>CNRS, Pessac, France</p>	<p><b>EuMC Poster01-12</b> <i>Closed-loop Adaptive Control Techniques for Matching Networks in the Uplink Mode</i> A. Danak, S. M. Ali, J. Warden, M. Pecun, BlackBerry, Waterloo, Canada</p>	<p><b>EuMC Poster01-18</b> <i>Low Voltage High-Order Agile Active Filter for Microwave Applications</i> L. Pantoli, V. Stornelli, G. Leuzzi, University of L'Aquila, L'Aquila, Italy</p>
<p><b>EuMC Poster01-3</b> <i>Scattering and Diffraction of TM Modes on a Grating Consisting of a Finite Number of Pre-Fractal Thin Impedance Strips</i> K. V. Nesvit, Karazin Kharkiv National University, Kharkiv, Ukraine</p>	<p><b>EuMC Poster01-8</b> <i>Differential Excitation of a Hybrid Antenna for a 75 GHz Antenna Array Implemented on a Multilayer PC Board</i> R. Juenemann<sup>1</sup>, A. Zielska<sup>1</sup>, A. Schiessl<sup>1</sup>, S. Methfessel<sup>2</sup>, L. Schmidt<sup>2</sup>, <sup>1</sup>Rohde &amp; Schwarz, Munich, Germany, <sup>2</sup>Institute for Microwaves and Photonics, University of Erlangen-Nuremberg, Erlangen, Germany</p>	<p><b>EuMC Poster01-13</b> <i>Embedded Resistors for High Frequency Applications on Printed Circuit Boards</i> A. Bauer<sup>1</sup>, J. Jakobi<sup>1</sup>, R. Gmiha<sup>1</sup>, D. Hageneder<sup>2</sup>, W. Bogner<sup>1</sup>, <sup>1</sup>HDU-University of Applied Sciences Deggendorf, Deggendorf, Germany, <sup>2</sup>Rohde &amp; Schwarz GmbH &amp; Co. KG Werk Teisnach, Teisnach, Germany</p>	<p><b>EuMC Poster01-19</b> <i>A Compact Multilayer Liquid Crystal Polymer Narrowband Bandpass Filter</i> S. Qian, J. Hong, Heriot-Watt University, Edinburgh, United Kingdom</p>
<p><b>EuMC Poster01-4</b> <i>An Efficient Closed-Form Expression of Spatial Green's Function for Finite Dielectric Substrate Using Characteristic Green's Function-Perfectly Matched Layer Method</i> A. Torabi, A. Shishegar, Sharif University of Technology, Tehran, Iran</p>	<p><b>EuMC Poster01-9</b> <i>Glass-Ceramics as Dielectrics for Antennas and Filters in Microwave Electronics</i> H. P. Braun<sup>1,2</sup>, M. Hovhannysyan<sup>3,1</sup>, Y. Zheng<sup>3</sup>, A. Mehmood<sup>3</sup>, R. Jakoby<sup>3</sup>, O. Leisten<sup>4</sup>, M. Letz<sup>1</sup>, <sup>1</sup>Schott AG, Mainz, Germany, <sup>2</sup>University of Mainz, Mainz, Germany, <sup>3</sup>TU Darmstadt, Darmstadt, Germany, <sup>4</sup>Sarantel Ltd., Wellingborough, United Kingdom</p>	<p><b>EuMC Poster01-14</b> <i>Wideband Tapered Antipodal Fin-Line Waveguide-to-Microstrip Transition for E-band Applications</i> A. Mozharovskiy<sup>1,2</sup>, A. Artemenko<sup>1,2</sup>, V. Ssorin<sup>1,2</sup>, R. Maslennikov<sup>1,2</sup>, A. Sevastyanov<sup>1,2</sup>, <sup>1</sup>Radio Gigabit LLC, Nizhny Novgorod, Russian Federation, <sup>2</sup>Lobachevsky University of Nizhny Novgorod, Nizhny Novgorod, Russian Federation</p>	<p><b>EuMC Poster01-20</b> <i>Low-Loss 3-Bit Tunable SIW Filter with PIN Diodes and Integrated Bias Network</i> S. Sirci<sup>1</sup>, J. D. Martinez<sup>2</sup>, V. E. Boria<sup>1</sup>, <sup>1</sup>Universidad Politécnica de Valencia, Valencia, Spain, <sup>2</sup>Universidad Politécnica de Valencia, Valencia, Spain</p>
<p><b>EuMC Poster01-5</b> <i>Optimizing Folded Dipole Array with Quick Smith Chart Manipulations Giving Broadband Absorption Surface and Optional Two-Way Communication</i> Y. Chang<sup>1,2</sup>, W. Che<sup>1</sup>, Y. L. Chow<sup>2,1</sup>, <sup>1</sup>Nanjing University of Science and Technology, Nanjing, China, <sup>2</sup>University of Waterloo, Waterloo, Canada</p>	<p><b>EuMC Poster01-10</b> <i>A Low-Cost Closed-Loop Antenna Tuner Module</i> M. A. de Jongh, A. van Bezooijen, T. Bakker, K. R. Boyle, J. Stulemeijer, TDK-epc, Nijmegen, Netherlands</p>	<p><b>EuMC Poster01-15</b> <i>On the Design of Dual-Polarization Directional Couplers</i> A. Morini<sup>1</sup>, M. Baldelli<sup>1</sup>, G. Venanzoni<sup>1</sup>, M. Farina<sup>1</sup>, P. Angeletti<sup>2</sup>, D. Petrolati<sup>2</sup>, G. Toso<sup>2</sup>, N. Sidiropoulos<sup>3</sup>, A. Catalani<sup>3</sup>, A. Didonato<sup>1</sup>, M. Tosti<sup>3</sup>, <sup>1</sup>Università Politecnica delle Marche, Ancona, Italy, <sup>2</sup>European Space Agency, Noordwijk, Netherlands, <sup>3</sup>Space Engineering, Rome, Italy</p>	<p><b>EuMC Poster01-21</b> <i>Discrete-tunable High-Q E-plane Filters</i> L. Pelliccia<sup>1</sup>, V. Nocella<sup>2</sup>, F. Cacciamani<sup>2</sup>, F. Gentili<sup>2</sup>, P. Farinelli<sup>1</sup>, R. Sorrentino<sup>2</sup>, <sup>1</sup>RF Microtech srl, Perugia, Italy, <sup>2</sup>University of Perugia, Perugia, Italy</p>
		<p><b>EuMC Poster01-16</b> <i>Design of Miniature Tri-band Filter with Multiple Types of Resonators</i> Y. Chiang, J. Chen, Chang Gung University, Kwei-Shan, Taiwan</p>	<p><b>EuMC Poster01-22</b> <i>A Novel Design Method for Highly Selective and Tunable Microwave Bandpass Filter</i> M. Yuceer<sup>1,2</sup>, I. C. Hunter<sup>2</sup>, <sup>1</sup>Turksat, Ankara, Turkey, <sup>2</sup>The University of Leeds, Leeds, United Kingdom</p>

## EuMC Poster Session

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<p><b>EuMC Poster01-23</b> <b>Investigation of Decoupling Between MRI Array Elements</b> M. Kozlov, R. Turner, Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany</p>	<p><b>EuMC Poster01-29</b> <b>A Novel FFT/IFFT Size Efficient Technique to Generate Real Time Optical OFDM Signals Compatible with IM/DD Systems</b> F. Barrami<sup>1,2</sup>, Y. Le Guennec<sup>2</sup>, E. Novako<sup>2</sup>, P. Busson<sup>1</sup>, <sup>1</sup>STMicroelectronics, Crolles, France, <sup>2</sup>Imep Lahc, Grenoble, France</p>	<p><b>EuMC Poster01-35</b> <b>Effective Utilization of Coaxial Connector for Millimeter Wave Multilayer Device Testing</b> A. Mozharovskiy<sup>1,2</sup>, V. Ssorin<sup>1,2</sup>, A. Artemenko<sup>1,2</sup>, R. Maslennikov<sup>1,2</sup>, A. Sevastyanov<sup>1,2</sup>, <sup>1</sup>Radio Gigabit LLC, Nizhny Novgorod, Russian Federation, <sup>2</sup>Lobachevsky University of Nizhny Novgorod, Nizhny Novgorod, Russian Federation</p>	<p><b>EuMC Poster01-40</b> <b>Improved Gain-Transfer Method for Long Antennas</b> G. Mayhew-Ridgers<sup>1</sup>, P. A. Van Jaarsveld<sup>1</sup>, J. W. Odendaal<sup>2</sup>, J. Joubert<sup>2</sup>, <sup>1</sup>Vodacom (Pty) Ltd., Midrand, South Africa, <sup>2</sup>University of Pretoria, Pretoria, South Africa</p>
<p><b>EuMC Poster01-24</b> <b>Mode Profile Shaping with 2D Periodic Array of Metallic Patches on Electrodes in SAW Resonators</b> J. Yoon<sup>1,2</sup>, M. Mayer<sup>2</sup>, T. Ebner<sup>2</sup>, K. Wagner<sup>2</sup>, A. Wixforth<sup>1</sup>, <sup>1</sup>University of Augsburg, Augsburg, Germany, <sup>2</sup>TDK/Epcos AG, Munich, Germany</p>	<p><b>EuMC Poster01-30</b> <b>Transformation of Gaussian-like Pulses by a Nonlinear Dielectric Layer</b> D. A. Zolotariov<sup>1,2</sup>, A. G. Nerukh<sup>2</sup>, <sup>1</sup>Kharkov National University of Radio Electronics, Kharkov, Ukraine, <sup>2</sup>Kharkov National University of Radio Electronics, Kharkov, Ukraine</p>	<p><b>EuMC Poster01-36</b> <b>Evaluation of Electromagnetic Field Characteristics Inside Carbon Fiber Reinforced Plastic Structure Using Reverberation Chamber Method</b> S. Futatsumori, A. Kohmura, N. Yonemoto, Electronic Navigation Research Institute, Chofu, Japan</p>	<p><b>EuMC Poster01-41</b> <b>OROTRON Intracavity Millimeter-Wave Spectroscopy of Weakly Bound Complexes and Small Clusters</b> L. A. Surin, Institute of Spectroscopy, Troitsk, Moscow, Russian Federation</p>
<p><b>EuMC Poster01-25</b> <b>Wideband Analysis of Scattering Problems Using an Eigenmode Projection Technique</b> M. H. Nasr, I. A. Eshrah, T. M. Abuefadel, Faculty of Engineering, Cairo University, Giza, Egypt</p>	<p><b>EuMC Poster01-31</b> <b>Modified Spiral RFID Tag Antenna Optimal Design Using Artificial Bee Colony Optimization</b> S. K. Goudos<sup>1</sup>, K. Siakavara<sup>1</sup>, J. N. Sahalos<sup>2</sup>, <sup>1</sup>Aristotle University of Thessaloniki, Thessaloniki, Greece, <sup>2</sup>University of Nicosia, Nicosia, Cyprus</p>	<p><b>EuMC Poster01-37</b> <b>New Verification Routine for pulsed I-V and Transient Current Measurement Setup Applied to a THz Schottky Diode</b> S. Khanal<sup>1</sup>, T. Kiuru<sup>2</sup>, J. Mallat<sup>1</sup>, A. Raisanen<sup>1</sup>, T. Närhi<sup>3</sup>, <sup>1</sup>Aalto University, Espoo, Finland, <sup>2</sup>VTT Technical Research Center of Finland/MilliLab, Espoo, Finland, <sup>3</sup>European Space Agency, RF Payload Systems Division Noordwijk, The Netherlands</p>	<p><b>EuMC Poster01-42</b> <b>1mm Coaxial Matches with an Excellent Absorption Behavior Over the Frequency Range 0 - 110GHz</b> A. Tag<sup>1</sup>, J. Leinhos<sup>2</sup>, G. Hechtischer<sup>2</sup>, M. Leibfritz<sup>2</sup>, T. Eibert<sup>3</sup>, <sup>1</sup>University of Erlangen-Nuremberg, Erlangen, Germany, <sup>2</sup>Rohde &amp; Schwarz GmbH &amp; Co. KG, Munich, Germany, <sup>3</sup>Technische Universität München, Munich, Germany</p>
<p><b>EuMC Poster01-26</b> <b>Planar Transmission Line Pickups for Beam Position Monitoring in Particle Accelerators</b> A. Angelovski<sup>1</sup>, A. Penirschke<sup>1</sup>, C. Sydlo<sup>2</sup>, U. Mavric<sup>2</sup>, C. Gerth<sup>2</sup>, R. Jakoby<sup>1</sup>, <sup>1</sup>Technische Universität Darmstadt, Darmstadt, Germany, <sup>2</sup>Deutsches Elektronen-Synchrotron DESY, Hamburg, Germany</p>	<p><b>EuMC Poster01-32</b> <b>Considerations of Small Cell Strategy in Mobile Communication Systems</b> H. Otsuka, Y. Ichimura, Y. Sakamoto, K. Kikuchi, Kogakuin University, Tokyo, Japan</p>	<p><b>EuMC Poster01-38</b> <b>Digitally-Controlled Calibrator for Measurement and Testing of CW Doppler Radars</b> V. Jenik, Z. Plhak, P. Hudec, P. Cerny, Czech Technical University in Prague, Praha 6, Czech Republic</p>	
<p><b>EuMC Poster01-27</b> <b>Improved Field Homogeneity for Microstrip Transceiver Array for 7T MRI using Particle Swarm Optimization</b> J. F. Stack, Jr., Remcom, Inc., State College, United States</p>	<p><b>EuMC Poster01-33</b> <b>Reduction of Human Body Effect on Mobile Handset Antennas</b> A. D. Grigoriev, Saint-Petersburg State Electrotechnical University (LETI), Saint-Petersburg, Russian Federation</p>	<p><b>EuMC Poster01-39</b> <b>A Proposal of a New Permittivity Measurement Method for Low-Loss Materials</b> Y. Kato, M. Ameya, M. Horibe, S. Kurokawa, National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan</p>	
<p><b>EuMC Poster01-28</b> <b>Broadband Detector Array Concept for 3D Holographic Imaging at THz Frequencies</b> C. Schildbach, J. Schür, L. Schmidt, Friedrich-Alexander University Erlangen-Nuremberg, Erlangen, Germany</p>	<p><b>EuMC Poster01-34</b> <b>Reducing the Interference in Compact MIMO Antennas of CRLH-TL-Based Broadside-Capacitive and Slot Couplings</b> K. Jang<sup>1</sup>, S. Kahng<sup>1</sup>, K. Kahng<sup>1</sup>, I. Yang<sup>1</sup>, Y. Kim<sup>2</sup>, <sup>1</sup>University of Incheon, Incheon, Republic of Korea, <sup>2</sup>Inha Technical College, Incheon, Republic of Korea</p>		



## Kiew

### EuMC30

#### Supply Modulation Techniques and Switched Mode PAs

Chair: Wolfgang Bösch, Graz University of Technology  
Co-Chair: Wolfgang Heinrich, Ferdinand-Braun-Institut (FBH)

#### *EuMC30-1 Efficient Linear Supply-Modulated PA with Harmonic Injection*

A. Dani, M. Coffey, Z. Popovic, University of Colorado Boulder, Boulder, United States

#### *EuMC30-2 Current Consumption Benefit of Adjustable Bias in Low-Power Mode of WCDMA Power Amplifiers*

B. Schleicher, A. Kryshypin, M. Holz, V. Wannenmacher, S. Weigand, TriQuint Semiconductor, Munich, Germany

#### *EuMC30-3 A GaN Voltage-Mode Class-D MMIC with Improved Overall Efficiency for Future RRH Applications*

A. Wentzel, W. Heinrich, Ferdinand-Braun-Institut (FBH), Berlin, Germany

#### *EuMC30-4 GaN-HEMTs as Switches for High-Power Wideband Supply Modulators*

M. Krellmann, O. Bengtsson, W. Heinrich, Ferdinand-Braun-Institut (FBH), Leibniz-Institut für Höchstfrequenztechnik, Berlin, Germany

#### *EuMC30-5 Comparative Evaluation of Different Current Saving Strategies for Power Amplifiers in Back-Off Operation*

S. Pinarello<sup>1,2</sup>, J. Mueller<sup>1</sup>, R. Weigel<sup>2</sup>,  
<sup>1</sup>Intel Mobile Communications, Neubiberg, Germany, <sup>2</sup>University of Erlangen-Nuremberg, Erlangen, Germany

## Riga

### EuMC31

#### Digital Communications in Wireless Systems

Chair: Geneviève Baudoin, ESIEE Paris  
Co-Chair: Jean Francois Diouris, Université de Nantes

#### *EuMC31-1 Demodulation of Aggregated RF Signal in Three Frequencies Bands with a Unique Rx Chain*

A. Kassoine<sup>1</sup>, B. Huyart<sup>1</sup>, K. Mabrouk<sup>2</sup>,  
<sup>1</sup>Telecom Paris Tech, Paris, France,  
<sup>2</sup>Esigete, Fountainebleau, France

#### *EuMC31-2 Improved BER Performance in GSM by Mitigating Non-linear Distortions in the Receiver*

M. Grimm<sup>1</sup>, R. Zemmati<sup>2</sup>, R. K. Sharma<sup>1</sup>, M. Hein<sup>1</sup>, R. Thomä<sup>1</sup>,<sup>1</sup>Ilmenau University of Technology, Ilmenau, Germany, <sup>2</sup>Fraunhofer FKIE, Wachtberg, Germany

#### *EuMC31-3 pPSK for Bandwidth and Energy Efficiency*

E. W. McCune, RF Communications Consulting, Santa Clara, United States

#### *EuMC31-4 Interference Rejection by Time Selective Sampling*

R. W. Jackson, M. Shusta, University of Massachusetts, Amherst, United States

#### *EuMC31-5 Quasi-LoS MIMO Wireless Communication with Twisted Radio Wave*

Z. Li, O. Yoji, K. Kasai, Fujitsu Laboratories Ltd., Kawasaki, Japan

## Istanbul

### EuMC32

#### Recent Developments in Passive Components

Chair: Vesna Crnojevic-Bengin, University of Novi Sad  
Co-Chair: Jan Machac, Czech Technical University in Prague

#### *EuMC32-1 Novel Tri-operational Mode Synthesized Transmission Line*

C. Lai, C. Shiau, T. Ma, National Taiwan University of Science and Technology, Taipei, Taiwan

#### *EuMC32-2 High-Q CRLH Transmission Line Stub Resonator Utilizing Negative Order Resonance Modes*

S. Tanaka, K. Mukaida, R. Sugita, Shibaura Institute of Technology, Tokyo, Japan

#### *EuMC32-3 Design, Fabrication and Characterization of 3D Microcoils with Air Core in Low Temperature Co-fired Ceramics Technology*

P. Krivic, Vienna University of Technology, Vienna, Austria

#### *EuMC32-4 Dual-Band Bi-Phase Waveguide Polarizer for a Novel Feeder Network without Orthomode Transducer*

C. A. Leal-Sevillano<sup>1</sup>, J. A. Ruiz-Cruz<sup>2</sup>, J. R. Montejó-Garai<sup>1</sup>, J. M. Rebollar<sup>1</sup>,  
<sup>1</sup>Universidad Politécnica de Madrid, Madrid, Spain, <sup>2</sup>Universidad Autónoma de Madrid, Madrid, Spain

#### *EuMC32-5 Planar Orthogonal Mode Transducer Based on Orthogonal LSM<sub>10</sub> and TE<sub>10</sub> Modal Fields of Co-layered Image SINRD (iSINRD) and SIW Guides*

J. Attari, K. Wu, Poly-Grames Research Center and Center for Radiofrequency Electronics Research of Quebec (CREER), Montreal, Canada

## Kopenhagen

### EuMC33

#### Microwave Systems for Characterisation and Heating

Chair: Dimytro Vavriv, Institute of Radio Astronomy  
Co-Chair: Dominique Schreurs, KU Leuven

#### *EuMC33-1 RF Transmit Performance Comparison for Several MRI Head Array Geometries*

M. Kozlov, R. Turner, Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany

#### *EuMC33-2 Advanced Non-Contact Near-Field Proximity Vital Sign Sensor Using Phase Locked Loop*

Y. Hong<sup>2,1</sup>, S. Kim<sup>1</sup>, B. Kim<sup>1</sup>, H. Lee<sup>3</sup>, G. Yun<sup>4</sup>, J. Yook<sup>1</sup>,  
<sup>1</sup>Yonsei University, Seoul, Republic of Korea, <sup>2</sup>Samsung Thales, Yongin, Republic of Korea, <sup>3</sup>Yonsei University, Seoul, Republic of Korea, <sup>4</sup>Sungkyul University, Anyang, Republic of Korea

#### *EuMC33-3 Dielectric Characterization of Water-Methanol Mixtures up to 110 GHz Using a CPW Sensor in LTCC Technology*

S. Liu<sup>1</sup>, I. Ocket<sup>2,1</sup>, D. Schreurs<sup>1</sup>, B. Nauwelaers<sup>1</sup>, W. De Raedt<sup>2</sup>,  
<sup>1</sup>University of Leuven, Heverlee, Belgium, <sup>2</sup>Interuniversity Microelectronics Center, Heverlee, Belgium

#### *EuMC33-4 A 60 GHz Liquid Sensing Substrate Integrated Cavity in LTCC*

S. Liu<sup>1</sup>, I. Ocket<sup>2,1</sup>, D. Schreurs<sup>1</sup>, B. Nauwelaers<sup>1</sup>, W. De Raedt<sup>2</sup>,  
<sup>1</sup>University of Leuven, Heverlee, Belgium, <sup>2</sup>Interuniversity Microelectronics Center, Heverlee, Belgium

#### *EuMC33-5 Development of a Microwave Enhanced Bagasse Hydrolysis Process for Ethanol Production*

L. A. Jermolovicius, J. T. Senise, E. V. Pouzada, R. B. do Nascimento, E. R. de Castro, Instituto Maua de Tecnologia, Sao Caetano do Sul, Brazil





# EUROPEAN MICROWAVE WEEK



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- Short walk to the Messe

*Rooms from* €112.00

### **Arvena Park Hotel - ★★★★★**

*Görlitzer Strasse 51, 90473 Nuremberg*

- Next to the Station
- 4 minutes on U1 or U11 to Messe

*Rooms from* €96.00

### **Maritim Hotel - ★★★★★**

*Frauentorgraben 11, 90443 Nuremberg*

- Short walk to Hauptbahnhof Central Station
- 8 minutes on U1 or U11 to Messe

*Rooms from* €153.00

### **Holiday Inn Nürnberg City Centre - ★★★★★**

*Engelhardsgasse 12, 90402 Nuremberg*

- Short walk to Hauptbahnhof Central Station
- 8 minutes on U1 or U11 to Messe

*Rooms from* €165.00

### **NH Hotel Nürnberg City - ★★★★★**

*Bahnhofstrasse 17-19, 90402 Nuremberg*

- Short walk to Hauptbahnhof Central Station
- 8 minutes on U1 or U11 to Messe

*Rooms from* €104.00

### **Wöhrdersee Hotel Mercure Nürnberg City - ★★★★★**

*Duerrenhofstrasse 8, 90402 Nuremberg*

- Short walk to Hauptbahnhof Central Station
- 8 minutes on U1 or U11 to Messe

*Rooms from* €124.00

### **Arvena Messe Am Messezentrum - ★★★**

*Bertold-Brecht-Strasse 2, 90471 Nuremberg*

- Short walk to the Messe

*Rooms from* €90.00

### **Ramada Nürnberg Landhotel - ★★★**

*Oelser Strasse 2, 90475 Nuremberg*

- Short walk to the Messe

*Rooms from* €88.00

### **Ringhotel Loew's Merkur - ★★★**

*Pillenreuther Strasse 1, 90459 Nuremberg*

- Short walk to Hauptbahnhof Central Station
- 8 minutes on U1 or U11 to Messe

*Rooms from* €93.00

### **Best Western Hotel Nürnberg - ★★★**

*Allersberger Strasse 35, 90461 Nuremberg*

- Short walk to Hauptbahnhof Central Station
- 8 minutes on U1 or U11 to Messe

*Rooms from* €77.00

### **Invite Hotel Nürnberg City - ★★★**

*Landgrabenstrasse 25, 90443 Nuremberg*

- Short walk to Hauptbahnhof Central Station
- 8 minutes on U1 or U11 to Messe

*Rooms from* €69.00

### **Motel One Nürnberg City - ★★★**

*Bahnhofstrasse 18, 90402 Nuremberg*

- Short walk to Hauptbahnhof Central Station
- 8 minutes on U1 or U11 to Messe

*Rooms from* €59.00

## Stockholm

### EuMC34

#### Numerical Modeling and Optimization

Chair: Maurizio Bozzi,  
University of Pavia  
Co-Chair: Vicente E. Boria,  
Universidad Politécnica de Valencia

### EuMC34-1

#### Fast SAR Assessment Using Spherical Modes

A. Bellaouel<sup>1,2</sup>, A. Gati<sup>1</sup>, A. Hadjem<sup>1</sup>,  
J. Wiart<sup>1</sup>, D. Lautru<sup>2</sup>, V. Fouad Hanna<sup>2</sup>,  
<sup>1</sup>Orange Labs, Issy-Les-Moulineaux,  
France, <sup>2</sup>UPMC Univ Paris 06 UR 2,  
Paris, France

### EuMC34-2

#### Modelling Material Interfaces in Structured Nonorthogonal Finite-Difference Methods

R. B. Armenta<sup>1</sup>, C. D. Sarri<sup>2</sup>, <sup>1</sup>Simon Fraser University, Burnaby, Canada,  
<sup>2</sup>University of Toronto, Toronto, Canada

### EuMC34-3

#### Singlet Formed by Two Transversal Ridges in a Rectangular Waveguide from the Spectral Theory Point of View

L. P. Mospan, S. A. Prikolotin,  
A. A. Kirilenko, O. Ya. Usikov Institute  
for Radiophysics and Electronics of  
the National Academy of Sciences of  
Ukraine, Kharkov, Ukraine

### EuMC34-4

#### Topology Optimization Method for Microstrips using Boundary Condition Representation and Adjoint Analysis

T. Nomura<sup>1</sup>, M. Ohkado<sup>2</sup>, P. Schmalenberg<sup>1</sup>,  
J. Lee<sup>1</sup>, O. Ahmed<sup>3</sup>, M. Bakr<sup>3</sup>, <sup>1</sup>Toyota Research  
Institute of North America, Ann Arbor, United  
States, <sup>2</sup>Toyota Central R&D Labs., Inc.,  
Nagakute, Japan, <sup>3</sup>McMaster University,  
Hamilton, Canada

### EuMC34-5

#### Application of Aggressive Space Mapping (ASM) to the Efficient Synthesis of Stepped Impedance Resonators (SIRs)

J. Selga<sup>1</sup>, A. Rodríguez<sup>2</sup>, J. Naqui<sup>1</sup>,  
M. Duran-Sindreu<sup>1</sup>, V. E. Boria<sup>2</sup>, F. Martín<sup>1</sup>,  
<sup>1</sup>Universitat Autònoma de Barcelona,  
Bellaterra, Spain, <sup>2</sup>Universidad Politécnica de  
Valencia, Valencia, Spain

## Helsinki

### EuMC35

#### Multiband and UWB Antennas

Chair: Bart Nauwelaers, KU Leuven  
Co-Chair: Marco Pasian,  
Università degli Studi di Pavia

### EuMC35-1

#### On the Design of a 3D LTE Antenna for Automotive Applications based on MID Technology

A. Friedrich<sup>1</sup>, B. Geck<sup>1</sup>, O. Klemp<sup>2</sup>,  
H. Kellermann<sup>2</sup>, <sup>1</sup>Leibniz Universität  
Hannover, Hannover, Germany,  
<sup>2</sup>BMW Forschung und Technik GmbH,  
München, Germany

### EuMC35-2

#### A Novel Circularly-Polarised Quad-Band Patch Antenna for Satellite Applications

S. E. Valavan, D. Tran, A. G. Yarovoy,  
Delft University of Technology, Delft,  
Netherlands

### EuMC35-3

#### A Curved-Edge Dipole Antenna for UWB Applications

C. Rave, T. Jäschke, B. Rohrdantz,  
A. F. Jacob, Technische Universität  
Hamburg-Harburg, Hamburg, Germany

### EuMC35-4

#### Multiband Circularly-Polarized Planar Array Based on the Complementary Strip-Slot Element

E. Abdo-Sánchez<sup>1</sup>, C. Camacho-  
Peñalosa<sup>1</sup>, T. Martín-Guerrero<sup>1</sup>,  
J. Esteban<sup>2</sup>, J. Page<sup>2</sup>, <sup>1</sup>Universidad de  
Málaga, Málaga, Spain, <sup>2</sup>Universidad  
Politécnica de Madrid, Madrid, Spain

### EuMC35-5

#### Design of Novel Multi-band Printed Dipole Antennas Fed by a Modified Microstrip Ring Hybrid

L. Cheng, F. Chen, National Chiao Tung  
University, Hsinchu, Taiwan

## Shanghai

### EuMC36

#### Special Session Eastern Europe 3 - New Concepts for Filters and Antennas

Chair: Michal Mrozowski,  
Gdansk University of Technology  
Co-Chair: Dmitry Kholodnyak,  
St. Petersburg Electrotechnical  
University LETI

### EuMC36-1

#### Small-size Dual-band Filters on Capacitively Loaded Cavities

V. M. Turgaliev, D. V. Kholodnyak,  
I. B. Vendik, St. Petersburg  
Electrotechnical University «LETI»,  
St. Petersburg, Russian Federation

### EuMC36-2

#### Coupling Matrix Synthesis by Optimization with Hybrid Cost Function Based on Hausdorff Distance and Wavelet D4 Transform

T. Kacmajor<sup>1</sup>, J. J. Michalski<sup>1</sup>,  
J. Gulowski<sup>2</sup>, <sup>1</sup>TeleMobile Electronics  
Ltd., Gdynia, Poland, <sup>2</sup>University of  
Gdansk, Gdansk, Poland

### EuMC36-3

#### MM-wave Left-Handed Transmission Line Antenna on Anisotropic Substrate

G. Sajin<sup>1</sup>, I. Mocanu<sup>1,2</sup>, F. Craciunoiu<sup>1</sup>,  
M. Carp<sup>1</sup>, <sup>1</sup>IMT Bucharest, Bucharest,  
Romania, <sup>2</sup>Politechnica University  
Bucharest, Bucharest, Romania

### EuMC36-4

#### Tunable High-Temperature Superconductor Filter Using Ferroelectric Capacitors

I. Vendik<sup>1</sup>, V. Pleskachev<sup>1</sup>, E. Zameshaeva<sup>1</sup>,  
P. Turalchuk<sup>1</sup>, D. Kholodnyak<sup>1</sup>, S. Zubko<sup>1</sup>,  
I. Kolmakova<sup>1</sup>, I. Munina<sup>1</sup>, V. Turgaliev<sup>1</sup>,  
X. Wang<sup>2</sup>, N. Li<sup>2</sup>, L. Sun<sup>2</sup>, Y. He<sup>2</sup>, <sup>1</sup>St. Petersburg  
Electrotechnical University,  
St. Petersburg, Russian Federation, <sup>2</sup>Institute  
of Physics, Chinese Academy of Sciences,  
Beijing, China

### EuMC36-5

#### Tunable Ferroelectric Ceramic-Polymer Composites for Sub-THz Applications

Y. Yashchyn<sup>1</sup>, K. Godziszewski<sup>1</sup>, P. Bajurko<sup>1</sup>,  
J. Modelska<sup>1</sup>, M. Szafran<sup>2</sup>, E. Bobryk<sup>2</sup>,  
E. Pawlikowska<sup>2</sup>, G. Tarapata<sup>3</sup>, J. Weremczuk<sup>3</sup>,  
R. Jachowicz<sup>3</sup>, <sup>1</sup>Warsaw University of Technology,  
Warsaw, Poland, <sup>2</sup>Warsaw University of  
Technology, Warsaw, Poland, <sup>3</sup>Warsaw University  
of Technology, Warsaw, Poland

13:50h - 14:10h

14:10h - 14:30h

14:30h - 14:50h

14:50h - 15:10h

15:10h - 15:30h

## Kiew

### EuMC37

#### High Efficiency Power Amplifiers

Chair: Paolo Colantino,  
University of Rome Tor Vergata  
Co-Chair: John Walker, Integratech

## Riga

### EuMC38

#### Wireless Technologies and Measurements in Biological Problems

Chair: Geneviève Baudoin, ESIEE Paris  
Co-Chair: Luciano Tarricone,  
University of Salento, Lecce

## Kopenhagen

### EuMC39

#### Measuring and Communication Techniques

Chair: Tuami Lasri,  
University Lille1/IEMN  
Co-Chair: Rolf Jakoby, TU Darmstadt

16:00h - 16:20h

#### EuMC37-1

##### A Zero Capacitive LINC Architecture for Efficient Broadband Transmitters

A. Koukab, O. Talebi Amiri, Swiss  
Federal Institute of Technology  
in Lausanne (EPFL), Lausanne,  
Switzerland

#### EuMC38-1

##### Interaction of the Human Body on the Performance of Class E PAs in Body Area Networks

G. T. Watkins, Toshiba Research Europe  
Limited, Bristol, United Kingdom

#### EuMC39-1

##### Influence of Single and Multiple Antenna Placements on the Capacity of C2C Communication Systems

L. Reichardt, T. Mahler, T. Schipper,  
T. Zwick, Karlsruhe Institute of  
Technology, Karlsruhe, Germany

16:20h - 16:40h

#### EuMC37-2

##### A LSNA Configured to Perform Baseband Engineering for Device Linearity Investigations under Modulated Excitations

F. L. Ogboi<sup>1</sup>, M. Akmal<sup>1</sup>, H. Choi<sup>1</sup>, J. Lees<sup>1</sup>,  
J. Benedikt<sup>1</sup>, P. Tasker<sup>1</sup>, S. Bensmida<sup>2</sup>,  
K. Morris<sup>2</sup>, M. Beach<sup>2</sup>, J. McGeehan<sup>2</sup>,  
<sup>1</sup>Cardiff University, Cardiff, United Kingdom,  
<sup>2</sup>University of Bristol, Bristol,  
United Kingdom

#### EuMC38-2

##### Verification of Bio-radiolocation Method with Respiratory Plethysmography for Non-contact Remote Breathing Monitoring

M. Alekhin<sup>1</sup>, L. Anishchenko<sup>1</sup>, A. Zhuravlev<sup>1</sup>,  
A. Tataraidze<sup>1</sup>, V. Razevig<sup>1</sup>, I. Vasilyev<sup>1</sup>, V.  
Parashin<sup>1</sup>, S. Ivashov<sup>1</sup>, A. Bugaev<sup>2</sup>, <sup>1</sup>Bauman  
Moscow State Technical University, Moscow,  
Russian Federation, <sup>2</sup>Moscow Institute of Physics  
and Technology, Dolgoprudny, Russian Federation

#### EuMC39-2

##### Ultra-wideband based Dynamic Target Tracking using Cost-Reference Particle Filtering

D. Kakkar<sup>1</sup>, P. Karbownik<sup>2</sup>, T. Nowak<sup>2</sup>,  
G. Krukar<sup>2</sup>, N. Franke<sup>2</sup>, R. Galas<sup>1</sup>,  
<sup>1</sup>Technical University Berlin, Berlin,  
Germany, <sup>2</sup>Fraunhofer Institute for  
Integrated Circuits, Nuremberg,  
Germany

16:40h - 17:00h

#### EuMC37-3

##### A 20W Ka-band Radial Solid-State Power Amplifier with 20% Associated Power-Added Efficiency

J. Frayse<sup>1</sup>, G. Soubercaze-Pun<sup>2</sup>,  
L. Lapiere<sup>2</sup>, J. Richard<sup>1</sup>, M. Maignan<sup>1</sup>,  
J. Denoual<sup>3</sup>, A. Peden<sup>3</sup>, <sup>1</sup>Thales Alenia  
Space, Toulouse, France, <sup>2</sup>CNES, Toulouse,  
France, <sup>3</sup>Lab-STICC, Brest, France

#### EuMC38-3

##### Effects of Tuning Condition, Head Size and Position on the SAR of MRI Dual-Row Transmit Arrays

M. Kozlov, R. Turner, Max Planck  
Institute for Human Cognitive and  
Brain Sciences, Leipzig, Germany

#### EuMC39-3

##### Linearity Study of Path Imbalances in Multi-level LINC Transmitter for Wideband LTE Application

J. Guan, A. F. Aref, T. Hone, R. Negra,  
RWTH Aachen University, Aachen,  
Germany

17:00h - 17:20h

#### EuMC37-4

##### Highly Efficient Carrier Bursting RF Transmitter Employing Direct Band Pass Filter Connection

D. Seebacher<sup>1</sup>, W. Bösch<sup>1</sup>, P. Singerl<sup>2</sup>,  
C. Schuberth<sup>2</sup>, <sup>1</sup>Graz University of  
Technology, Graz, Austria, <sup>2</sup>Infineon  
Technologies, Villach, Austria

#### EuMC38-4

##### Estimation of 433 MHz Path Loss in Algae Culture for Biosensor Capsule Application

N. Todtenberg, T. Basmer, IHP, Frankfurt  
(Oder), Germany

#### EuMC39-4

##### Analytical Methods for the Evaluation of the Impact of the VCO Phase Noise and the Modulator IQ Imbalance for a QAM Modulation

R. Djenadi, C. Berland, Esiee Paris,  
Noisy Le Grand, France

17:20h - 17:40h

#### EuMC37-5

##### Bandwidth versus Efficiency Performance using Power Combining in GaN HEMT Power Amplifiers

S. Preis<sup>1</sup>, M. T. Arnous<sup>1</sup>, G. Boeck<sup>1,2</sup>,  
<sup>1</sup>Berlin Institute of Technology, Berlin,  
Germany, <sup>2</sup>Ferdinand-Braun-Institut,  
Berlin, Germany

#### EuMC38-5

##### Wideband Measurements and Linearization of a Simplified Architecture for Analog RF-PWM

D. Markert<sup>1</sup>, C. Haslach<sup>1</sup>, G. Luz<sup>1</sup>,  
G. Fischer<sup>2</sup>, A. Pascht<sup>1</sup>, <sup>1</sup>Bell Labs,  
Alcatel-Lucent, Stuttgart, Germany,  
<sup>2</sup>University Erlangen-Nuremberg,  
Erlangen, Germany

#### EuMC39-5

##### Emulation Platform for Coexistence Analysis in Wireless Automation

M. Ullmann<sup>1</sup>, S. Hoener<sup>1</sup>, A. Frotzsch<sup>2</sup>,  
U. Wetzker<sup>2</sup>, I. Splitt<sup>2</sup>, M. Galetzka<sup>2</sup>,  
<sup>1</sup>Signalion GmbH, Dresden, Germany,  
<sup>2</sup>Fraunhofer Institute for Integrated  
Circuits IIS, Dresden, Germany



## Stockholm

### EuMC40

#### Sub-Millimeter and Millimeter-Wave Communications and Sensing

Chair: Ingmar Kallfass,  
University of Stuttgart  
Co-Chair: Jan Stake, Chalmers  
University of Technology

#### EuMC40-1

##### A Highly Flexible Digital Radio Testbed and 60 GHz Application Examples

W. Keusgen<sup>1</sup>, A. Kortke<sup>2</sup>, M. Peter<sup>1</sup>,  
R. Weiler<sup>1</sup>, <sup>1</sup>Fraunhofer Heinrich Hertz  
Institute, Berlin, Germany, <sup>2</sup>Technical  
University of Berlin, Berlin, Germany

#### EuMC40-2

##### 10-Gbit/s Dual Channel Transmission of 120-GHz-Band Wireless Link Using Planar Slot Array Antennas

A. Hirata<sup>1</sup>, J. Takeuchi<sup>1</sup>, D. Kim<sup>2</sup>,  
J. Hirokawa<sup>2</sup>, <sup>1</sup>NTT Corporation, Atsugi,  
Japan, <sup>2</sup>Tokyo Institute of Technology,  
Meguro-ku, Japan

#### EuMC40-3

##### GaN Field Effect Transistors with Integrated Antennas for THz Heterodyne Detectors

M. Dispenza<sup>1</sup>, F. Crispoldi<sup>1</sup>, A. Nanni<sup>1</sup>,  
C. Lanzieri<sup>1</sup>, A. DiGaspere<sup>2</sup>,  
V. Giliaberti<sup>2</sup>, R. Casini<sup>2</sup>, M. Ortolani<sup>2</sup>,  
E. Giovine<sup>2</sup>, F. Evangelisti<sup>2</sup>, <sup>1</sup>Selex ES,  
Rome, Italy, <sup>2</sup>CNR - Istituto Fotonica e  
Nanotecnologie, Rome, Italy

#### EuMC40-4

##### Low-Jitter Electrooptic Sampling of Active mm-Wave Devices up to 300 GHz

M. Jamshidifar, G. Spickermann,  
H. S. Eberwein, P. H. Bolivar, HQE,  
Siegen, Germany

#### EuMC40-5

##### THz Josephson Spectral Analysis

Y. Divin<sup>1</sup>, U. Poppe<sup>1</sup>, K. Urban<sup>1</sup>,  
M. Lyatti<sup>1,2</sup>, A. Snezhko<sup>1,2</sup>,  
I. Gundareva<sup>1,2</sup>, O. Volkov<sup>2</sup>,  
V. Pavlovskiy<sup>2</sup>, V. Gubankov<sup>2</sup>,  
<sup>1</sup>Forschungszentrum Jülich, Jülich,  
Germany, <sup>2</sup>Russian Academy of  
Sciences, Moscow, Russian Federation

## Helsinki

### EuMC41

#### Novel Materials and Reconfigurable Antennas

Chair: Ioan Lager,  
Delft University of Technology  
Co-Chair: Christian Friesicke,  
TU Hamburg-Harburg

#### EuMC41-1

##### Liquid Crystal Based Tunable Composite Right/Left-Handed Leaky-Wave Antenna for Ka-Band Applications

M. Roig, M. Maasch, C. Damm,  
O. H. Karabey, R. Jakoby, Technische  
Universität Darmstadt, Darmstadt,  
Germany

#### EuMC41-2

##### Compact Dual-Band Hybrid Dielectric Resonator Antenna Based on New Glass-Ceramic Material

A. Mehmood<sup>1</sup>, Y. Sun<sup>1</sup>, Y. Zheng<sup>1</sup>,  
O. Karabey<sup>1</sup>, H. Braun<sup>2,3</sup>, M.  
Hovhannisyanyan<sup>1,3</sup>, M. Letz<sup>3</sup>, R. Jakoby<sup>1</sup>,  
<sup>1</sup>TU Darmstadt, Darmstadt, Germany,  
<sup>2</sup>University of Mainz, Mainz, Germany,  
<sup>3</sup>Schott AG, Mainz, Germany

#### EuMC41-3

##### Reconfigurable Independent Multiband Printed Inverted F-Antenna for Wireless USB Applications

D. M. Elsheakh<sup>2</sup>, A. M. Soliman<sup>2</sup>, E.  
A. Abdallah<sup>2</sup>, H. M. El-Henawy<sup>2,1</sup>,  
<sup>1</sup>Electronics Research Institute, Dokki,  
Egypt, <sup>2</sup>Ain Shams University, Faculty of  
Engineering, Abassia, Egypt

#### EuMC41-4

##### Microwave Performance of a Carbon Composite Antenna

L. Manac'h<sup>1,2</sup>, X. Castel<sup>1,2</sup>,  
M. Himdi<sup>1</sup>, <sup>1</sup>Institute of Electronics  
and Telecommunications of Rennes,  
Rennes, France, <sup>2</sup>Institute of Electronics  
and Telecommunications of Rennes,  
Saint Briec, France

#### EuMC41-5

##### Compact MIMO Antenna with Simple Decoupling Method

J. Li, Q. Chu, School of Electronic and  
Information Engineering, Guangzhou,  
China

## Oslo

### EuMC/EuRAD01

#### RF Engineering and Education

Chair: Dietmar Kissinger,  
University of Erlangen Nürnberg  
Co-Chair: Bianca Will,  
Ruhr-University Bochum

#### EuMC/EuRAD01-1

##### Active Learning, Hardware Projects and Reverse Instruction in Microwave/RF Education

B. Pejcinovic, R. L. Campbell, Portland  
State University, Portland, United States

#### EuMC/EuRAD01-2

##### Activating Teaching for Quality Learning

V. Zhurbenko, Technical University of  
Denmark, Kgs. Lyngby, Denmark

#### EuMC/EuRAD01-3

##### Using UltraWideband to Teach Electromagnetics

A. M. Petroff, Time Domain, Huntsville,  
United States

#### EuMC/EuRAD01-4

##### Photonic Crystal Waveguide Design: A Didactic Microwave Approach

T. P. Passeto<sup>1</sup>, A. S. Sombra<sup>3</sup>, V. F. Rodríguez-  
Esquerre<sup>4</sup>, S. E. Barbin<sup>2</sup>, H. E. Hernández-  
Figueroa<sup>1</sup>, <sup>1</sup>University of Campinas,  
Campinas, Brazil, <sup>2</sup>University of Sao Paulo,  
Sao Paulo, Brazil, <sup>3</sup>Federal University of  
Ceara, Fortaleza, Brazil, <sup>4</sup>Federal University of  
Bahia, Salvador, Brazil

16:00h - 16:20h

16:20h - 16:40h

16:40h - 17:00h

17:00h - 17:20h

17:20h - 17:40h

## Kiew

### EuMC42

#### Emerging Microwave Technologies

Chair: Ioan Lager,  
Delft University of Technology  
Co-Chair: Kamal K. Samanta, Milmega

## Istanbul

### EuMC43

#### Tunable and Reconfigurable Filters 1

Chair: Serge Verdeyme,  
XLIM University of Limoges  
Co-Chair: Ian Robertson,  
University of Leeds

## Shanghai

### EuMC44

#### Signal Generators

Chair: Antti Räisänen, Aalto University  
Co-Chair: Wolfgang Heinrich,  
Ferdinand-Braun-Institut (FBH)

08:30h - 08:50h

#### ***EuMC42-1 Novel Family of Broadband Nanocomposite Absorbers with Carbon Nanotubes in Solid Polymer Films***

A. Emplit, I. Huynen, F. Tao, C. Bailly,  
Information and Communications  
Technologies, Electronics and Applied  
Mathematics (ICTEAM), Louvain-la-  
Neuve, Belgium

#### ***EuMC43-1 Optically Reconfigurable E-plane Waveguide Resonators and Filters***

N. Mohottige<sup>1</sup>, C. J. Panagamuwa<sup>2</sup>,  
D. Budimir<sup>1</sup>, <sup>1</sup>University of  
Westminster, London, United  
Kingdom, <sup>2</sup>Loughborough University,  
Loughborough, United Kingdom

#### ***EuMC44-1 Compact High-Power Oscillator With 2.45GHz Differential Output***

C. Bansleben, W. Heinrich, Ferdinand-  
Braun-Institut (FBH), Leibniz-Institut  
für Höchstfrequenztechnik, Berlin,  
Germany

08:50h - 09:10h

#### ***EuMC42-2 Effects of Controlled Formation of Magnetic Domains in Patterned Permalloy Thin Films on RFIC Spiral Inductors***

V. Pulijala, A. Syed, International  
Institute of Information Technology,  
Hyderabad, India

#### ***EuMC43-2 RF MEMS Hairpin Filter With Three Reconfigurable Bandwidth States***

F. Gentili<sup>1</sup>, F. Cacciamani<sup>1</sup>, V. Nocella<sup>1</sup>,  
L. Pelliccia<sup>2</sup>, R. Sorrentino<sup>1</sup>, <sup>1</sup>Università  
di Perugia, Perugia, Italy, <sup>2</sup>RF Microtech,  
Perugia, Italy

#### ***EuMC44-2 An Ultra-Low Power Self-Oscillating Mixer for WSN Applications***

H. Kraimia, T. Taris, J. Begueret, Y. Deval,  
IMS Laboratory, Talence, France

09:10h - 09:30h

#### ***EuMC42-3 Effects of Particle Size on Magnetic and Dielectric Properties of Ferrites at Microwave and Millimeterwave Frequencies***

A. Sharma, M. N. Afsar, High Frequency  
Materials Measurement and  
Information Centre, Medford, United  
States

#### ***EuMC43-3 Tunable Dual-Mode Bandpass Filter Based on Liquid Crystal Technology***

J. Torrecilla Rosell, C. Marcos Lucas,  
V. Urruchi del Pozo, J. Sánchez-Pena,  
Universidad Carlos III de Madrid,  
Leganés, Spain

#### ***EuMC44-3 Phase Noise Improvement Using Digitally Controlled Artificial Dielectric***

J. Yu, F. F. Dai, Auburn University,  
Auburn, United States

09:30h - 09:50h

#### ***EuMC42-4 Multimaterial Inkjet Technology for the Fabrication of Microwave Components.***

R. Rammal<sup>1</sup>, N. Delhote<sup>1</sup>, O. Tantot<sup>1</sup>,  
S. Verdeyme<sup>1</sup>, C. Dossou-Yovo<sup>2</sup>,  
R. Noguera<sup>2</sup>, G. Di-Vita<sup>3</sup>, T. Chartier<sup>3</sup>,  
L. Estagerie<sup>4</sup>, <sup>1</sup>XLIM, Limoges, France,  
<sup>2</sup>Ceradrop, Limoges, France, <sup>3</sup>SPCTS,  
Limoges, France, <sup>4</sup>CNES, Toulouse, France

#### ***EuMC43-4 Compact Triple-Mode Bandpass Filter Using a Spherical Dielectric Resonator***

N. Park<sup>1</sup>, D. Lee<sup>1</sup>, B. Kim<sup>1</sup>, J. Won<sup>1</sup>, I.  
Na<sup>1</sup>, G. Jang<sup>1</sup>, Y. Cho<sup>2</sup>, X. Wang<sup>2</sup>, S.  
Yun<sup>2</sup>, <sup>1</sup>KMW Co., Hwasung-Si, Republic  
of Korea, <sup>2</sup>Sogang university, Seoul,  
Republic of Korea

#### ***EuMC44-4 Reversible Operation of a CMOS Colpitts VCO as a W-band Passive Detector and Energy Harvester***

N. Weissman, S. Jameson, E. Socher,  
Tel Aviv University, Tel Aviv, Israel

09:50h - 10:10h

#### ***EuMC42-5 Modeling and Characterization of Copper Adhesive Tape Microstrips on Paper Substrate***

C. Mariotti, F. Alimenti, P. Mezzanotte,  
M. Dionigi, M. Virili, S. Giacomucci,  
L. Roselli, University of Perugia,  
Perugia, Italy

#### ***EuMC43-5 Design of Compact Ultra-Selective Filters for Multiradio Front-Ends***

A. Périgaud<sup>1</sup>, S. Bila<sup>1</sup>, S. Verdeyme<sup>1</sup>, A. Elhadbi<sup>2</sup>,  
J. Coupez<sup>2</sup>, C. Person<sup>2</sup>, J. Le Naour<sup>3</sup>, J. Robert<sup>3</sup>,  
D. Lo Hine Tong<sup>2</sup>, A. Louzir<sup>3</sup>, <sup>1</sup>XLIM UMR 7252  
Université de Limoges/CNRS, Limoges, France,  
<sup>2</sup>Labsticc / Télécom Bretagne, Brest, France,  
<sup>3</sup>Technicolor, Cesson-Sévigné, France

#### ***EuMC44-5 Investigation on Oscillation Mode-jump Phenomenon in Reflection Type of Self-injection Locked NRD Guide Gunn Oscillator at 60GHz***

T. Tanaka, F. Kuroki, Kure National  
College of Technology, 2-2-11,  
Aga-Minami, Kure, Japan

## EuMC45

### Special Session on APMC

Chair: Lorenz-Peter Schmidt,  
University of Erlangen-Nürnberg  
Co-Chair: Songcheol Hong,  
Wave Embedded Integrated Systems Lab

8:30h – 8:40h

#### Introduction

Roberto Sorrentino,  
EuMA International Officer, University of Perugia, Italy

08:40h – 09:10h

#### EUMC45-1

##### Hybrid Metamaterial Antennas

J. Lee, S. Ko, B. Park, Hongik University, Seoul, Korea

09:10h – 09:40h

#### EUMC45-2

##### Multi-Mode SDR VSAT Against Big Disasters

N. Suematsu<sup>1</sup>, S. Kameda<sup>1</sup>, H. Oguma<sup>2</sup>, M. Sasanuma<sup>3</sup>, S. Eguchi<sup>4</sup>,  
K. Kuroda<sup>5</sup>, <sup>1</sup>Tohoku University, Sendai, Japan, <sup>2</sup>Toyama National  
College of Technology, Toyama, Japan, <sup>3</sup>SKY Perfect JSAT Corporation,  
Tokyo, Japan, <sup>4</sup>ISB Corporation, Yokohama, Japan, <sup>5</sup>Cyber Creative  
Institute, Tokyo, Japan

09:40h – 10:10h

#### EUMC45-3

##### Radar Design for Wireless Indoor Positioning Applications

R. Lee, J. Wu, S. Chang, S. Chang, C. Chang, Yi-Ming Chen  
National Chung Cheng University, Chia-Yi, Taiwan

## EuMC46

### Focused Session - Microwaves in Agriculture, Environment and Earth Observation (MAGEO)

Chair: Vesna Crnojevic-Bengin,  
University of Novi Sad  
Co-Chair: Maurizio Bozzi,  
University of Pavia

#### EuMC46-1

##### Active Textile Antennas in Professional Garments for Sensing, Localisation and Communication

H. Rogier, S. Agneessens, A. Dierck,  
B. Spinnewyn, G. Stockman, F. Declercq,  
P. Van Torre, L. Vallozzi, D. Vande Ginste,  
Ghent University - IMEC, Ghent,  
Belgium

#### EuMC46-2

##### Challenges in Energy Harvesting Techniques for Autonomous Self- Powered Wireless Sensors

F. Giuppi, K. Niotaki, A. Collado, A.  
Georgiadis, Centre Tecnològic de  
Telecomunicacions de Catalunya,  
Castelldefels, Spain

#### EuMC46-3

##### Low-Cost Fabrication, Eco- Friendly Materials, and Easy Integration: the New Technological Paradigm for the Future Wireless Sensor Networks

M. Bozzi, R. Moro, University of Pavia,  
Pavia, Italy

#### EuMC46-4

##### Microwave Soil Moisture Sensors

B. Will<sup>1</sup>, V. Crnojević-Bengin<sup>2</sup>, G. Kitić<sup>2</sup>,  
<sup>1</sup>Ruhr-University Bochum, Bochum,  
Germany, <sup>2</sup>University of Novi Sad, Novi  
Sad, Yugoslavia

#### EuMC46-5

##### Inkjet-printed Sensors on Paper Substrate for Agricultural Applications

S. Kim<sup>1</sup>, H. Lee<sup>1</sup>, A. Traill<sup>2</sup>, Y. Kawahara<sup>2</sup>,  
A. Georgiadis<sup>4</sup>, A. Collado<sup>4</sup>, H. Aubert<sup>3</sup>, M. M.  
Tentzeris<sup>1</sup>, <sup>1</sup>Georgia Institute of Technology,  
Atlanta, United States, <sup>2</sup>University of Tokyo,  
Tokyo, Japan, <sup>3</sup>Centre National de la Recherche  
Scientifique (CNRS), Toulouse, France, <sup>4</sup>Centre  
Tecnològic de Telecomunicacions de Catalunya  
(CTTC), Catalunya, Spain

## EuMC/EuRAD02

### Advances in Six-Port Technology

Chair: Alexander Kölpin,  
University of Erlangen-Nürnberg  
Co-Chair: Serioja Tatu,  
Institut national de la  
recherche scientifique

#### EuMC/EuRAD02-1

##### Six-Port Technology for Precise Geometrical Measurement Applications - an Overview

A. Koelpin, G. Vinci, S. Lindner, S. Mann,  
F. Barbon, S. Linz, F. Oesterle, R. Weigel,  
University of Erlangen-Nuremberg,  
Erlangen, Germany

#### EuMC/EuRAD02-2

##### Six-port Technology for Millimeter Wave MIMO Systems

T. Jiang<sup>1</sup>, J. F. Frigon<sup>1</sup>, K. Wu<sup>1</sup>,  
D. Hammou<sup>2</sup>, C. Hannachi<sup>2</sup>, M. Nedil<sup>2</sup>,  
S. O. Tatu<sup>2</sup>, <sup>1</sup>Ecole Polytechnique de  
Montreal, Montreal, Canada, <sup>2</sup>Institut  
national de la recherche scientifique,  
Montreal, Canada

#### EuMC/EuRAD02-3

##### Six-port and Five-port Receivers for UWB and Optical Communications

I. Molina-Fernandez, A. Moscoso-Martir,  
J. M. Avila-Ruiz, R. Halir,  
P. Reyes-Iglesias, L. Moreno-Pozas,  
J. de-Oliva-Rubio, A. Ortega-Moñux,  
E.T.S.I. Telecomunicación. Malaga  
University, Malaga, Spain

#### EuMC/EuRAD02-4

##### Six-Port Microwave Interferometer Radar for Mechanical Vibration Analysis

G. Vinci, S. Lindner, S. Mann, F. Barbon,  
S. Linz, R. Weigel, A. Koelpin, University  
of Erlangen-Nuremberg, Erlangen,  
Germany

#### EuMC/EuRAD02-5

##### Three-Paths Microwave Interferometric System Based on a Six-Port Technique

K. Haddadi, T. Lasri, Institut  
d'Electronique, de Microélectronique et  
de Nanotechnologie (IEMN), villeneuve  
d'Ascq, France

08:30h - 10:10h

08:30h - 08:50h

08:50h - 09:10h

09:10h - 09:30h

09:30h - 09:50h

09:50h - 10:10h

THURSDAY



Kopenhagen

**EuMC/EuRAD03**  
**Millimeter-Wave Phased Arrays for Communications and Radar**  
 Chair: Philippe Eudeline, Thales Air Systems  
 Co-Chair: Wolfgang Menzel, University of Ulm



Helsinki

**EuMC/EuRAD04**  
**Microwave Imaging Principles and Systems**  
 Chair: Alexander Yarovoy, Delft University of Technology  
 Co-Chair: Volker Ziegler, EADS Innovation Works



Stockholm

**EuRAD02**  
**Multi Sensor Radar and Compressive Sensing**  
 Chair: Marco Martorella, University of Pisa  
 Co-Chair: Jens Klare, Fraunhofer FHR

08:30h - 08:50h

**EuMC/EuRAD03-1**  
**Full-Space Scanning Phased Array System for Future Integrated High Data Rate Communication over E-band and Beyond**  
 A. Guntupalli, K. Wu, Ecole polytechnique of Montreal, Montreal, Canada

**EuMC/EuRAD04-1**  
**Increasing Measurement Speed in mm-Wave Imaging Systems by Means of Frequency Multiplexing**  
 T. Koepfel<sup>1</sup>, S. Methfessel<sup>1</sup>, A. Schiessl<sup>2</sup>, L. Schmidt<sup>1</sup>, <sup>1</sup>University Erlangen-Nuremberg, Erlangen, Germany, <sup>2</sup>Rohde und Schwarz GmbH & Co. KG, Munich, Germany, <sup>3</sup>University Erlangen-Nuremberg, Erlangen, Germany, <sup>4</sup>University Erlangen-Nuremberg, Erlangen, Germany

**EuRAD02-1**  
**Enhanced Angular Resolution and Ambiguity Suppression for MIMO Radar Systems by Compressed Sensing Techniques**  
 A. Kirschner, J. Guetlein, J. Detlefsen, Technische Universität München, Munich, Germany

08:50h - 09:10h

**EuMC/EuRAD03-2**  
**A SiGe-Based 16-Channel Phased Array Radar System at W-Band for Automotive Applications**  
 P. Schmalenberg, J. Lee, K. Shiozaki, Toyota Motor Engineering & Manufacturing North America, Inc., Ann Arbor, United States

**EuMC/EuRAD04-2**  
**Phase Error Sensitivity in Multistatic Microwave Imaging Systems**  
 A. Schiessl<sup>1</sup>, S. S. Ahmed<sup>1</sup>, A. Genghammer<sup>1</sup>, L. Schmidt<sup>2</sup>, <sup>1</sup>Rohde & Schwarz, Munich, Germany, <sup>2</sup>Institute for Microwaves and Photonics, University of Erlangen-Nuremberg, Erlangen, Germany

**EuRAD02-2**  
**Estimation of Moving Target Parameters using Compressive Sensing Methods**  
 M. Hägelen, Fraunhofer FHR, Wachtberg, Germany

09:10h - 09:30h

**EuMC/EuRAD03-3**  
**79 GHz CMOS Circuits for Phase/Amplitude Calibration in High-resolution Beamforming Radar Systems**  
 M. Kanemaru<sup>1</sup>, J. Sato<sup>1</sup>, K. Takahashi<sup>2</sup>, T. Ando<sup>3</sup>, H. Komori<sup>3</sup>, M. Matsuo<sup>1</sup>, <sup>1</sup>Panasonic Corporation, Yokohama, Japan, <sup>2</sup>Panasonic Mobile Communications R&D Lab. Co., Ltd., Sendai, Japan, <sup>3</sup>Panasonic Corporation, Nagaokakyo, Japan

**EuMC/EuRAD04-3**  
**SUMIRAD - a Fast Imaging MMW Radiometer for Security and Safety Applications**  
 S. Dill, M. Peichl, D. Rudolf, DLR, Oberpfaffenhofen, Germany

**EuRAD02-3**  
**On the Applicability of Compressive Sensing on FMCW Synthetic Aperture Radar Data for Sparse Scene Recovery**  
 M. Becquaert, E. Cristofani, M. Vandewal, Royal Military Academy, Brussels, Belgium

09:30h - 09:50h

**EuMC/EuRAD03-4**  
**A 60GHz Band 2x4 Planar Dipole Phased Array Antenna Using Flip Chip Mounted MMIC Mixers**  
 Y. Suzuki, S. Yoshida, T. Ta, S. Tanifuji, S. Kameda, N. Suematsu, T. Takagi, K. Tsubouchi, Tohoku University, Katahira 2-1-1, Aoba-ku, Sendai, Japan

**EuMC/EuRAD04-4**  
**79GHz-band Coded Pulse Compression Radar System Performance in Outdoor for Pedestrian Detection**  
 K. Kobayashi, T. Morita, H. Mukai, T. Kishigami, Y. Nakagawa, Panasonic Corporation, Yokohama City, Japan

**EuRAD02-4**  
**An FMCW MIMO Radar Calibration and Mutual Coupling Compensation Approach**  
 C. M. Schmid, C. Pfeffer, R. Feger, A. Stelzer, Johannes Kepler University, Linz, Austria

09:50h - 10:10h

**EuMC/EuRAD03-5**  
**A Prototype of 60 GHz Multiple-Beam Phased Array for Limited Scan**  
 Q. Lai, P. Li, M. Jin, C. Gao, T. Yuan, East China Research Institute of Electronic Engineering, Hefei, China

**EuMC/EuRAD04-5**  
**Environmental Imaging with a Mobile UWB Security Robot for Indoor Localisation and Positioning Applications**  
 R. Salaman<sup>1</sup>, I. Willms<sup>1</sup>, T. Sakamoto<sup>2,3</sup>, T. Sato<sup>2</sup>, A. G. Yarovoy<sup>3</sup>, <sup>1</sup>Universität Duisburg-Essen, Duisburg, Germany, <sup>2</sup>Kyoto University, Kyoto, Japan, <sup>3</sup>Delft University of Technology, Delft, Netherlands

**EuRAD02-5**  
**2D Measurement Using Interferometry and FMCW Multistatic Radar System for Indoor Localization**  
 R. Kumar<sup>1</sup>, J. C. Cousin<sup>1</sup>, B. Huyart<sup>1</sup>, K. Mabrouk<sup>2</sup>, <sup>1</sup>Telecom ParisTech, Paris, France, <sup>2</sup>Esigeteil, Fontainebleau, France



## Kiew

### EuMC47

#### Emerging Microwave Applications

Chair: Kamal K Samanta, Milmega UK  
Co-Chair: Asher Madjar, M2 Microwaves

## Istanbul

### EuMC48

#### Wideband and UWB Filters

Chair: Stéphane Bila, XLIM University of Limoges  
Co-Chair: Michael Höft, Panasonic

## Stockholm

### EuMC49

#### Multi-Domain Multi-Source Wireless Energy Systems

Chair: Ana Collado, CTTC  
Co-Chair: Mauro Mongiardo, DIEI - University of Perugia

## Helsinki

### EuMC50

#### Microwave Applications of Metamaterials

Chair: Yang Hao, Queen Mary University of London  
Co-Chair: Oksana Shramkova, Queen's University of Belfast

#### EuMC47-1 Millimeter-Wave Signal Generation Using Optical Difference Frequency Generation in Rectangular Waveguide Embedded with LiTaO<sub>3</sub>

H. Murata<sup>1</sup>, Y. Maejima<sup>1</sup>, Y. Okamura<sup>1</sup>, A. Kannno<sup>2</sup>, T. Kawanishi<sup>2</sup>, <sup>1</sup>Osaka University, Osaka, Japan, <sup>2</sup>NICT, Tokyo, Japan

#### EuMC47-2 Investigation of an Optically Reconfigurable Plasma for Silicon Based Microwave Applications

C. D. Gamalath<sup>1</sup>, D. M. Benton<sup>2</sup>, M. J. Cryan<sup>1</sup>, <sup>1</sup>University of Bristol, Bristol, United Kingdom, <sup>2</sup>L3-TRL, Tewkesbury, United Kingdom

#### EuMC47-3 Factors Affecting Biological Cell Characterization by Waveguide Reflection/Transmission Method

A. K. Saha, S. J. Timmons, Albany State University, Albany, United States

#### EuMC47-4 Rapid Detection of Blood Enteroviruses Using Microstrip Antenna Bio-Sensor

D. M. Elsheikh<sup>1</sup>, H. A. Elsadek<sup>1</sup>, E. A. Abdallah<sup>1</sup>, S. M. Atteya<sup>2</sup>, W. N. Elmazny<sup>3</sup>, <sup>1</sup>Electronics Research Institute, Dokki, Egypt, <sup>2</sup>Al-Azhar University, Cairo, Egypt, <sup>3</sup>Holding Company for Biological Products and Vaccines (VACSERA), Dokki, Egypt

#### EuMC47-5 Electrodeless Low Pressure Lamp with Bi-Static Matching at 2.45 GHz

C. Schopp, H. Heuermann, Aachen University of Applied Science, Aachen, Germany

#### EuMC48-1 Ultra-Wideband Bandpass Filter Using Symmetric Multi-mode Resonator and Stepped Impedance Resonators

J. Zhou, W. Che, W. Feng, Nanjing University of Science and Technology, Nanjing, China

#### EuMC48-2 An Iterative Synthesis Scheme for Wideband Filter Based on Parallel-Coupled Three-line Including the Cross-Coupling Between Non-Adjacent Lines

C. Chen<sup>1</sup>, J. Oda<sup>1</sup>, K. Kamata<sup>1</sup>, W. Imashiro<sup>1</sup>, T. Anada<sup>1</sup>, S. Takeda<sup>2</sup>, <sup>1</sup>Kanagawa University, Yokohama, Japan, <sup>2</sup>Antenna Giken Co., Ltd., Saitama City, Japan

#### EuMC48-3 Wide-band Bandpass Filter Using Coupled Three-line Microstrip Structure and Plane Capacitor

H. Kao, J. Wu, C. Tang, National Chung Cheng University, Chia-Yi County, Taiwan

#### EuMC48-4 A Novel Compact Ultra-Wideband Filter

S. Qian<sup>1</sup>, J. Hong<sup>1</sup>, A. Rusakov<sup>2</sup>, I. B. Vendik<sup>2</sup>, <sup>1</sup>Heriot-Watt University, Edinburgh, United Kingdom, <sup>2</sup>St. Petersburg Electrotechnical University «LETI», St. Petersburg, Russian Federation

#### EuMC48-5 An Investigation on the coupling characteristics of a novel multiplexer configuration

Y. Wang<sup>1</sup>, M. J. Lancaster<sup>2</sup>, <sup>1</sup>University of Greenwich, Chatham, United Kingdom, <sup>2</sup>University of Birmingham, Birmingham, United Kingdom

#### EuMC49-1 A Compact 35-Watt High-efficiency Wireless Power Transmission System under Seawater Environment

S. Yoshida<sup>1</sup>, M. Tanomura<sup>1</sup>, K. Shizuno<sup>1</sup>, N. Kobayashi<sup>2</sup>, H. Fukuda<sup>2</sup>, Y. Hama<sup>3</sup>, <sup>1</sup>NEC Corporation, Tsukuba, Japan, <sup>2</sup>NEC Corporation, Kawasaki, Japan, <sup>3</sup>NEC Corporation, Fuchu, Japan

#### EuMC49-2 Design of a Capacitor-Less 5.8-GHz Microwave Rectifier for Microwave Power Transmission

B. Zhang, C. Yu, C. Liu, Sichuan University, Chengdu, China

#### EuMC49-3 Efficient Solar Powered Wireless Sensor Solution

R. Weiß<sup>1</sup>, M. Schienle<sup>1</sup>, H. Eckert<sup>1</sup>, I. Kuehne<sup>3</sup>, A. Frey<sup>2</sup>, B. Krümmel<sup>4</sup>, <sup>1</sup>Siemens AG, München, Germany, <sup>2</sup>Hochschule Augsburg, Augsburg, Germany, <sup>3</sup>Hochschule Heilbronn, Künzelsau, Germany, <sup>4</sup>Friedrich-Alexander Universität Erlangen-Nürnberg, Erlangen, Germany

#### EuMC49-4 Microwave Power Transfer Evaluation at 2.45 GHz Using a High-Efficiency GaAs HEMT Amplifier and Rectifier

R. Ishikawa, K. Honjo, University of Electro-Communications, Chofu, Japan

#### EuMC49-5 A 2.3 GHz Single-Ended Energy Recovery Rectifier with Stepped-Impedance Resonator for Improved Efficiency of Outphasing Amplifier

D. Wang, R. Negra, RWTH Aachen University, Aachen, Germany

#### EuMC50-1 Contiguous Triplexer Based on Combining Method of Two Filtering Circuits Using CRLH and RH Isolation Circuits

H. Lee, J. S. Sun, T. Itoh, University of California at Los Angeles, Los Angeles, United States

#### EuMC50-2 3D Frequency Selective Surface with Incident Angle Independence

S. N. Azemi, K. Ghorbani, W. S. Rowe, RMIT University, Melbourne, Australia

#### EuMC50-3 Mechanically Tunable and Reconfigurable FSS using Spring Loaded Ring Resonators

S. N. Azemi, K. Ghorbani, W. S. Rowe, RMIT University, Melbourne, Australia

#### EuMC50-4 The Simplest Example of Polarization Plane Rotation by the Fringing Fields Interaction

N. G. Kolmakova, S. A. Prikolotin, A. O. Kirilenko, A. O. Perov, O. Ya. Usikov Institute for Radiophysics and Electronics, Kharkov, Ukraine

#### EuMC50-5 Mitigation of Unwanted Forward Narrow-band Radiation from PCBs with a Metamaterial Unit Cell

A. Ruaro<sup>2,1</sup>, J. Thaysen<sup>2</sup>, K. B. Jakobsen<sup>1</sup>, <sup>1</sup>Technical University of Denmark, Kgs. Lyngby, Denmark, <sup>2</sup>GN ReSound A/S, Ballerup, Denmark

10:40h - 11:00h

11:00h - 11:20h

11:20h - 11:40h

11:40h - 12:00h

12:00h - 12:20h

THURSDAY

## Shanghai

### EuMC51

#### Transceiver Components

Chair: Noriharu Suematsu,  
Tohoku University  
Co-Chair: Andreas Stelzer,  
Johannes Kepler University

## Neu-Delhi

### EuMC52

#### Physics-Based Modeling of Microwave Structures

Chair: Hervé Aubert, LAAS  
Co-Chair: Jose Carlos Pedro,  
Universidade de Aveiro

## Singapur

### EuMC53

#### Focused Session - Energy Harvesting and Wireless Power Transfer

Chair: Manos M. Tentzeris,  
Georgia Institute of Technology  
Co-Chair: Nuno Borges Carvalho,  
University of Aveiro

10:40h - 11:00h

#### *EuMC51-1 Adaptive Carrier Suppression for UHF RFID using Digitally Tunable Capacitors*

M. Koller, R. Küng, ZHAW Zurich  
University of Applied Sciences,  
Winterthur, Switzerland

#### *EuMC52-1 Influence of Energy Distribution of Emitted Electrons on Multipactor Discharge*

N. Zhang, R. Wang, Y. Li, W. Z. Cui,  
China Academy of Space Technology  
(Xi'an), Xi'an, China

#### *EuMC53-1 Inkjet-printed RF Energy Harvesting and Wireless Power Transmission Devices on Paper Substrate*

S. Kim<sup>1</sup>, R. Vyas<sup>1</sup>, M. M. Tentzeris<sup>1</sup>, A. Georgiadis<sup>2</sup>, A. Collado<sup>2</sup>, <sup>1</sup>Georgia Institute of Technology, Atlanta, United States, <sup>2</sup>Centre Tecnologic de Telecomunicacions de Catalunya, Catalunya, Spain

11:00h - 11:20h

#### *EuMC51-2 An 8-channel Ku Band Transmit Beamformer with Low GainPhase Imbalance Between Channels*

S. Zhu<sup>1</sup>, Y. You<sup>1</sup>, K. F. Warnick<sup>2</sup>,  
D. Heo<sup>1</sup>, <sup>1</sup>Washington State University,  
Pullman, United States, <sup>2</sup>Brigham Young University, Provo, United States

#### *EuMC52-2 Substrate Integrated Waveguide Couplers: a Semi-Analytical Design Approach based on Side Leakage*

M. Pasion, M. Bozzi, L. Perregrini,  
University of Pavia, Pavia, Italy

11:20h - 11:40h

#### *EuMC51-3 A L-Band Transmit/Receive Module for Satellite Telecommunications*

G. Mannocchi, M. Amici, M. Del Marro,  
D. Di Giulio, P. Farilla,  
M. Macchiusi, A. Suriani, Thales Alenia Space Italia, Rome, Italy

#### *EuMC52-3 New Approach to the Theory of Irregular Lossy Waveguides and its Application to Design of Terahertz Gyrotrons*

G. I. Zaginaylov<sup>1,2</sup>, V. I. Shcherbinin<sup>1</sup>, M. Y. Glyavin<sup>3</sup>, <sup>1</sup>National Science Center, Kharkov, Ukraine, <sup>2</sup>V.N. Karazin Kharkov National University, Kharkov, Ukraine, <sup>3</sup>Institute of Applied Physics, Nizny Novgorod, Russian Federation

#### *EuMC53-2 A Fully-Autonomous Integrated RF Energy Harvesting System for Wearable Applications*

M. Dini<sup>1</sup>, M. Del Prete<sup>1</sup>, M. Filippi<sup>1</sup>,  
D. Masotti<sup>2</sup>, A. Romani<sup>1</sup>, M. Tartagni<sup>1</sup>,  
A. Costanzo<sup>1</sup>, <sup>1</sup>University of Bologna, Cesena, Italy, <sup>2</sup>University of Bologna, Bologna, Italy

11:40h - 12:00h

#### *EuMC51-4 High Sensitivity HTS Receiver Module with Hermetic Thermal Insulation Waveguides*

T. Kawaguchi<sup>1</sup>, N. Shiokawa<sup>1</sup>,  
K. Nakayama<sup>1</sup>, M. Yamazaki<sup>1</sup>,  
H. Kayano<sup>1</sup>, H. Takahashi<sup>2</sup>, K. Gomi<sup>2</sup>,  
B. Abe<sup>2</sup>, <sup>1</sup>Toshiba Corporation,  
Kawasaki, Japan, <sup>2</sup>Toshiba Corporation,  
Yokohama, Japan

#### *EuMC52-4 High-Frequency Modeling of Metal Fill Eddy-Current Loss in Integrated Circuits*

S. G. Gaskill, V. S. Shilimkar,  
A. Weisshaar, Oregon State University,  
Corvallis, United States

#### *EuMC53-3 K-band energy harvesting circuits for satellite application*

A. Takacs<sup>1</sup>, H. Aubert<sup>1</sup>, L. Despoisse<sup>3</sup>,  
S. Fredon<sup>2</sup>, <sup>1</sup>Cnrs Laas and University of Toulouse, Toulouse, France, <sup>2</sup>Cnes (French Space Agency), Toulouse, France, <sup>3</sup>Thales Alenia Space, Cannes, France

12:00h - 12:20h

#### *EuMC51-5 A 25-to-45-GHz 45° Power Divider*

J. Kao, Y. Hsiao, K. Yeh, K. Lin, H. Wang,  
National Taiwan University, Taipei, Taiwan

#### *EuMC52-5 Large Signal Characterization of High Speed Digital Buffers for Signal Integrity Analysis of Software-Defined-Radio Applications*

H. M. Teixeira, T. R. Cunha, J. C. Pedro,  
Universidade de Aveiro, Aveiro, Portugal

#### *EuMC53-4 A Battery-less Remote Control based on a Novel Multi-RFID Scheme*

A. S. Boaventura, N. B. Carvalho,  
Instituto de Telecomunicacoes, Aveiro, Portugal



Hongkong

## EuMC/EuRAD05

### Beam Forming Techniques for Phased Array Antennas

Chair: Jean-Yves Dauvignac,  
University of Nice-Sophia Antipolis  
Co-Chair: Heinz-Peter Feldle, Cassidian



Kopenhagen

## EuMC/EuRAD06

### Dielectric and Lens Antennas

Chair: Arne Jacob,  
TU Hamburg-Harburg  
Co-Chair: Yoke Leen Sit,  
Karlsruhe Institute of Technology



St. Petersburg

## EuRAD03

### MIMO Systems

Chair: Willem Hol, Thales Nederland B.V.  
Co-Chair: Francois Le Chevalier,  
Delft University of Technology

#### EuMC/EuRAD05-1 Horn Antenna Array for Imaging Reflector Antenna Engineering Model in 21-GHz Band

M. Nagasaka, S. Nakazawa, M. Kamei,  
S. Tanaka, Y. Ito, Japan Broadcasting Corporation, Setagaya-ku, Japan

#### EuMC/EuRAD06-1 Static and Electronic Shaping of the Radiated Electromagnetic Fields in Radial Arrays of Substrate Integrated Leaky-Wave Antennas

A. J. Martinez-Ros, R. Guzmán-Quirós,  
J. L. Gómez-Tornero, Universidad Politécnica de Cartagena, Cartagena, Spain

#### EuRAD03-1 Technical Realization of the MIMO Radar MIRA-CLE Ka

O. Biallawons, J. Klare, O. Saalman,  
Fraunhofer FHR, Wachtberg, Germany

10:40h - 11:00h

#### EuMC/EuRAD05-2 A Multiport Approach to Modeling of Phased Antenna Array for Radio Astronomy

P. L. Tokarsky, S. N. Yerin,  
Institute of Radio Astronomy,  
Kharkiv, Ukraine

#### EuMC/EuRAD06-2 High Performance 60-GHz Dielectric Rod Antenna with Dual Circular Polarization

M. W. Rousstia, M. H. Herben,  
Eindhoven University of Technology,  
Eindhoven, Netherlands

#### EuRAD03-2 Hybrid SIMO and MIMO Sparse Array Radar

T. Takayama, M. Sugano, Y. Tokieda,  
H. Sugawara, Japan Radio Co., Ltd.,  
Mitaka, Japan

11:00h - 11:20h

#### EuMC/EuRAD05-3 Synthesis of Radiation Pattern Including Error Effect of Current Excitation with Jamming Suppression Ability for Application in Radar Systems

O. Vendik, D. Kozlov, S. Kalinin,  
St. Petersburg Electrotechnical University «LETI», Saint Petersburg, Russian Federation

#### EuMC/EuRAD06-3 Broadband Metal-Plate Lens with Short Focal Length

H. Onoue, N. Kamiya, R. Suga,  
O. Hashimoto, Aoyama Gakuin University, 5-10-1 Fuchinobe, Sagamihara-shi, Japan

#### EuRAD03-3 Through Wall Imaging Based on MIMO UWB Radar With a Fast Image Reconstruction Method

M. S. Mercan, E. Ozturk, Netas Telekomunikasyon A.S., Istanbul, Turkey

11:20h - 11:40h

#### EuMC/EuRAD05-4 Design Methodology for Phased Subarray Antennas with Optimized Element Phase Control

W. Lee, S. Khang, K. Oh, J. Yu, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Republic of Korea

#### EuMC/EuRAD06-4 Electromagnetic Characterization of Supershaped Lens Antennas for High-Frequency Applications

P. Bia<sup>1</sup>, D. Caratelli<sup>2</sup>, L. Mescia<sup>1</sup>, J. Gielis<sup>3</sup>, <sup>1</sup>Politecnico di Bari, Bari, Italy, <sup>2</sup>Delft University of Technology, Delft, Netherlands, <sup>3</sup>University of Antwerp, Antwerp, Belgium

#### EuRAD03-4 UWB Near-Field MIMO Radar: Calibration, Measurements and Image Reconstruction

T. Spreng<sup>1</sup>, U. Prechtel<sup>1</sup>, B. Schönlinner<sup>1</sup>, A. Meusling<sup>2</sup>, U. Siart<sup>3</sup>, V. Ziegler<sup>1</sup>, <sup>1</sup>EADS Innovation Works, Ottobrunn, Germany, <sup>2</sup>Cassidian, Ulm, Germany, <sup>3</sup>Technische Universität München, München, Germany

11:40h - 12:00h

#### EuMC/EuRAD05-5 Group Delay Dispersion Engineered Antenna Array

C. M. Wu, S. Gharavi, B. Daneshrad,  
T. Itoh, University of California, Los Angeles, Los Angeles, United States

#### EuMC/EuRAD06-5 A Feeding Concept of a Dielectric Hemispherical Lens Antenna for Polarimetric Radar Applications

C. Dahl<sup>1</sup>, C. Schulz<sup>1</sup>, C. Baer<sup>2</sup>, T. Musch<sup>2</sup>, B. Will<sup>1</sup>, I. Rolfes<sup>1</sup>, <sup>1</sup>Ruhr-University Bochum, Bochum, Germany, <sup>2</sup>Ruhr-University Bochum, Bochum, Germany

#### EuRAD03-5 Motion Compensation for a TDM FMCW MIMO Radar System

J. Guetlein, A. Kirschner, J. Detlefsen,  
Technische Universität Muenchen, Munich, Germany

12:00h - 12:20h

## EuRAD/EuMC Poster Session

Chair: Christian Friesicke, TU Hamburg-Harburg  
Co-Chair: Arne Jacob, TU Hamburg-Harburg

**10:00h - 18:00h**

The posters are on display from 10:00h - 18:00h

The authors are present for discussion from 10:00h - 11:00h, 12:15h - 14:00h and 15:15h - 16:15h



Exhibition Hall	Exhibition Hall	Exhibition Hall	Exhibition Hall
<p><b>EuRAD/EuMC Poster01-1 Improved Polarization Estimation Method Using Spatial Polarization Characteristic of Antenna</b> Y. Chang, J. Dong, B. Rao, X. Wang, L. Shi, National University of Defense Technology, Changsha, China</p>	<p><b>EuRAD/EuMC Poster01-7 Ultra-Wideband Signals Radiation by Linear Arrays of Aperture Stacked Patch Antennas</b> A. Vilenskiy<sup>1</sup>, A. Kletsov<sup>2</sup>, <sup>1</sup>Samsung RND Russia, Moscow, Russian Federation, <sup>2</sup>Samsung RND Russia, Moscow, Russian Federation</p>	<p><b>EuRAD/EuMC Poster01-13 Slot Dual Dipole Antenna with Miniature Elliptical Substrate Lenses for Millimeter-Wave Imaging</b> J. Lai, C. Domier, N. C. Luhmann, University of California, Davis, Davis, United States</p>	<p><b>EuRAD/EuMC Poster01-19 Mission-Driven System Design During Runtime for Reconfigurable Radars and Antennas</b> T. H. de Groot, O. Krasnov, A. Yarovsky, Delft University of Technology, Delft, Netherlands</p>
<p><b>EuRAD/EuMC Poster01-2 The Measurement Method of Polarization Characteristics of Practical Radar Antenna</b> H. Dai, X. Shen, J. Li, L. Wang, Unit 63892 of PLA, Luoyang, China</p>	<p><b>EuRAD/EuMC Poster01-8 Circularly Polarized Dipole-Loop Antenna</b> H. Chang, Y. Shen, . Hong, M. Ho, National Changhua University of Education, Changhua, Taiwan</p>	<p><b>EuRAD/EuMC Poster01-14 Phase-Only Pattern Synthesis Using a Modified Least Squares Method for Phased Arrays</b> B. Pompeo<sup>1,2</sup>, L. Pralon<sup>1</sup>, M. Pralon<sup>1</sup>, R. Mendes<sup>2</sup>, <sup>1</sup>Brazilian Army Technological Center, Rio de Janeiro, Brazil, <sup>2</sup>School of Electrical and Computer Engineering - State University of Campinas, Campinas, Brazil</p>	<p><b>EuRAD/EuMC Poster01-20 LFM CW Based MIMO Imaging Processing with Keystone Transform</b> P. van Dorp, TNO, The Hague, Netherlands</p>
<p><b>EuRAD/EuMC Poster01-3 A Novel Cheeseholes Type Hemispherical Dielectric Resonator Antenna for Wireless Applications</b> B. Mukherjee, P. Patel, J. Mukherjee, Indian Institute of Technology Bombay, Powai, Mumbai, India</p>	<p><b>EuRAD/EuMC Poster01-9 UWB Low-Power Amplifier Integrated on Miniaturized Antenna for Biomedical Applications</b> M. Hamouda<sup>1</sup>, F. Scotto di Clemente<sup>2</sup>, M. Hein<sup>2</sup>, G. Fischer<sup>1</sup>, R. Weigel<sup>1</sup>, T. Ussmueller<sup>1</sup>, <sup>1</sup>University of Erlangen-Nuremberg, Erlangen, Germany, <sup>2</sup>Ilmenau University of Technology, Ilmenau, Germany</p>	<p><b>EuRAD/EuMC Poster01-15 A Novel Detection Algorithm of LFM Signal Based on Cubic Phase Function</b> H. Q. Yu, L. Ming, Z. Xu, C. Ning, Nanjing Electronic Equipment Institute, NanJing, China</p>	<p><b>EuRAD/EuMC Poster01-21 Indoor Radar SLAM</b> J. W. Marck, A. Mohamoud, E. van de Houwen, R. van Heijster, TNO, The Hague, Netherlands</p>
<p><b>EuRAD/EuMC Poster01-4 Four-Arm 2nd-Mode Conical Spiral Antenna Feeding with Split Tapered Coax Balun</b> X. X. Xu Zhao, M. M. Ming Li, N. N. Ning Chen, Q. Q. Qing Yu Hou, Nanjing Electronic Equipment Institute, Nan Jing, China</p>	<p><b>EuRAD/EuMC Poster01-10 Size-Reduction and Suppression of Cavity-Resonances in Hybrid mm-Wave Antennas for Polarimetric Measurements</b> S. Methfessel, L. Schmidt, Institute of Microwaves and Photonics, Erlangen, Germany</p>	<p><b>EuRAD/EuMC Poster01-16 Long Time Integration by Short Time Cross-Correlation and Two-Step Doppler Processing for Passive Bistatic Radar</b> T. Hoshino, K. Suwa, S. Nakamura, R. Takahashi, S. Morita, K. Yamamoto, T. Wakayama, Mitsubishi Electric Corporation, 5-1-1 Ofuna, Kamakura-shi, Japan</p>	<p><b>EuRAD/EuMC Poster01-22 Through-The-Wall Moving Target Surveillance Using GPR</b> V. Ivashchuk<sup>1</sup>, V. Prokhorenko<sup>1</sup>, A. Pitertsev<sup>2</sup>, F. J. Yanovsky<sup>2</sup>, <sup>1</sup>Transient Technologies LLC, Kiev, Ukraine, <sup>2</sup>National Aviation University, Kiev, Ukraine</p>
<p><b>EuRAD/EuMC Poster01-5 Spiral Antenna With Parasitic Radiating Elements</b> V. Callec<sup>1</sup>, E. Fourn<sup>1</sup>, R. Gillard<sup>1</sup>, H. Diez<sup>2</sup>, <sup>1</sup>Electronics and Telecommunications Institute of Rennes, Rennes, France, <sup>2</sup>French Space Agency, Toulouse, France</p>	<p><b>EuRAD/EuMC Poster01-11 Analysis and Optimization of a focusing Metal-dielectric Probe for Near-field Terahertz Imaging</b> B. Zhu<sup>1</sup>, G. He<sup>2</sup>, J. Stiens<sup>1</sup>, R. Vounckx<sup>1</sup>, <sup>1</sup>Vrije Universiteit Brussel, Brussels, Belgium, <sup>2</sup>University of Electronic Science and Technology of China, Chengdu, China</p>	<p><b>EuRAD/EuMC Poster01-17 Experimental Result of Passive Bistatic Radar with Unknown Transmitting Radar Pulse</b> T. Ito, R. Takahashi, S. Morita, K. Hirata, Mitsubishi Electric Corporation Information Technology R&amp;D Center, 5-1-1 Ofuna, Kamakura, Japan</p>	<p><b>EuRAD/EuMC Poster01-23 Radar-Communication (RadCom) Unified Transceiver Scheme Based on Multi-Port Interferometer Technique</b> J. Moghaddasi, K. Wu, Poly-Grames Research Center, Center for Radiofrequency Electronics Research of Quebec (CREER), Ecole Polytechnique (University of Montreal), Montreal, Canada</p>
<p><b>EuRAD/EuMC Poster01-6 Parametric and Dispersion Analysis of a Dual-Pol Cavity-Backed Slot-Fed UWB Patch Antenna</b> P. F. Freidl<sup>1</sup>, I. Russo<sup>1</sup>, E. Leitgeb<sup>1</sup>, W. Boesch<sup>1</sup>, T. Gigl<sup>2</sup>, G. Schultes<sup>2</sup>, <sup>1</sup>Graz University of Technology, Graz, Austria, <sup>2</sup>Maxim Integrated GmbH, Lebring, Austria</p>	<p><b>EuRAD/EuMC Poster01-12 Fabrication Techniques for Wearable Antennas</b> G. Monti, L. Corchia, L. Tarricone, University of Salento, Lecce, Italy</p>	<p><b>EuRAD/EuMC Poster01-18 Performance Analysis of Multisite Radar Systems</b> I. M. Ivashko, O. A. Krasnov, A. G. Yarovsky, Delft University of Technology, Delft, Netherlands</p>	<p><b>EuRAD/EuMC Poster01-24 Joint Polarization for Micro-Doppler Signature Enhancement</b> X. Cheng, J. Liu, Y. L. Chang, Y. Z. Li, X. S. Wang, National University of Defense Technology, Changsha, China</p>



## EuRAD/EuMC Poster Session

Chair: Christian Friesicke, TU Hamburg-Harburg

Co-Chair: Arne Jacob, TU Hamburg-Harburg

10:00h - 18:00h

The posters are on display from 10:00h - 18:00h

The authors are present for discussion from 10:00h - 11:00h, 12:15h - 14:00h and 15:15h - 16:15h



Exhibition Hall	Exhibition Hall	Exhibition Hall
<p><b>EuRAD/EuMC Poster01-25</b> <b>A Robust Phase Unwrapping Method for 3D Borehole Radar Interferometric imaging</b> Q. Hou<sup>2</sup>, H. P. Pan<sup>2,1</sup>, <sup>1</sup>China University of Geosciences, Wuhan, China, <sup>2</sup>China University of Geosciences, Wuhan, China</p>	<p><b>EuRAD/EuMC Poster01-31</b> <b>SINR Rank Ordering Metric for Signal Dependent Sub-Optimum STAP</b> N. Battisti<sup>2</sup>, R. Rossi<sup>2</sup>, <sup>1</sup>MBDA Italy, Rome, Italy, <sup>2</sup>MBDA Italy, Rome, Italy</p>	<p><b>EuRAD/EuMC Poster01-37</b> <b>Advanced Ground Penetrating Radar: Open Issues and New Research Opportunities in Europe</b> L. Pajewski, A. Benedetto, «Roma Tre» University, Rome, Italy</p>
<p><b>EuRAD/EuMC Poster01-26</b> <b>Almost Perfect Auto-Correlation Sequences for Binary Phase-Modulated Continuous Wave Radar</b> W. Van Thillo, P. Gioffré, V. Giannini, D. Guermendi, S. Brebels, A. Bourdoux, Imec, Leuven, Belgium</p>	<p><b>EuRAD/EuMC Poster01-32</b> <b>Support Vector Machine Based Micro-Doppler Signature Classification of Ground Targets</b> A. Javed, S. Liaqat, M. B. Ihsan, National University of Sciences and Technology, Rawalpindi, Pakistan</p>	<p><b>EuRAD/EuMC Poster01-38</b> <b>A Synthetic Aperture Interferometric Radiometer Test at X-band for Potential Improvements at W-Band</b> Y. Aouial, S. Méric, O. Lafond, M. Himdi, Institute of Electronic and Telecommunication of Rennes, Rennes, France</p>
<p><b>EuRAD/EuMC Poster01-27</b> <b>Optimal Binary Peak Sidelobe Level Sequences up to Length 72</b> A. N. Leukhin, E. N. Potekhin, Volga State University of Technology, Yoshkar-Ola, Russian Federation</p>	<p><b>EuRAD/EuMC Poster01-33</b> <b>Radar Cross-Section Model of the Sea in the Centimeter and Millimeter Waves at Small Grazing Angles</b> V. I. Lutsenko<sup>1</sup>, D. Popov<sup>1</sup>, I. Lutsenko<sup>1</sup>, L. Cong<sup>2</sup>, <sup>1</sup>Usikov Institute of Radiophysics and Electronics of National Academy of Sciences of Ukraine, Kharkov, Ukraine, <sup>2</sup>National Aerospace University "KhAI", Kharkov, Ukraine</p>	<p><b>EuRAD/EuMC Poster01-39</b> <b>Investigation of MW Imaging Capabilities for the Estimation of Truckload</b> M. Peichl, S. Dill, T. Kempf, DLR, Oberpfaffenhofen, Germany</p>
<p><b>EuRAD/EuMC Poster01-28</b> <b>Sensor Selection Algorithm for Optimal Management of the Tracking Capability in Multisensor Radar System</b> A. Narykov, A. Yarovoy, Delft University of Technology, Delft, Netherlands</p>	<p><b>EuRAD/EuMC Poster01-34</b> <b>Mutli-Sensor Surveillance Radar Based on MISO Sensors and Kalman Filtration</b> V. Jenik, F. Kozak, P. Hudec, Czech Technical University in Prague, Praha 6, Czech Republic</p>	<p><b>EuRAD/EuMC Poster01-40</b> <b>Measurement of Rain Parameters by Active-Passive Remote Sensing</b> A. Linkova, G. Khlopov, Usikov Institute of Radiophysics and Electronics of National Academy of Sciences of Ukraine, Kharkov, Ukraine</p>
<p><b>EuRAD/EuMC Poster01-29</b> <b>Enhancement of Stepped-Frequency Radar Imaging Based on Compressive Sensing</b> B. Pang, D. Dai, S. Xing, Y. Li, X. Wang, National University of Defense Technology, Changsha, China</p>	<p><b>EuRAD/EuMC Poster01-35</b> <b>A Comparison of Beamforming Methods for Microwave Breast Cancer Detection in Homogeneous and Heterogeneous Tissue</b> J. Moll, C. Kexel, V. Krozer, Goethe University Frankfurt, Frankfurt am Main, Germany</p>	<p><b>EuRAD/EuMC Poster01-41</b> <b>Automatic Radar Horizontal Alignment Scheme Using Stationary Target on Public Road</b> K. Choi, S. Jeong, J. Oh, MANDO, Seongnam-Si, Republic of Korea</p>
<p><b>EuRAD/EuMC Poster01-30</b> <b>Estimation of Trihedral Pose Angle from Virtual Aperture Radar Image</b> B. Chen, T. Jin, B. Lu, Z. Zhou, College of Electronic Science and Engineering, Changsha, China</p>	<p><b>EuRAD/EuMC Poster01-36</b> <b>Radar Subsurface Imaging by Phase Shift Migration Algorithm</b> H. Zhang<sup>1</sup>, W. Benedix<sup>1</sup>, D. Plettemeier<sup>1</sup>, V. Ciarletti<sup>2</sup>, <sup>1</sup>TU Dresden, Dresden, Germany, <sup>2</sup>University of Versailles Saint Quentin, Versailles, France</p>	<p><b>EuRAD/EuMC Poster01-42</b> <b>Scattering Characteristics of Atmospheric Pressure Dielectric Barrier Discharge Plasma</b> S. Lee<sup>1</sup>, I. Oh<sup>1</sup>, Y. Hong<sup>2</sup>, J. Yook<sup>1</sup>, <sup>1</sup>Yonsei University, Seoul, Republic of Korea, <sup>2</sup>Agency for Defense and Development, Daejeon, Republic of Korea</p>

Riga

**EuMC54**

**Wireless Technologies for Industrial Application**

Chair: Luciano Tarricone,  
University of Salento, Lecce  
Co-Chair: Alessandra Costanzo,  
DEI, University of Bologna

Istanbul

**EuMC55**

**Tunable and Reconfigurable Filters 2**

Chair: Morini Antonio,  
Università Politecnica delle Marche  
Co-Chair: Lluís Pradell,  
Universitat Politècnica de Catalunya

Stockholm

**EuMC56**

**Non-Linear, Controllable, and Terahertz Metamaterials**

Chair: Tatsuo Itoh,  
University of California at Los Angeles  
Co-Chair: Valerie Vigneras-Lefebvre,  
University of Bordeaux

Helsinki

**EuMC57**

**Metamaterial-Based Antennas**

Chair: Alessandro Galli,  
Sapienza University of Rome  
Co-Chair: Ramon Gonzalo Garcia,  
Public University of Navarra

13:50h - 14:10h

**EuMC54-1**  
**RFID Augmented Devices for Autonomous Sensing and Computation**

L. Catarinucci, R. Colella, D. De Donno,  
L. Tarricone, University of Salento,  
Lecce, Italy

**EuMC55-1**  
**Center Frequency and Bandwidth Tunable Compact SIR Bandpass Filter**

A. Mekadmini<sup>1,2</sup>, N. Martin<sup>1,2</sup>,  
P. Laurent<sup>1,2</sup>, G. Tanné<sup>1,2</sup>, <sup>1</sup>Université  
Européenne de Bretagne, Brest, France,  
<sup>2</sup>Université de Bretagne Occidentale,  
Brest, France

**EuMC56-1**  
**A Broadband Metamaterial Absorbing Panel with a Resistive Pattern Made of Ink with Graphene Nanoplatelets**

M. Olszewski<sup>1</sup>, B. Salski<sup>1</sup>, W. Gwarek<sup>1</sup>,  
P. Bajurko<sup>1</sup>, Y. Yashchyshyn<sup>1</sup>, M.  
Jakubowska<sup>2</sup>, D. Janczak<sup>2</sup>, <sup>1</sup>Warsaw  
University of Technology, Warsaw, Poland,  
<sup>2</sup>Warsaw University of Technology,  
Warsaw, Poland

**EuMC57-1**  
**Printed Annular Metasurface for Omnidirectional Dual-Pol Leaky-Wave Antennas**

P. Baccarelli<sup>1</sup>, P. Burghignoli<sup>1</sup>, D.  
Comite<sup>1</sup>, D. Di Ruscio<sup>1</sup>, A. Galli<sup>1</sup>, P.  
Lampariello<sup>1</sup>, D. R. Jackson<sup>2</sup>, <sup>1</sup>Sapienza  
University of Rome, Roma, Italy,  
<sup>2</sup>University of Houston, Houston,  
United States

14:10h - 14:30h

**EuMC54-2**  
**A Novel Booster Antenna Design, Coupled to a one Square Millimeter Coil-on-Chip RFID Tag, Enabling New Medical Applications**

W. Pachler<sup>1</sup>, W. Boesch<sup>1</sup>, G. Holweg<sup>2</sup>, G.  
Hofer<sup>2</sup>, <sup>1</sup>Graz University of Technology,  
Graz, Austria, <sup>2</sup>Infineon Technologies  
Austria AG, Graz, Austria

**EuMC55-2**  
**Miniaturised Sharp Rejection Bandpass Filter with Reconfigurable Bandwidth for UWB Applications**

K. Rabbi, D. Budimir, University of  
Westminster, London, United Kingdom

**EuMC56-2**  
**Tripe-Band Terahertz Metamaterial Absorber**

X. Zhang<sup>1</sup>, Z. Hu<sup>2</sup>, <sup>1</sup>University of  
Manchester, Manchester, United  
Kingdom, <sup>2</sup>University of Manchester,  
Manchester, United Kingdom

**EuMC57-2**  
**Dual-Band Orthogonal-Beam Multi-Standard CRLH Loop Antenna**

M. I. Ibrahim, S. I. El-Henawy,  
A. M. Safwat, Faculty of Engineering,  
Ain Shams University, Cairo, Egypt

14:30h - 14:50h

**EuMC54-3**  
**Compact Cavity-Backed Antenna on Textile in Substrate Integrated Waveguide (SIW) Technology**

R. Moro<sup>1</sup>, S. Agneessens<sup>2</sup>, H. Rogier<sup>2</sup>,  
M. Bozzi<sup>1</sup>, <sup>1</sup>University of Pavia, Pavia,  
Italy, <sup>2</sup>Ghent University, Ghent, Belgium

**EuMC55-3**  
**Compact Bandpass Filter with Tunable Center Frequency and Reconfigurable Bandwidth**

Y. Deng, K. Wu, Poly-GRAMES Research  
Center, Centre for Radiofrequency  
Electronics Research (CREER) of  
Quebec, Ecole Polytechnique(University  
of Montreal), Montreal, Canada

**EuMC56-3**  
**Numerical Study on Upper-Millimeter Wave to Terahertz Devices using PBG Waveguiding Structure**

K. Kamata, T. Kato, C. Chen, T. Anada,  
S. Takeda, Kanagawa university,  
Yokohama, Japan

**EuMC57-3**  
**Design of Compact Circularly Polarized Microstrip Antennas using Meta-surfaces**

K. Agarwal<sup>1</sup>, N. Nasimuddin<sup>2</sup>, A. Alphones<sup>3</sup>,  
<sup>1</sup>National University of Singapore,  
Singapore, Singapore, <sup>2</sup>Institute for  
Infocomm Research A\*STAR, Singapore,  
Singapore, <sup>3</sup>Nanyang Technological  
University, Singapore, Singapore

14:50h - 15:10h

**EuMC54-4**  
**Low-Cost E-Band Receiver Front-End Development for Gigabyte Point-to-Point Wireless Communications**

N. Ghassemi, J. Gauthier, K. Wu, Ecole  
Polytechnique (University of Montreal),  
Montreal, Canada

**EuMC55-4**  
**Compact Tunable Bandpass Filters using Defected Microstrip Structure for Multi-Standard Wireless Systems**

K. Chakrabarty, D. Budimir, University of  
Westminster, London, United Kingdom

**EuMC56-4**  
**Pulsed Second Harmonic Generation by Stacks of Magnetically Biased Semiconductor Layers**

O. Shramkova, A. Schuchinsky, Queen's  
University Belfast, Belfast, United  
Kingdom

**EuMC57-4**  
**Polarization-Rotating Zeroth-Order-Resonator Antenna with Voltage-Controlled Reflectors at Both Ends**

J. Fukuda<sup>1</sup>, T. Ueda<sup>1</sup>, Y. Kado<sup>1</sup>, T. Itoh<sup>2</sup>,  
<sup>1</sup>Kyoto Institute of Technology, Kyoto,  
Japan, <sup>2</sup>University of California, Los  
Angeles, Los Angeles, United States

15:10h - 15:30h

**EuMC54-5**  
**Dynamic Interference Suppression for Chipless Wireless Sensors: An Out-Of-Band Channel Estimation Approach**

B. Kubina, C. Mandel, M. Schüßler,  
R. Jakoby, Technische Universität  
Darmstadt, Darmstadt, Germany

**EuMC55-5**  
**Reconfigurable-Bandwidth Bandpass Filters Based on Signal Interference Techniques**

M. Sanchez-Soriano<sup>1</sup>, R. Gomez-Garcia<sup>2</sup>, M.  
Sanchez-Renedo<sup>2</sup>, G. Torregrosa-Penalva<sup>3</sup>,  
E. Bronchalo<sup>3</sup>, <sup>1</sup>Université de Bretagne  
Occidentale, Brest, France, <sup>2</sup>University of  
Alcalá, Alcalá de Henares, Spain, <sup>3</sup>Miguel  
Hernández University, Elche, Spain

**EuMC56-5**  
**Refractive Index of Magnetophotonic Crystal with Metal Nanoparticles in Magnetic Field**

A. B. Rinkevich<sup>1</sup>, D. V. Perov<sup>1</sup>, M. I. Samoylovich<sup>2</sup>,  
S. M. Klescheva<sup>2</sup>, E. A. Kuznetsov<sup>3,1</sup>, <sup>1</sup>Institute of  
Metal Physics, Ekaterinburg, Russian Federation,  
<sup>2</sup>Central Research Technological Institute  
"TECHNOMASH", Moscow, Russian Federation,  
<sup>3</sup>Nizhny Tagil State Socially - Pedagogical  
Academy, Nizhny Tagil, Russian Federation

## Shanghai

### EuMC58

#### Exploring White Spaces by SDR/CR Technology

Chair: Sven Dortmund,  
Ruhr-University Bochum  
Co-Chair: Andreas Wilceck,  
wiseSense GmbH

#### *EuMC58-1 Empirical and Site Specific Eigenmode Characterization of an Indoor Radio Propagation Channel in the UHF Band*

A. Nalobin, S. Dortmund, S. Sczyslo,  
I. Rolfes, Ruhr-Universität Bochum,  
Bochum, Germany

#### *EuMC58-2 Evaluation of Radio Channel LOS/NLOS Transitions in Indoor and Outdoor Fading Measurements*

J. Barowski, S. Dortmund, B. Meiners,  
A. Nalobin, S. Sczyslo, I. Rolfes, Ruhr-  
Universität Bochum, Bochum, Germany

#### *EuMC58-3 DoA Estimation Combining Uniform Circular Array and Sequential Array Processing*

M. Stefer, C. Schmedt, M. Schneider,  
University of Bremen, Bremen,  
Germany

#### *EuMC58-4 Flexible RF Front-end for Communication in TV White Spaces*

M. Schuehler, A. Jaschke, M. Tessema,  
C. Kelm, Fraunhofer IIS, Erlangen,  
Germany

#### *EuMC58-5 Components and Implementation of a Spectrum Sensing Network for the UHF TV Band*

S. Riess, J. Brendel, A. Stoeckle, R. Rose,  
G. Fischer, University of Erlangen-  
Nuremberg, Erlangen, Germany

## Neu-Delhi

### EuMC59

#### Hybrid Analytical- Numerical Electromagnetic Modeling

Chair: Anton Tjihuis,  
Technische Universiteit Eindhoven  
Co-Chair: Marco Pasian,  
University of Pavia

#### *EuMC59-1 An Efficient Near Field to Near or Far Field Transformation in Time Domain*

M. Serhir, D. Picard, Supélec,  
Laboratoire des Signaux et Systèmes,  
Gif sur Yvette, France

#### *EuMC59-2 Foldy Lax Scattering in Magnetic Wall Waveguides*

A. R. Diewald, IEE SA, Contern,  
Luxembourg

#### *EuMC59-3 PEEC Modeling of Circular Spiral Coils*

N. Gvozdenovic<sup>1</sup>, L. W. Mayer<sup>1</sup>,  
R. Prestros<sup>2</sup>, C. F. Mecklenbräuer<sup>1</sup>,  
<sup>1</sup>Institute of Telecommunications,  
Vienna University of Technology, Wien,  
Austria, <sup>2</sup>IXP Semiconductors Austria  
GmbH, Gratkorn, Austria

#### *EuMC59-4 Modeling of the Coupled Microstrip Lines with Using Numerical Conformal Transformations*

A. N. Sychev, M. A. Chekalin, V. A.  
Shestakov, S. M. Struchkov, Tomsk  
State University of Control Systems  
and Radioelectronics (TUSUR), Tomsk,  
Russian Federation

#### *EuMC59-5 Analytical Response Sensitivities of Infinitesimally Thin Metallic Shapes*

M. Dadash, N. Nikolova, J. Bandler,  
McMaster University, Hamilton, Canada

## Singapur

### EuMC60

#### Focused Session - Ultra Fast Real Time EM Spectrum and EM Interference Measurement Techniques

Chair: Peter Russer,  
Technische Universität München  
Co-Chair: Yury Kuznetsov,  
Moscow Aviation Institute

#### *EuMC60-1 Real-Time EM Spectrum and EM Interference Measurement Techniques*

P. Russer, Technical University Munich,  
Munich, Germany

#### *EuMC60-2 Ultra-fast Real-Time Spectrum Analysis for Investigation of Communication Signals*

S. M. Braun, Gauss Instruments GmbH,  
München, Germany

#### *EuMC60-3 Adaptive Filtering for Noise Cancellation and Signal Analysis in Real- time*

A. Frech, Gauss Instruments GmbH,  
München, Germany

#### *EuMC60-4 Near Field Characterisation of Electromagnetic Interference from Multilayered Printed Circuit Boards*

D. W. Thomas, C. Obiekezie, A. Nothofer,  
S. Greedy, L. Arnaut, P. Sewell, The  
University of Nottingham, Nottingham,  
United Kingdom

#### *EuMC60-5 Stochastic EMI Sources Localization Based on Ultra Wide Band Near- Field Measurements*

A. Baev<sup>1</sup>, A. Gorbunova<sup>1</sup>, M.  
Konovalyuk<sup>1</sup>, Y. Kuznetsov<sup>1</sup>, J. A. Russer<sup>2</sup>,  
<sup>1</sup>Moscow Aviation Institute (National  
Research University), Moscow, Russian  
Federation, <sup>2</sup>Technische Universität  
München, Munich, Germany

13:50h - 14:10h

14:10h - 14:30h

14:30h - 14:50h

14:50h - 15:10h

15:10h - 15:30h



Kopenhagen

## EuMC/EuRAD07

### Antenna Arrays for Radar and Radiometry

Chair: Peter Knott, Fraunhofer FHR  
Co-Chair: Bianca Will, Ruhr-Universität Bochum



Kiew

## EuRAD04

### Radar for Space and Security Applications

Chair: Nicolas Le Gallou, ESA  
Co-Chair: Lorenz-Peter Schmidt, University Erlangen-Nürnberg



St. Petersburg

## EuRAD05

### Radar Subsystems and Phenomenology

Chair: Michael Schlechtweg, Fraunhofer IAF  
Co-Chair: Jean-Yves Dauvignac, University of Nice - Sophia Antipolis

13:50h - 14:10h

### *EuMC/EuRAD07-1 Submillimeter Wave 8x1 Antenna Array With Dielectric Rods to Improve the Radiation Pattern*

R. Cambior, S. Ver Hoeye, C. Vázquez,  
G. R. Hotopan, M. Fernández,  
A. Hadarig, F. Las-Heras,  
University of Oviedo, Gijón/Xixón,  
Spain

### *EuRAD04-1 Space Radar Technology Developments for ESA's Earth Explorer 7 Mission*

N. Gebert, F. Hélière, C. Lin, F. Fois,  
A. Lécuyot, M. Arcioni, M. Kern,  
K. Scipal, K. van't Klooster, M. Aloisio,  
N. Le Gallou, European Space Agency  
(ESA), Noordwijk, Netherlands

### *EuRAD05-1 A 3-5 GHz Fully Integrated CMOS UWB Radar Chip*

S. Jung<sup>1</sup>, J. Ha<sup>1</sup>, H. Yoo<sup>1</sup>, C. Cheong<sup>1</sup>,  
Y. Eo<sup>1</sup>, Y. Young-Hoon Chun<sup>2</sup>, W. Wan-  
Sik Kim<sup>2</sup>, <sup>1</sup>Kwangwoon Univ, Seoul,  
Republic of Korea, <sup>2</sup>LIGNEX1 inc., Yong  
In, Republic of Korea

14:10h - 14:30h

### *EuMC/EuRAD07-2 The Design of a Broadband Slotted Waveguide Antenna for Electronical Beam Steering Applications in MW Radiometry*

E. Schreiber, M. Jirousek, M. Peichl,  
H. Suess, German Aerospace Center  
e.V., Wessling, Germany

### *EuRAD04-2 Optical Fiber Connected Millimeter-Wave Radar for FOD Detection on Runway*

A. Kohmura, S. Futatsumori,  
N. Yonemoto, K. Okada, ENRI(Electric  
Navigation Research Institute),  
Chofu, Japan

### *EuRAD05-2 8-GHz-Bandwidth FM-CW Signal Generation Based on Optical Modulation Technology for W-Band Radar System*

A. Kanno, T. Kawanishi,  
National Institute of Information  
and Communications Technology,  
Koganei, Japan

14:30h - 14:50h

### *EuMC/EuRAD07-3 2D Antenna Array Geometries for MIMO Radar Imaging by Digital Beamforming*

M. Harter<sup>1</sup>, T. Mahler<sup>1</sup>, T. Schipper<sup>1</sup>,  
A. Zirot<sup>2,1</sup>, T. Zwick<sup>1</sup>, <sup>1</sup>Karlsruher Institut  
für Technologie, Karlsruhe, Germany,  
<sup>2</sup>Siemens AG, München, Germany

### *EuRAD04-3 A Multi-channel Frequency-variable Test Signal Generator for SSR Signals*

R. Trommer, P. Quednau, L. Schmidt,  
Friedrich-Alexander-University  
Erlangen-Nuremberg, Erlangen,  
Germany

### *EuRAD05-3 Radar Transceiver Module for QUASAR UAV Based Polarimetric SAR System*

J. del Castillo, J. Larrañaga, Spanish  
National Institute for Aerospace  
Technology-INTA, Torrejón de Ardoz,  
Spain

14:50h - 15:10h

### *EuMC/EuRAD07-4 Design of a Cosecant Square-Shaped Beam Pattern SAR Antenna Array Fed with Square Coaxial Feeder Network*

A. K. Pandey, Agilent Technologies,  
Gurgaon, India

### *EuRAD04-4 Miniaturized 122 GHz System-in-Package (SiP) Short Range Radar Sensor*

M. G. Girma<sup>1</sup>, S. Beer<sup>2</sup>, J. Hasch<sup>1</sup>, W.  
Debski<sup>3</sup>, W. Winkler<sup>3</sup>, Y. Sun<sup>4</sup>, T. Zwick<sup>2</sup>,  
<sup>1</sup>Robert Bosch GmbH, Gerlingen,  
Germany, <sup>2</sup>Karlsruhe Institute of  
Technology, Karlsruhe, Germany, <sup>3</sup>Silicon  
Radar GmbH, Frankfurt(Oder), Germany,  
<sup>4</sup>IHP GmbH, Frankfurt(Oder), Germany

### *EuRAD05-4 Numerical Investigation of Electromagnetic Characteristics of Dielectric Barrier Discharge Plasma Actuators*

Y. Kim<sup>1</sup>, I. Oh<sup>1</sup>, Y. Hong<sup>2</sup>, J. Yook<sup>1</sup>, <sup>1</sup>Yonsei  
University, Seoul, Republic of Korea,  
<sup>2</sup>Agency for Defense and Development,  
Daejeon, Republic of Korea

15:10h - 15:30h

### *EuRAD04-5 Clutter Removal in the Automatic Detection of Concealed Weapons with Late Time Responses*

J. J. McCombe<sup>1</sup>, M. S. Georgiev<sup>2</sup>, T.  
Thayaparan<sup>3</sup>, N. K. Nikolova<sup>1</sup>, <sup>1</sup>McMaster  
University, Hamilton, Canada, <sup>2</sup>Technical  
University of Munich, Munich, Germany,  
<sup>3</sup>Defence R&D Canada - Ottawa | R & D  
pour la défense Canada - Ottawa,  
Ottawa, Canada

### *EuRAD05-5 Ray-Tracing Simulator for Radar Signals Propagation in Radar Networks*

D. Gubelli<sup>1</sup>, O. Yarovy<sup>2</sup>, O. Krasnov<sup>2</sup>,  
<sup>1</sup>Polytechnic of Bari, Bari, Italy, <sup>2</sup>Delft  
University of Technology, Delft,  
Netherlands





## Tokio

**EuMW02****EuMW/EuMC Closing Session**

Chair: Robert Weigel, EuMW2013 General Chair

Co-Chair: Lorenz-Peter Schmidt, EuMC2013 Chair

Co-Chair: Andreas Stelzer, EuMW2013 Awards Chair

**16:00h - 16:30h*****Medical Value by Medical Valley – Innovation by Cooperation***

Erich R. Reinhardt, President, Medical Valley EMN, Erlangen, Germany

MedTech offers huge innovation potential to improve efficiency and effectiveness of healthcare delivery. At this, sensor technologies are key components for innovative applications in prevention, diagnostics and ambient assisted living. This is why one of the central themes in the MedTech cluster Medical Valley EMN is "Intelligent Sensors". The cluster is home to highly specialized research facilities, global players and many upcoming companies. They cooperate closely with world-renowned health research facilities within the cluster to find solutions to the challenges of healthcare today and in the future. This exceptional concentration of stakeholders provides the basis for turning ideas into products, processes and services more quickly and efficiently. The Medical Valley EMN Association facilitates cooperation between the cluster partners and offers know how for the optimization of the innovation process.

**16:30h - 17:00h*****Reinforcing the Competitiveness of Europe in Micro- and Nanoelectronics***

Dirk Beernaert, Adviser to the DG for Interdisciplinary and Integrating Activities, European Commission, DG CONNECT, Brussels, Belgium

Micro- and nano-electronic components and systems are essential to digital products and services and underpin innovation and competitiveness of all major economic sectors. This is why micro- and nano-electronics are Key Enabling Technologies (KET) and why Europe must stay at the leading edge in the design and manufacturing of these technologies and related products; providing benefits across the economy and across society, creating growth and jobs in the European Union. This presentation will, after a broad introduction, elaborate on an industrial policy and a European strategy to strengthen the investments and the competitiveness of the micro- and nano-electronics industry in Europe. Research, development and innovation in the context of Horizon 2020, the new framework for European Research, as well as access to skills, to capital and relevant legislation issues will be addressed.

**17:00h - 17:30h*****Awards Ceremony***

Chair: Andreas Stelzer, EuMW2013 Awards Chair

***EuMC Microwave Prize******EuMC Young Engineer Prizes******Student Challenge Prize******Student Design Competition Prizes*****17:30h - 17:50h*****Closing of European Microwave Conference 2013***

Lorenz-Peter Schmidt, EuMC2013 Chair

***Closing of European Microwave Week 2013***

Robert Weigel, EuMW2013 Chair

***Closing Address***

Wolfgang Heinrich, President EuMA

***Invitation to the European Microwave Week 2014***

Roberto Sorrentino, EuMW2014 General Chair

16:00h - 17:50h

THURSDAY



Kiew

St. Petersburg

Istanbul

**EuRAD06**

**Ultra Wideband Imaging**

Chair: Felix Yanovsky,  
National Aviation University  
Co-Chair: Alexander Yarovoy,  
Delft University of Technology

**EuRAD07**

**Front-End Subsystems**

Chair: Eddy van Eeuwijk,  
Thales Nederland B.V.  
Co-Chair: Amelie Hagelauer,  
University of Erlangen-Nürnberg

**EuRAD08**

**Industrial Radar**

Chair: Massimiliano Pieraccini,  
University Florence  
Co-Chair: Thomas Musch,  
Ruhr-University Bochum

08:30h - 08:50h

**EuRAD06-1**  
**Threat Object**  
**Classification with a**  
**Close Range Polarimetric**  
**Imaging System by Means**  
**of H-alpha Decomposition**

J. Adametz, L. Schmidt, University  
of Erlangen-Nuremberg, Erlangen,  
Germany

**EuRAD07-1**  
**Sensitivity Analysis of**  
**UWB Minimum Variance**  
**Beamformer for Medical**  
**Imaging**

M. Jalilvand, X. Li, L. Zwiello, T. Zwick,  
Karlsruhe Institute für Technologie  
(KIT), Karlsruhe, Germany

**EuRAD08-1**  
**Characterization of a**  
**Beam Steering Lens**  
**Antenna for Industrial**  
**Radar Measurements in**  
**Harsh Environments**

C. Schulz<sup>1</sup>, C. Baer<sup>2</sup>, N. Pohl<sup>3</sup>, T. Musch<sup>2</sup>, B.  
Will<sup>1</sup>, I. Rolfes<sup>1</sup>, <sup>1</sup>Ruhr-University Bochum,  
Bochum, Germany, <sup>2</sup>Ruhr-University  
Bochum, Bochum, Germany, <sup>3</sup>Ruhr-  
University Bochum, Bochum, Germany

08:50h - 09:10h

**EuRAD06-2**  
**Self-similarity Analysis on**  
**Human Backscattering in**  
**Radar**

Y. He, F. Le Chevalier, A. G. Yarovoy,  
Delft University of Technology, Delft,  
Netherlands

**EuRAD07-2**  
**Improved Dual Six-**  
**Port Receiver Structure**  
**for Two-Dimensional**  
**Direction of Arrival**  
**Detection Using pHEMT**  
**Power Detectors**

S. Mann, G. Vinci, S. Lindner, F. Barbon,  
S. Linz, R. Weigel, A. Koelpin, Friedrich-  
Alexander-University Erlangen-  
Nürnberg, Erlangen, Germany

**EuRAD08-2**  
**FPGA-Based Signal Control**  
**for Highly Integrated**  
**60 GHz Radar Distance**  
**Measurements**

R. Agethen, M. Pourmousavi,  
P. S. Mengs, R. Weigel, D. Kissinger,  
University of Erlangen Nuremberg,  
Erlangen, Germany

09:10h - 09:30h

**EuRAD06-3**  
**Background Removal**  
**Methods in GPR**  
**Prospecting**

R. Solimene<sup>1</sup>, A. Cuccaro<sup>1</sup>,  
A. Dell'Aversano<sup>1</sup>, I. Catapano<sup>2</sup>,  
F. Soldovieri<sup>2</sup>, <sup>1</sup>Seconda Università degli  
Studi di Napoli, Aversa, Italy, <sup>2</sup>Consiglio  
Nazionale delle Ricerche, Napoli, Italy

**EuRAD07-3**  
**Design and Fundamental**  
**Properties of CMOS**  
**IC for 26GHz IR-UWB**  
**Automotive Radar with**  
**Beam Steering Capability**

F. Sakai<sup>1</sup>, Y. Amano<sup>1</sup>, M. Makimoto<sup>1</sup>,  
S. Igarashi<sup>2</sup>, <sup>1</sup>Sakura Tech Corporation,  
Kawasaki, Japan, <sup>2</sup>RF Chips Technology  
Inc., Kawasaki, Japan

**EuRAD08-3**  
**Interference Recognition**  
**and Fault Reduction**  
**Method for FSCW-based**  
**SAW-Tag Readers**

C. Pfeffer<sup>1</sup>, T. Wagner<sup>1</sup>, S. Scheibelhofer<sup>2</sup>,  
A. Stelzer<sup>1</sup>, <sup>1</sup>Johannes Kepler University,  
Linz, Austria, <sup>2</sup>Hainzl Industriesysteme,  
Linz, Austria

09:30h - 09:50h

**EuRAD06-4**  
**Novel Transform for Ultra**  
**Wide-Band Radar Imaging**  
**with Circular Scanning**  
**Antennas**

T. Sakamoto<sup>1,3</sup>, T. Sato<sup>1</sup>, R. Salman<sup>2</sup>,  
I. Willms<sup>2</sup>, A. G. Yarovoy<sup>3</sup>, <sup>1</sup>Kyoto  
University, Kyoto, Japan, <sup>2</sup>Universität  
Duisburg-Essen, Duisburg, Germany,  
<sup>3</sup>Delft University of Technology, Delft,  
Netherlands

**EuRAD07-4**  
**Miniaturized Regenerative**  
**Backscatter Transponder**  
**with Bidirectional**  
**Communication**

C. Carlowitz, M. Vossiek, University  
of Erlangen-Nuremberg, Erlangen,  
Germany

**EuRAD08-4**  
**Frequency-Diversity**  
**Technique for Reliable**  
**Radar Level Measurement**  
**of Bulk Solids in Silos**

M. Vogt, T. Neumann, M. Gerding,  
Krohne Messtechnik GmbH, Duisburg,  
Germany

09:50h - 10:10h

**EuRAD06-5**  
**Geometry Classification**  
**by Means of Scattering**  
**Matrix Decomposition for**  
**Ultra-Wideband Radar**

R. Salman<sup>1</sup>, I. Willms<sup>1</sup>, L. Reichardt<sup>2</sup>,  
T. Zwick<sup>2</sup>, W. Wiesbeck<sup>2</sup>, <sup>1</sup>Universität  
Duisburg-Essen, Duisburg, Germany,  
<sup>2</sup>Karlsruher Institute of Technology  
(KIT), Karlsruhe, Germany

**EuRAD07-5**  
**Up-Converter Design**  
**and Transmit Path**  
**Characterization for MIRA-**  
**CLE Ka**

G. El-Arnauti, O. Saalman, J. Klare,  
Fraunhofer Institute, Wachtberg,  
Germany

**EuRAD08-5**  
**Radar Gauge for Molten**  
**Glass Level Measurement**

M. Pieraccini<sup>1</sup>, D. Mecatti<sup>1</sup>, D. Dei<sup>1</sup>,  
F. Parrini<sup>1</sup>, G. Macaluso<sup>1</sup>, A. Spinetti<sup>1</sup>,  
F. Puccioni<sup>2</sup>, <sup>1</sup>University of Florence,  
Firenze, Italy, <sup>2</sup>Glass Service,  
San Miniato, Italy



## Kopenhagen

**EuRAD09****Focused Session - Future Radar**

Chair: Werner Wiesbeck,  
Karlsruhe Institute of Technology  
Co-Chair: Marwan Younis,  
German Aerospace Center (DLR)



## Stockholm

**EuRAD10****Doppler and Micro-Doppler Processing**

Chair: Philippe Eudeline,  
Thales Air Systems  
Co-Chair: Joachim Ender,  
Fraunhofer FHR

**EuRAD09-1****The Radar of the Future**

W. Wiesbeck, Karlsruhe Institute of  
Technology, Karlsruhe, Germany

**EuRAD10-1****Scale-Invariant Multi-Sensor Velocity Component Estimation Using Certainty Grids**

D. Zoelke<sup>1,2</sup>, A. Zirotz<sup>2</sup>, <sup>1</sup>Univ. Erlangen-Nuremberg, Erlangen, Germany,  
<sup>2</sup>Siemens AG, Munich, Germany

08:30h - 08:50h

**EuRAD09-2****MIMO SAR Techniques and Trades**

M. Younis, G. Krieger, A. Moreira,  
German Aerospace Center (DLR),  
Oberpfaffenhofen, Germany

**EuRAD10-2****Wide-Band Range-Doppler Processing for FMCW Radar Systems**

T. Wagner, R. Feger, A. Stelzer, Johannes  
Kepler University, Linz, Austria

08:50h - 09:10h

**EuRAD09-3****2D Radar Imaging with Velocity Estimation using a MIMO OFDM-Based Radar for Automotive Applications**

Y. Sit, T. Nguyen, C. Sturm, T. Zwick,  
Karlsruhe Institute of Technology (KIT),  
Karlsruhe, Germany

**EuRAD10-3****Interpolated Root-Music for Transversal Automotive Radar Traffic Monitoring**

S. Askeland, T. Ekman, Norwegian  
University of Science and Technology,  
Trondheim, Norway

09:10h - 09:30h

**EuRAD09-4****Varying Sets of Waveforms for Cognitive Radar**

S. Cao<sup>1</sup>, Y. Zheng<sup>1</sup>, R. L. Ewing<sup>2</sup>,  
<sup>1</sup>The Ohio State University, Columbus,  
United States, <sup>2</sup>Wright-Patterson Air  
Force Base, Dayton, United States

**EuRAD10-4****High Resolution 2D Time-Frequency Representation of Radar Micro-Doppler Pedestrian Signal**

S. Liaquat, M. B. Ihsan, S. Z. Asghar,  
A. Ejaz, A. Javed, National University of  
Sciences and Technology, Islamabad,  
Pakistan

09:30h - 09:50h

**EuRAD09-5****Multi Function Radar System for Improved Situational Awareness in Helicopters**

P. Feil, R. Schneider, H. Sanchez-Trigo,  
Cassidian, Ulm, Germany

**EuRAD10-5****Classification of Small UAVs and Birds by Micro-Doppler Signatures**

P. Molchanov<sup>1</sup>, K. Egiastian<sup>1</sup>, J. Astola<sup>1</sup>,  
R. Harmanny<sup>2</sup>, J. de Wit<sup>3</sup>, <sup>1</sup>Tampere  
University of Technology, Tampere,  
Finland, <sup>2</sup>Thales Nederland B.V.,  
Delft, Netherlands, <sup>3</sup>TNO, The Hague,  
Netherlands

09:50h - 10:10h



Kiew

### **EuRAD11 SAR and ISAR**

Chair: Peter Hoogeboom,  
Delft University of Technology  
Co-Chair: Laurent Ferro-Famil,  
University of Rennes 1



St. Petersburg

### **EuRAD12 Short Range Systems**

Chair: Winfried Mayer,  
Endress & Hauser  
Co-Chair: Stephen Harman, QinetiQ



Istanbul

### **EuRAD13 Automotive Radar**

Chair: Martin Vossiek,  
University Erlangen-Nürnberg  
Co-Chair: Thomas Walter, HS Ulm



Kopenhagen

### **EuRAD14 Focused Session - Polarimetric/ Interferometric Synthetic Aperture Radar POLinSAR**

Chair: Wolfgang-Martin Boerner,  
University of Illinois at Chicago  
Co-Chair: Kostas P. Papathanassiou,  
German Aerospace Center (DLR)

10:40h - 11:00h

**EuRAD12-1  
Prerequisites of mmW  
Automotive Radar  
Specification, Platform  
Integration and Operation**  
H. L. Bloecher, C. Fischer, A. Sailer,  
Daimler AG, Ulm, Germany

**EuRAD13-1  
Lens Based 77GHz TDM  
MIMO Radar Sensor for  
Angular Estimation in  
Multitarget Environments**  
S. Lutz, T. Walter, University of Applied  
Sciences Ulm, Ulm, Germany

**EuRAD14-1  
Future Perspectives of  
Microwave Imaging with  
Application to Multi-  
Modal Fully Polarimetric  
POLSAR Remote Sensing  
and Geophysical Stress-  
Change Monitoring**  
W. Boerner, University of Illinois at  
Chicago, Chicago, United States

11:00h - 11:20h

**EuRAD11-2  
Enhancement of Static  
Human-to-Background  
Contrast in Through-The-  
Wall Polarimetric Radar  
ISAR Measurements**  
T. Johansson, A. Sume, S. Nilsson, A.  
Orbom, Swedish Defence Research  
Agency (FOI), Linköping, Sweden

**EuRAD12-2  
Multi-functional  
UltraWideband Platform  
for Ranging, Radar and  
Communications**  
A. Petroff, B. Dewberry, Time Domain,  
Huntsville, United States

**EuRAD13-2  
An ISO 26262 Compliant  
Built-in Self-Test for  
77GHz Automotive Radar  
Sensors**  
R. Schnabel<sup>1</sup>, D. Steinbuch<sup>1</sup>, R. Weigel<sup>2</sup>,  
<sup>1</sup>Robert Bosch GmbH, Leonberg,  
Germany, <sup>2</sup>Universität Erlangen-  
Nürnberg, Erlangen, Germany

11:20h - 11:40h

**EuRAD11-3  
Polarimetric SAR  
Tomography Based  
on a Multi-Baseline  
Generalization of RVoG  
Model**  
B. El Hajj Chehade, L. Ferro-Famil,  
University of Rennes 1, Rennes, France

**EuRAD12-3  
Ultra-Wideband Sensor  
Network in ECC Band for  
Monitoring of Vitality in a  
Real World Case Study**  
R. Herrmann<sup>1</sup>, J. Sachs<sup>1</sup>, M.  
Kmec<sup>1</sup>, R. Mueller<sup>1</sup>, K. Schilling<sup>1</sup>, P.  
Rauschenbach<sup>2</sup>, <sup>1</sup>Ilmenau University  
of Technology, Ilmenau, Germany,  
<sup>2</sup>MEODAT GmbH, Ilmenau, Germany

**EuRAD13-3  
Moving Target Using  
Dielectric Waveguide for  
Radar-Based Pre-Crash  
Safety Systems**  
H. Suzuki, K. Saito, KEYCOM  
Corporation, Tokyo, Japan

**EuRAD14-2  
First Results of  
Multispectral Polarimetry  
and Single-Pass PolInSAR  
with the F-SAR Airborne  
SAR Instrument**  
A. Reigber, K. Papathanassiou, M. Jäger,  
R. Scheiber, A. Moreira, DLR, Weßling,  
Germany

11:40h - 12:00h

**EuRAD11-4  
Calibration Error Model  
for Multichannel  
Spaceborne SAR  
Systems Based on Digital  
Beamforming**  
F. Bordoni, P. Laskowski, M. Younis,  
G. Krieger, German Aerospace Center  
(DLR), Oberpfaffenhofen, Germany

**EuRAD12-4  
Approaches for Linear-  
Frequency-Modulated  
Continuous-Wave  
(LFMCW) Dual-Band  
Radars**  
J. Munoz-Ferreras, R. Gomez-Garcia,  
University of Alcalá, Alcalá de Henares,  
Spain

**EuRAD13-4  
Decision Adaptive Antenna  
Array Processing for  
Collision Avoidance RADAR**  
N. S. Subotic<sup>1</sup>, H. Kourous<sup>1</sup>, B. Wilson<sup>1</sup>,  
L. Li<sup>2</sup>, P. Schmalenberg<sup>2</sup>, J. S. Lee<sup>2</sup>,  
K. Shiozaki<sup>2</sup>, <sup>1</sup>Michigan Tech University,  
Ann Arbor, United States, <sup>2</sup>Toyota  
Motor Engineering & Manufacturing  
North America, Inc., Ann Arbor,  
United States

**EuRAD14-3  
Exploring the Potential  
of Pol-InSAR Techniques  
at X-Band: Results  
and Experiments from  
TanDEM-X**  
K. Papathanassiou, F. Kugler, I. Hajnsek,  
German Aerospace Center (DLR),  
Weßling, Germany

12:00h - 12:20h

**EuRAD11-5  
Efficient Estimation  
of Residual Trajectory  
Deviations from SAR Data**  
O. O. Bezvesilniy, I. M. Gorovyi, D. M.  
Vavriv, Institute of Radio Astronomy,  
Kharkiv, Ukraine

**EuRAD12-5  
A Delta-Sigma Transmitter  
Based Heterodyne FMCW  
Radar**  
R. Feger, H. J. Ng, C. Pfeiffer, A. Stelzer,  
Johannes Kepler University, Linz,  
Austria

**EuRAD13-5  
An Estimation of the  
Operating Range for  
Frequency Modulated  
Radars in the Presence of  
Interference**  
T. Schipper, T. Mahler, M. Harter,  
L. Reichardt, T. Zwick, Karlsruhe  
Institute of Technology, Karlsruhe,  
Germany

**EuRAD14-4  
INTA's New RBX  
Polarimetric SAR System  
Design, Performance and  
Calibration Review After  
First Trials**  
J. del Castillo, J. Larrañaga, Spanish  
National Institute for Aerospace  
Technology - INTA, Torrejón de Ardoz,  
Spain





## Stockholm

### **EuRAD15**

#### **Passive Radars**

Chair: Krzysztof Kulpa,  
Warsaw University of Technology  
Co-Chair: Fabrizio Berizzi,  
University of Pisa

#### **EuRAD15-1** ***A Flexible Receiver*** ***Architecture for Multi-*** ***Band Passive Bistatic*** ***Radar***

A. Macera, C. Bongioanni, F. Colone,  
P. Lombardo, University of Rome La  
Sapienza, Rome, Italy

10:40h - 11:00h

#### **EuRAD15-2** ***Analysis of Recorded*** ***Helicopter Echo in a*** ***Passive Bistatic Radar***

M. K. Bączyk, J. Misiurewicz,  
D. Gromek, K. Kulpa, Warsaw  
University of Technology, Warsaw,  
Poland

11:00h - 11:20h

#### **EuRAD15-3** ***Utilization of Long*** ***Coherent Integration Time*** ***in Helicopter Recognition*** ***by Passive Coherent*** ***Location (PCL) Radar***

J. M. Tikkinen, K. Hiltunen,  
Patria, Tampere, Finland

11:20h - 11:40h

#### **EuRAD15-4** ***Analysis of the Radar*** ***Coverage Provided by a*** ***Maritime Radar Network*** ***Of Co-Operative Vessels*** ***Based on Real AIS Data***

F. Sermi<sup>1</sup>, C. Mugnai<sup>1</sup>, F. Cuccoli<sup>1</sup>,  
L. Facheris<sup>2</sup>, <sup>1</sup>National Laboratory of  
Radar and Surveillance Systems (RaSS)  
of CNIT, Florence, Italy, <sup>2</sup>University of  
Florence, Florence, Italy

11:40h - 12:00h

#### **EuRAD15-5** ***Multipath Sensor Based*** ***on GNSS for Passive*** ***Airborne Surveillance***

S. Wachtl<sup>1</sup>, V. Koch<sup>1</sup>, L. P. Schmidt<sup>2</sup>,  
<sup>1</sup>Diehl BGT Defence GmbH & Co. KG,  
Röthenbach an der Pegnitz, Germany,  
<sup>2</sup>University of Erlangen, Erlangen,  
Germany

12:00h - 12:20h



## St. Petersburg

### **EuRAD16**

#### **EuRAD Closing Session**

Chair: Arne Jacob, EuRAD2013 Chair  
Co-Chair: Reinhard Knöchel, EuRAD2013 TPC Chair  
Co-Chair: Andreas Stelzer, EuMW2013 Awards Chair

12:20h - 13:50h

#### ***Buffet Lunch (Foyer St. Petersburg)***

13:50h - 14:30h

#### ***Integrated Radar Sensors***

Andreas Stelzer, Johannes Kepler University Linz, Austria

Automotive radar sensors are still the driving force for the integration of mm-wave sensor systems and pave the way for various new solutions. Industrial and life-science applications e.g. require 3D imaging capabilities, higher accuracy, smaller size and easier applicability, i.e. a package including all RF-parts. This presentation will review radar and frontend concepts for integration, MIMO and phased array approaches, integrated sensors above 100 GHz, as well as packaging solutions with antennas in package up to 160 GHz and additional focusing elements.

14:30h - 14:50h

#### ***EuRAD Awards Ceremony***

Chair: Andreas Stelzer, EuMW2013 Awards Chair

#### ***EuRAD Best Paper Award***

#### ***EuRAD Young Engineer Prize***

14:50h - 15:00h

#### ***Closing of EuRAD2013***

Arne Jacob, EuRAD2013 Chair

#### ***Invitation to EuRAD2014***

Enzo Dalle Mese, EuRAD2014 Chair

12:20h - 15:00h

## WORKSHOPS AND SHORT COURSES - SUNDAY

Duration: 08:30h to 17:40h

Room Kiew



### W 01 (EuMIC)

#### Low-Power RFIC Frontends and Components

##### Organisers:

Heinrich Milosiu, Fraunhofer IIS, Germany  
Frank Ellinger, TU Dresden, Germany

##### Abstract

Radio frequency integrated circuits comprise a wide frequency range of 0.5 GHz up to 125 GHz and beyond. Not only wireless applications such as smartphones with WiFi link increasingly apply modern RF circuits. But also radar and broadband communication are emerging fields for RFICs. Power efficiency is a major design issue both in mm-wave circuits and microwatt receivers. This workshop gives an overview of latest developments in low-power RFIC design using state-of-the-art semiconductor technologies.

##### Programme

08:30h - 09:20h	<i>Pushing the Frontiers of Silicon IC's: Digital RF, mm-Waves, and THz Communication and Imaging</i> A. Niknejad, UC Berkeley
09:20h - 10:10h	<i>Power-Efficiency RF-IC and Millimetre-Wave Transmitters</i> P. Reynaert, KU Leuven
10:10h - 10:40h	<i>Coffee Break</i>
10:40h - 11:30h	<i>Microwatt Millimeter-Wave CMOS RFIC</i> Tian-Wei Huang, National Taiwan University

11:30h - 12:20h

*Indoor 10 Gbps Wireless Communication with Low-Power D-Band CMOS Circuits*  
M. Fujishima, Hiroshima University

12:20h - 13:50h

*Lunch*

13:50h - 14:25h

*RF MEMS Reconfigurable Frontends*  
J. Oberhammer, KTH Stockholm

14:25h - 14:55h

*Low-power Monolithic Millimetre-Wave ICs for Wireless Communication Systems Based on III/V-mHMT-Technologies*  
F. Thome, Fraunhofer IAF

14:55h - 15:30h

*Power Efficient RF Circuits for Wireless and Optical Communications*  
Frank Ellinger, TU Dresden

15:30h - 16:00h

*Coffee Break*

16:00h - 16:35h

*Analog Signal Processing Techniques for Low-power Microwave Circuits*  
H. Schumacher, Ulm University

16:35h - 17:05h

*Sub 10  $\mu$ Watt Wake-Up Receiver for the 868 MHz ISM-Band*  
G.U. Gamm, IMTEK Freiburg

17:05h - 17:40h

*Recent Trends in UHF Ultra-Low Power CMOS Wake-Up Receiver Design*  
Heinrich Milosiu, Fraunhofer IIS

Duration: 08:30h to 17:40h

Room Riga



### W 02 (EuMC)

#### Wireless Power Transmission – Techniques and Applications

##### Organisers:

Nuno Borges Carvalho, Instituto de Telecomunicações, Universidade de Aveiro, Portugal  
Apostolos Georgiadis, CTTC, Spain

##### Abstract

In this workshop new technology advances in the area of Wireless Power Transmission and Applications are presented. The WPT research area had a recent attention increase due to the possibility and technology advances in powering up battery appliances remotely. For inductive coupling or radio energy transfer, the main idea is to eliminate the wire connection, by removing the interconnection between the power outlet and the device to power. The workshop will start with some presentations on how to maximize the energy efficiency of the overall energy transfer system, by then present some recent and emerging applications in this area. The talks will cover the study of sheet-like structures for wireless power transmission, followed by the discussion of nanotechnology-based inkjet-printed structures for wireless power transmission and ambient energy harvesting and some powering applications for wireless transfer. The workshop will then be followed by CAD approaches of multi-domain optimization of entire near-field wireless power transmission links and some analysis on how to improve wireless power transmission efficiency using signal waveform optimization. Several applications will then be studied including dual band paper shoe piezo harvested and empowering "wirelessly" the smart floor, followed by some applications special tailored for bio-medical applications as the study of inverters, synchronous rectifiers and resonant converters for UHF wireless power for charging health assistance clocks and wireless power transmission in biomedical applications.

##### Programme

08:30h - 08:40h	<i>Introduction</i>
08:40h - 09:25h	<i>Wireless Power Transmission in Biomedical Applications</i> Dominique Schreurs, KU Leuven

09:25h - 10:10h

*Multi-Domain Optimization of Entire Near-Field Wireless Power Transmission Links*  
Alessandra Constanzo, Franco Matri, University of Bologna  
Mauro Mongiardo, Marco Dionigi, University of Perugia

10:10h - 10:40h

*Coffee Break*

10:40h - 11:25h

*Dual Band Paper Shoe Piezo Harvested and Empowering "Wirelessly" the Smart Floor*  
Luca Roselli, University of Perugia

11:25h - 12:10h

*Study of Sheet-Like Structures for Wireless Power Transmission*  
Jan Kracek, Milos Mazanek, Czech Technical University in Prague  
Enrica Martini, Stefano Maci, University of Siena

12:10h - 14:00h

*Lunch*

14:00h - 14:45h

*Inverters, Synchronous Rectifiers and Resonant Converters for UHF Powering Applications*  
José Angel García, Universidad de Cantabria

14:45h - 15:30h

*Nanotechnology-Based Inkjet-Printed Structures for Wireless Power Transmission and Ambient Energy Harvesting*  
Manos Tentzeris, Sangkil Kim, Rushi Vyas, Georgia Tech  
Herve Aubert, Anya Traill, LAAS  
Stavros Georgakopoulos, FIU

15:30h - 16:45h

*Improving Wireless Power Transmission Efficiency Using Signal Waveform Optimization*  
Ana Collado, Apostolos Georgiadis, CTTC  
Alirio Boaventura, Nuno Borges Carvalho, Instituto de Telecomunicações, Universidade de Aveiro

16:45h - 17:25h

*Wireless Power for Charging Health Assistance Watches*  
André Schwarzmeier, University of Erlangen-Nürnberg

17:25h - 17:40h

*Open Debate*

## WORKSHOPS AND SHORT COURSES - SUNDAY

Duration: 08:30h to 17:40h

Room Krakau

### W 03 (EuMC & EuMIC)

#### Energy Harvesting, Circuit and System Advances for Battery-Less Radio Frequency Identification (RFID) Systems with Sensing Capability

##### Organisers:

Apostolos Georgiadis, CTTC, Spain  
Manos Tentzeris, Georgia Institute of Technology, USA  
Ana Collado, CTTC, Spain

##### Abstract

Emerging communication systems point towards ubiquitous sensor networks where RFID tags and sensor circuitry are used to interconnect numerous objects providing useful information to the network users. Such nodes, consisting of RFID-enabled sensors including NFC systems are being used in an increasing number of applications such as identification, tracking, monitoring, logistics and security. Consequently, there is significant interest in low power, energy efficient, self-sustainable and environmental friendly battery-less nodes. Furthermore, low cost, low profile and conformal circuits are sought, prompting research efforts utilizing novel flexible substrate materials such as paper and textiles. RF power transfer and energy harvesting technologies, circuit and system architectures, and signal waveform optimization are applied in order to improve performance and enable novel applications. Challenges related to the utilization of flexible substrate materials such as paper, PET and textiles, as well as novel technologies such as inkjet printing, towards the design of low cost, high performance, conformal RFIDs and sensors are presented. Finally the workshop aims to report novel systems and exciting applications such as wearable communication systems, environmental sensing and utilization of RFID technology in home appliances. Following the speaker presentations, the floor will be opened for interactive discussion with the audience discussing topics such as a) power budget of RFID enabled sensors from wireless power transmission to sensor read-out operations, b) advantages and limitations of CAD techniques c) robustness and reliability issues versus cost, d) public adoption of smart textile systems. It is the aim of this workshop to highlight state-of-art research results on new technologies, architectures and CAD techniques of modern RFID systems and networks enhanced with energy harvesting and sensing capability. The workshop will be beneficial to students, engineers and researchers who want to learn about the current status and future trends of RFID technologies and energy harvesting.



##### Programme

- 08:30h - 09:20h** *Autonomous Wireless Sensors and RFID's: Energy Harvesting, Material and Circuit Challenges*  
A. Georgiadis, A. Collado, Centre Tecnologic de Telecomunicacions de Catalunya (CTTC)
- 09:20h - 10:10h** *Using Garments as a Platform for the Deployment of Autonomous Wearable Communication Systems*  
H. Rogier, Ghent University
- 10:10h - 10:40h** *Coffee Break*
- 10:40h - 11:30h** *Ultra-Low Cost Reception of Backscatter-Enabled Environmental Sensing: Challenges and Current Progress*  
A. Bletsas, Technical Univ. of Crete  
J. N. Sahalos, University of Nicosia
- 11:30h - 12:20h** *Battery-Less Operation in Home Appliances Using RFID Technologies*  
N.B. Carvalho, A. Boaventura, R. Goncalves, Institute of Telecommunications - University of Aveiro
- 12:20h - 13:50h** *Lunch*
- 13:50h - 14:40h** *Long Range UHF Wireless Ambient Energy Harvesting Systems*  
M. Tentzeris, R. Vyas, Georgia Institute of Technology
- 14:40h - 15:30h** *CAD Tools and Techniques for Co-Design of Multi-Source Energy Autonomous Systems*  
A. Costanzo, D. Masotti, University of Bologna
- 15:30h - 16:00h** *Coffee Break*
- 16:00h - 16:45h** *Wireless Sensing from RCS Variability Measurement of Passive and Chipless Electromagnetic Sensors - a Review*  
H. Aubert, P. Mons, LAAS-CNRS  
M. Tentzeris, Georgia Institute of Technology
- 16:45h - 17:20h** *Chipless and Multi-bit Passive RFID Sensor for Monitoring Rotating Parts*  
L. Roselli, F. Alimenti, Chiara Mariotti, Univ. of Perugia
- 17:20h - 17:40h** *Open Discussion*

Duration: 08:30h to 12:20h

Room Prag

### W 04 (EuMC & EuMIC)

#### Modulators and Power Amplifiers for Power-Efficient Transmitters

##### Organiser:

Patrick Reynaert, ESAT-MICAS, KU Leuven, Belgium

##### Abstract

Recent years have seen a tremendous increase in novel concepts and architectures for power-efficient amplifiers and transmitters. Energy efficiency is the key, and is improved by drastically increasing the complexity of the TX and PA architecture. That will be the main focus of the workshop which aims to bring together the experts and major players in this field, both from industry and academia. It will cover presentations of both base-stations and handsets. The first presentation will focus on NXP's novel switch-mode PA (SMPA) concept, which promises to offer the required flexibility in power amplifiers by a direct digital control of the PA. The second talk is from Aalborg University and introduces the application of Multiple Dynamic Digital Controls (MDDC) to maximize the performance of an RF Power Amplifier. The third presentation, from Infineon, will present the realization of a PWM modulator, the implementation on an FPGA platform, the RF PA design for PWM signals and the measurement results of the complete transmitter. Presentation four, given by KU Leuven will discuss the growing tendency to move as many components as possible to the digital domain. Using continuous-time digital (CTD) circuits, timing resolutions in the order of a few picoseconds can be achieved. Finally, the fifth presentation is from imec. It will show how the DAC is moving towards the antenna in transmitters and give some examples of new transmitter architectures sustaining this evolution.



##### Programme

- 08:30h - 09:10h** *Digital Base Station Transmitters - Changing an Industry, Bit by Bit*  
Mark P. van der Heijden, NXP Eindhoven
- 09:10h - 09:50h** *Power Amplifier Optimization Using Multiple Dynamic Digital Controls*  
Francesco Tafuri, O. K. Jensen and J. J. Mikkelsen, Aalborg University
- 09:50h - 10:30h** *Implementation of a 2.6-GHz, 5-W Carrier Bursting Switched-Mode Transmitter*  
Peter Singerl, Infineon
- 10:30h - 11:00h** *Coffee Break*
- 11:00h - 11:40h** *RF-PWM and BB-PWM Digital Transmitters in CMOS*  
Pieter Nuyts, W. Dehaene and P. Reynaert, KU Leuven
- 11:40h - 12:20h** *Direct Digital RF Modulators Architectures*  
Mark Ingels, imec, Leuven

## WORKSHOPS AND SHORT COURSES - SUNDAY

Duration: 08:30h to 12:20h

Room Budapest

### W 05 (EuMC)

#### Biomedical Applications of Microwaves: Challenges and New Opportunities

##### Organisers:

Chafik Meliani, IHP Microelectronics, Frankfurt (Oder), Germany  
Christian Wenger, IHP Microelectronics, Frankfurt (Oder), Germany  
Roland Thewes, Technical University of Berlin, Germany

##### Abstract

This workshop addresses the use of microwaves and microelectronics for biomedical applications and presents the latest developments on system, single device and technology level. It will start with an overview given in the first presentation where application needs such as form factor, power consumption, configurability, and sensor resolution of medical systems will be discussed. This will be followed by a focus on semi-conductor technologies for biomedical applications, the new possibilities they offer and the challenges they have to face. Finally, based on various concepts, several realizations ranging from a single SoC sensor to complete microwave systems will be presented.



##### Programme

08:30h - 09:05h	<b>New Opportunities for Microelectronics in Medical Diagnosis</b> Ralf Brederlow, Bjoern Eversmann, Texas Instruments
09:05h - 09:40h	<b>Silicon Based Sensors for Bio-Medical Applications</b> Klaus Schmalz, Christian Wenger, Chafik Meliani, IHP Microelectronics
09:40h - 10:15h	<b>Microwave Dielectric Spectroscopy: Interests for Non-Invasive and Label Free Cellular and Molecular Biosensing</b> Katia Grenier, David Dubuc, LAAS-CNRS and Univ. de Toulouse
10:15h - 10:45h	<b>Coffee Break</b>
10:45h - 11:25h	<b>Hyperthermia: RF and MW Methods to Heat Tumours</b> Hans Crezee, University of Amsterdam
11:25h - 12:10h	<b>Harmonic Radar for Non-Invasive Monitoring Medical and Health Care Applications</b> Lydia Chioukh, Ke Wu, École Polytechnique, Montréal Dominic Deslandes, Université du Québec à Montréal
12:10h - 12:20h	<b>Discussion and Conclusions</b>

Duration: 08:30h to 17:40h

Room Istanbul

### W 06 (EuMC & EuMIC)

#### RFIC Design, Assembly, and Packaging Towards Sub-mm and THz Waves

##### Organisers:

Michael Schlechtweg,  
Fraunhofer Institute for Applied Solid State Physics, Germany  
Dietmar Kissinger, University of Erlangen-Nuremberg, Germany

##### Abstract

The millimetre-wave and submillimetre-wave frequency range of the electromagnetic spectrum is increasingly addressed for high-resolution radar and imaging solutions. Millimetre-waves easily penetrate dust, snow, fog, and fabrics. Operation distances up to a few hundred meters and more are feasible. Furthermore, these high carrier frequencies offer a large absolute bandwidth enabling the realization of broadband front-ends for high-speed communication applications. Steady progress in compound integrated circuit technology with maximum frequencies of oscillation approaching the terahertz range has enabled the realization of submillimetre-wave circuits and systems with unprecedented performance and operating frequencies. At the same time the advancement of SiGe and CMOS silicon technologies has enabled the low-cost fabrication of fully integrated millimetre-wave and submillimetre-wave transceivers for mass market consumer applications in communication technology and sensor systems. Current research is targeting transition frequencies above 500GHz paving the way towards monolithic electronic THz solutions. While these high operating frequencies allow for smaller antenna geometries at unchanged resolution they pose a variety of challenges both on RFIC design as well as on interconnect, assembly, and packaging solutions required for fully integrated high-performance easy-to-use system solutions. This workshop covers the status and latest trends and challenges for future millimetre-wave and terahertz integrated sensor and communication systems. The discussion topics include related devices and circuits, packaging technologies, as well as subsystem and system aspects.



##### Programme

08:30h - 09:20h	<b>Schottky-based THz MIC-s Using Film-Diode Process</b> Oleg Cojocari, ACST GmbH
09:20h - 10:10h	<b>InP HEMT Transceiver IC and Module Technologies for Sub-MMW Wideband Data Communications</b> Toshihiko Kosugi, NTT
10:10h - 10:40h	<b>Coffee Break</b>
10:40h - 11:30h	<b>Design of Multifunction Millimetre-Wave/ Submillimetre-Wave MMICs Based on a 250 nm InP DHBT Technology</b> Herbert Zirath, Chalmers University of Technology
11:30h - 12:20h	<b>Multifunctional ICs and Modules Based on mHEMT Technology up to 700 GHz for Sensors and Communication</b> Michael Schlechtweg, Fraunhofer IAF
12:20h - 13:50h	<b>Lunch</b>
13:50h - 14:40h	<b>Ultra-Broadband Millimetre-Wave SiGe Front-End Design</b> Dietmar Kissinger, University of Erlangen-Nuremberg
14:40h - 15:30h	<b>mm-Wave System-On-Chip Design in 0.13 <math>\mu</math>m SiGe BiCMOS</b> Christoph Scheytt, University of Paderborn
15:30h - 16:00h	<b>Coffee Break</b>
16:00h - 16:50h	<b>mm-Wave and Sub-mm-Wave CMOS Systems-on-Chip</b> Frank Chang, University of California at Los Angeles Adrian Tang, Jet Propulsion Laboratory
16:50h - 17:40h	<b>On-Wafer Measurements to THz Frequencies</b> Dylan Williams, National Institute of Standards and Technology



## WORKSHOPS AND SHORT COURSES - SUNDAY

Duration: 08:30h to 17:40h

Room Copenhagen

### W 07 (EuMC & EuMIC)

#### RF-MEMS: From Monolithic Device Integration to Circuit and System Design

##### Organisers:

Volker Ziegler, EADS Innovation Works, Germany  
Harrie Tilmans, IMEC, Belgium  
Luigi Boccia, University of Calabria, Italy  
Ralf Sommer, IMMS GmbH, 98693 Ilmenau, Germany  
Klemens Brückner, Ilmenau University of Technology, Germany

##### Abstract

The performance advantages of RF-MEMS in terms of loss and linearity continue to attract attention in various microwave and millimetre-wave applications for mobile and satellite communications or sensing, and first RF-MEMS components have made it to the commercial market. While the cost of a single, mass produced RF-MEMS device is comparable with "solid state" components, the integration of packaged RF-MEMS is a major concern both in terms of cost and interconnection losses, especially for millimetre wave applications. Hence, the monolithic integration of RF-MEMS with standard semiconductor technologies is one of the major steps towards the fabrication of RF-MEMS-based reconfigurable ICs in a high yield industrial processing line. This needs to be accompanied with the accessibility of parameterised device models that can be used in state-of-the-art software tools. Parametric models at different abstraction and refinement levels including non-idealities and parasitic effects are of particular importance not only for the top-down design path, but also for the bottom-up verification of integrated microelectronic-microelectromechanic RF circuits. This workshop will provide an overview of the current status of RF-MEMS research on monolithic integration and circuit and system design. The first part of the workshop will be dedicated to processes and technologies. In particular, the monolithic integration of RF-MEMS switches into SiGe BiCMOS, GaAs and GaN technologies will be described with special emphasis on reliability and packaging aspects. The second part of the workshop will be focused on circuits and applications. Circuit examples will range from basic building blocks (switches, switched capacitors, tunable capacitors, MEMS or NEMS resonators, matching networks, phase shifters, etc.) to more complex reconfigurable chips. As a case study, the application of monolithically integrated RF-MEMS to the development of a Ka-band Sat-Com user terminal antenna will be introduced showing as a design example a mixed signal Si/SiGe BiCMOS MMIC developed using on-chip RF-MEMS. The workshop is promoted by the EuMA Topical Group on RF MEMS, the European Commission-funded FP7 project "FLEXWIN", and the DFG research unit MUSIK on RF-MEMS-based circuit and system design.



##### Programme

08:30h - 08:40h	<i>Introduction</i>
08:40h - 09:30h	<i>RF-MEMS Reconfigurable Si/SiGe BiCMOS ICs at Microwave and Millimetre-Wave Frequencies</i> Hermann Schumacher, Ulm University
09:30h - 10:10h	<i>BiCMOS Embedded RF-MEMS Technologies for Millimetre-Wave Applications</i> Mehmet Kaynak, IHP
10:10h - 10:40h	<i>Coffee Break</i>
10:40h - 11:20h	<i>Integrated RF MEMS-CMOS Devices</i> R. R. Mansour, S. Fouladi, M. Bakri-Kassem, N. Sarkar and N. Zahirovic, University of Waterloo
11:20h - 11:50h	<i>RF MEMS: A Summary on RADAR Front-End Applications</i> Anna Maria Fiorello, Luisa Marescialli, Selex SE
11:50h - 12:20h	<i>Monolithically Integrated RF-MEMS on GaN for Aeronautic and Space Applications</i> Afshin Ziaei, Thales Research & Technology
12:20h - 13:50h	<i>Lunch</i>
13:50h - 14:40h	<i>Integrated RF-MEMS for Mobile Terminals</i> Art Morris, WiSpry, Irvine
14:40h - 15:30h	<i>Ultra High Frequency Oscillators Based on AlN Contour-Mode Resonators</i> Gianluca Piazza, Carnegie Mellon University
15:30h - 16:00h	<i>Coffee Break</i>
16:00h - 16:50h	<i>Advanced Modelling and System-Level Simulation of Integrated RF-MEMS</i> Alexandre Mehdaoui, Coventor SARL
16:50h - 17:40h	<i>Methods for MEMS Design</i> Mathias Reimann, Robert Bosch GmbH

Duration: 08:30h to 17:40h

Room Stockholm

### W 08 (EuMIC)

#### Growing and Designing GaN in Europe

##### Organisers:

Rüdiger Quay, Fraunhofer IAF, Germany  
Walter Wohlmuth, WIN Semiconductors, Taiwan  
Paul Tasker, Cardiff University, United Kingdom  
Sylvain Delage, III-V Lab, France

##### Abstract

This workshop shall be devoted enabling commercialization of GaN RF designs and products in Europe. It will cover the entire supply chain of GaN products: markets, materials, modelling, devices, products, and designs, enabling a perspective and to provide insight on how to expand GaN products within Europe. Energy efficiency, classical design parameters such as area constraints, and total power consumption are key parameters in this activity which takes GaN to the market with impressive performances.

##### Programme

08:30h - 08:40h	<i>Introduction</i>
08:40h - 09:25h	<i>GaN Market Update – Opportunities and Outlook</i> Asif Anwar, Strategy Analytics
09:25h - 10:10h	<i>Advances in GaN Epitaxy and Substrates in Europe</i> Trevor Martin, IQE plc



10:10h - 10:40h	<i>Coffee Break</i>
10:40h - 11:30h	<i>Low Frequency Parasitics of GaN HEMTs and Their Impact on Large Signal Characteristics</i> R. Quéré, O. Jardel, S. Laurent, R. Sommet, S. Piotrowicz, XLIM
11:30h - 12:20h	<i>GaN Characterisation and Behavioural Modelling</i> Paul Tasker, Cardiff University
12:20h - 13:50h	<i>Lunch</i>
13:50h - 14:35h	<i>Progress on Industrial Gallium Nitride MMICs to 20 GHz</i> D. Floriot, H. Blanck, United Monolithic Semiconductors
14:35h - 15:20h	<i>Advances in GaN Foundry Services in Asia for European Use</i> Walter Wohlmuth, WIN Semiconductors
15:30h - 16:00h	<i>Coffee Break</i>
16:00h - 16:45h	<i>GaN for RF Power</i> Thomas Roedle, NXP Semiconductors
16:45h - 17:30h	<i>Advanced GaN Based MMICs for T/R Modules</i> P. Schuh, Hardy Sledzik, Rolf Reber, Ulf Schmid, Bernd Bunz, Cassidian Electronics
17:30h - 17:40h	<i>Conclusion</i>

# WORKSHOPS AND SHORT COURSES - SUNDAY

Duration: 08:30h to 17:40h

Room Helsinki

## W 09 (EuMC & EuMIC)

### Future RF Fingerprinting and On-Chip Security

#### Organisers:

Reinhard Knöchel, University of Kiel, Germany

Mohamed Kheir, University of Kiel, Germany

Heinz Kreft, University of Kiel, Germany

Klaus Jöcks, Jöcks Consultancy, Germany

#### Abstract

Radio Frequency Identification (RFID) systems that utilize Physical Unclonable Functions (PUFs) are being considered as a potential solution to security problems. Some recent attempts have investigated possible solutions for security and counterfeiting issues. However, most of the known RFID and fingerprinting approaches are mainly designed for products and human identification and do not thoroughly deal with security matters related to electronic chips. On-chip embedded security can be cost-effective and simple in realization. Relying on 3D chip integration techniques, PUFs can be implemented within the same process of chip production. This workshop aims at giving the respective attendee an overview of the recent micro- and nanostructured RF security issues.

#### Programme

08:30h - 08:40h	<b>Welcome Note &amp; Introduction</b> Reinhard Knöchel, University of Kiel
08:40h - 09:25h	<b>PUFs as Crypto Primitives for Clone-Resistant Entities</b> Wael Adi, University of Braunschweig
09:25h - 10:10h	<b>Introduction to Hardware Intrinsic Security</b> Pim Tuyls, Intrinsic-ID



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10:10h - 10:40h	<b>Coffee Break</b>
10:40h - 11:30h	<b>Unclonable Material-Based Security Architecture</b> Markus Hinkelmann, NXP Semiconductors
11:30h - 12:20h	<b>Radio Frequency Certificates of Authenticity (RF-CoA)</b> Manos Tentzeris, Georgia Institute of Technology Vasileios Lakafosis, Cisco Systems
12:20h - 13:50h	<b>Lunch</b>
13:50h - 14:15h	<b>Nano-SAFE Secured Chips Wrapped by a Cocoon-PUF: Applied Cryptographic Aspects</b> Heinz Kreft, University of Kiel
14:15h - 14:50h	<b>Future Nanostructured On-Chip Security: Microwave and UWB Aspects</b> Mohamed Kheir, University of Kiel
14:50h - 15:30h	<b>Graphene and Carbon Nano Tubes (CNTs) for RF On-Chip Security</b> Rainer Adelung, University of Kiel
15:30h - 16:00h	<b>Coffee Break</b>
16:00h - 16:30h	<b>Overview of Potential Chip Embedding Technologies for Cocoon-PUF Encapsulation</b> Norman Marengo, Fraunhofer Institute for Silicon Technology
16:30h - 17:15h	<b>Identity Mapping by Fuzzy Extraction and Quantization</b> Andreas Uhl, Salzburg University
17:15h - 17:40h	<b>Session Close and Discussions</b> Reinhard Knöchel, University of Kiel

Duration: 08:30h to 17:40h

Room Shanghai

## W 10 (EuMC & EuMIC)

### Microwave Metamaterial Concepts, Circuits and Applications

#### Organisers:

Dmitry Kholodnyak, St. Petersburg Electrotechnical University, Russia

Matthias Hein, Ilmenau University of Technology, Germany

#### Abstract

Metamaterials have become important constituents for high-frequency systems and applications, ranging from microwave frequencies up to optical frequencies. A multitude of new types of antennas, N-port microwave devices ( $N = 2 \dots 4$ ), and sensors have been invented and studied, based on their intriguing properties. The purpose of this workshop is to present and discuss recent advances in the development of transmission-line metamaterials and metamaterial circuits for microwave applications. Interested student researchers will be provided an overview of current research areas, while advanced researchers will find plenty of opportunities to identify challenges and potential for future research and co-operation. In detail, the topics of the workshop cover novel technical and technological solutions, network synthesis, circuit and device design issues, passive circuits, non-Foster circuits and applications, aspects of stability and noise in active metamaterials, tuneability, and antenna applications.

#### Programme

08:30h - 08:50h	<b>Welcome, Overview, and Introduction</b> Dmitry Kholodnyak, St. Petersburg Electrotechnical University Matthias Hein, Ilmenau University of Technology
08:50h - 09:30h	<b>On the Symmetry Properties of Transmission Lines Loaded with Metamaterial Resonators: Theory and Applications</b> Jordi Naqui, Miguel Durán-Sindreu, Ferran Martín, CIMITEC, Universitat Autònoma de Barcelona
09:30h - 10:10h	<b>Near-Zero Metamaterials of the Resonant Type and Their Applications</b> Vesna Crnojevic-Bengin et al., University of Novi Sad



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10:10h - 10:40h	<b>Coffee Break</b>
10:40h - 11:30h	<b>Application of Non-Foster Metamaterials in Microwave Technology</b> Silvio Hrabar, University of Zagreb
11:30h - 12:20h	<b>Impedance Space Stability Analysis of Engineered Metamaterials Consisting of Loop Arrays</b> Yifeng Fan, Khalid Z. Rajab, Yang Hao, School of Electronic Engineering and Computer Science, Queen Mary University of London
12:20h - 13:50h	<b>Lunch</b>
13:50h - 14:40h	<b>Non-Foster Circuits: Practical Considerations and Applications</b> Daniel Segovia-Vargas, Eduardo Ugarte-Muñoz, Escuela Politécnica Superior, Universidad Carlos III de Madrid Vicente González-Posadas, J.L. Jiménez-Martín, Campus Sur, Universidad Politécnica de Madrid
14:40h - 15:30h	<b>Analysis and Design of Composite Right/Left-Handed Periodic Waveguides and Leaky-Wave Antennas by Even/Odd-Mode Techniques</b> T.F. Eibert, M.A. Eberspächer, Lehrstuhl für Hochfrequenztechnik, TU München
15:30h - 16:00h	<b>Coffee Break</b>
16:00h - 16:40h	<b>Metamaterial Transmission Lines and Circuit Applications</b> Dmitry Kholodnyak, St. Petersburg Electrotechnical University Jiasheng Hong, Heriot-Watt University, Matthias A. Hein, Ilmenau University of Technology, et al.
16:40h - 17:20h	<b>Design and Application of Tunable Microwave Metamaterials</b> Matthias Maasch, Christian Damm, María Roig, Rolf Jakob, Institute for Microwave Engineering and Photonics, Technische Universität Darmstadt
17:20h - 17:40h	<b>Discussion and Conclusions</b>

## WORKSHOPS AND SHORT COURSES - SUNDAY

Duration: 08:30h to 17:40h

Room Neu-Delhi

### W 11 (EuMC)

#### Advances in Multilayer Microwave and Millimetre-Wave Technologies and Emerging MCM/SoP Applications

##### Organisers:

Kamal K. Samanta, Milmega Ltd. Park Road, Ryde, UK

Ali A. Rezazadeh, School of Electrical and Electronic Engineering, University of Manchester, UK

##### Abstract

Ever growing demands and emerging applications of microwave and mm-wave frequencies including, that for broadband wireless, multimedia, passive sensing, radar and medical imaging, require development of compact modules/systems delivering advanced circuit performance at a low cost. The multilayer/3D system integration technologies, such as Multi-Chip-Module (MCM) and System-in-Package (SiP) or System-on-Package (SoP) have emerged as the leading methods of miniaturization and offer several advantages over on-chip or discrete passive components and is widely regarded as an excellent way of realizing compact high frequency module/system at a low cost and with ever-greater integration and functional density. The past decade has seen tremendous progress in a variety of multilayer MCM/SoP technologies, including low temperature co-fired ceramic (LTCC), liquid crystal polymer (LCP), advanced photoimageable thick-film, 3DMMIC and thin film on glass. These technologies are being developed to miniaturise the components (including array antenna and filters), circuits (includes active and passives) and systems on a single multilayer substrate with high performance. This very timely workshop will feature a wide range of presentations and will provide a comprehensive overview and understanding of the state-of-the-art multilayer/3D MCM/SoP technologies. Moreover, this will aware the participants on recent and significant advances including integration of mix technologies (such as ferrite and optically control LTCC and integrated MEMS/LCP) for innovative circuits and systems for emerging microwave and mm-wave applications. The speakers are the international experts and are all leading contributors in both industrial and academic sectors.



##### Programme

08:30h - 08:40h

##### Introduction

Kamal K. Samanta

08:40h - 09:25h

##### Recent Advances in Multilayer Organic Microwave and Millimetre-Wave Front Ends

John Papapolymerou, Georgia Institute of Technology

09:25h - 10:10h

##### Development of Millimetre-Wave Multifunction LTCC Components for System-in-Packages Applications

Ruey-Beei Wu et. al., Dept. of Electrical Engineering, National Taiwan University

10:10h - 10:40h

##### Coffee Break

10:40h - 11:30h

##### Advanced Planar/3D Components and Interconnects for Cost-Effective Microwave and Millimetre-Wave MCM/SoP

Kamal K. Samanta, Milmega Ltd

11:30h - 12:20h

##### Ferrite-LTCC Tunable Microwave/Millimetre-Wave Components

Langis Roy, Carleton University

12:20h - 13:50h

##### Lunch

13:50h - 14:40h

##### Hybrid Integrated Multi-Chip Modules for Microwave and Millimetre-Wave Applications'

A. Luukanen et. al., MilliLab, VTT Technical Research Centre of Finland

14:40h - 15:30h

##### CMOS MCM for V-Band Phased Array Applications

T-W. Huang et. al., National Taiwan University

15:30h - 16:00h

##### Coffee Break

16:00h - 16:45h

##### Design and Technology of Advances in 3D/Multilayer MMICs Technology

Ali Rezazadeh, University of Manchester

16:45h - 17:30h

##### Integration of RF Sensors into System on Package for Air Quality Monitoring

M. Swaminathan, Interconnect and Packaging Center, Georgia Tech Electromagnetics

17:30h - 17:40h

##### Conclusion

Duration: 08:30h to 17:40h

Room Singapur

### W 12 (EuMC & EuMIC)

#### Terahertz Technologies - From Materials to Devices and Their Applications

##### Organisers:

Hartmut Roskos, Johann Wolfgang von Goethe University of Frankfurt/Main, Germany

Sascha Preu, Friedrich-Alexander University of Erlangen-Nuremberg, Germany

Dimitris Pavlidis, Boston University & National Science Foundation, USA

Imran Mehdi, Jet Propulsion Laboratory (JPL), USA

Javier Mateos, University of Salamanca, Spain

##### Abstract

Nowadays, high frequency electronics and technology are increasing in operation frequency towards the THz range (100 GHz -10 THz), with the first devices and systems already operating above 100 GHz. However, there is a shortage of materials for THz technology as well as for powerful sources and sensitive detectors, the key elements for THz systems. This workshop will cover the latest developments in these fields. It will focus on new materials, particularly on graphene, and device concepts for efficient THz generation, such as photomixers, transistors and high frequency diodes. The Workshop is intended primarily for young scientists and engineers who are interested in learning about this emerging field, but is also



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useful for individuals with a more advanced understanding of related concepts. Novel technologies, important for future key THz applications, will be discussed by experts from Europe and the US.

##### Programme

08:30h - 08:55h

##### The Rise of Graphene in Microwave and THz Applications

J. Stake, Chalmers University of Technology

08:55h - 09:20h

##### Monolithic Electronics with Epitaxial Graphene on SiC

H. B. Weber, University of Erlangen

09:20h - 09:45h

##### Graphene Based Devices for a Terahertz Artwork Scanner

S. Ver Hoeye, University of Oviedo

09:45h - 10:10h

##### Novel Semiconductor Quantum Structures for THz Intersubband Optoelectronics

R. Paiella, Boston University

10:10h - 10:40h

##### Coffee Break

## WORKSHOPS AND SHORT COURSES - SUNDAY

Duration: 08:30h to 17:40h

Room Singapur

W 12 (EuMC & EuMIC) Continued



### Programme continued

10:40h - 11:05h	<b>GaAs Extrinsic-Photoconductive THz Sources Pumped at 1550 nm</b> E. R. Brown, Wright State University
11:05h - 11:30h	<b>Novel Materials for Photomixing and THz Photomixer Concepts</b> S. Preu, University of Erlangen
11:30h - 11:55h	<b>Photomixing THz Sources: mW Level and kHz Linewidth</b> E. Peytavit, G. Ducournau, P. Szriftgiser, A. Beck, T. Akalin, J.-F. Lampin, IEMN - Villeneuve d'Ascq, PhLAM - Villeneuve d'Ascq
11:55h - 12:20h	<b>Plasmonic Photoconductive Emitters and Detectors</b> M. Jarrahi, University of Michigan
12:20h - 13:50h	<b>Lunch</b>
13:50h - 14:15h	<b>Detection and Generation of THz Radiation by Plasma Waves in Nanometric Two-Dimensional Systems</b> W. Knap, University of Montpellier

14:15h - 14:40h	<b>Plasma Wave Assisted THz Detection</b> J. Mateos, University of Salamanca
14:40h - 15:05h	<b>THz Semiconductor Signal Sources</b> D. Pavlidis, Boston University & National Science Foundation
15:05h - 15:30h	<b>THz Electronic Devices Using Novel QCL-Bipolar Approaches</b> J. Dallesasse, University of Illinois
15:30h - 15:55h	<b>Coffee Break</b>
15:55h - 16:30h	<b>Recent Development in Design and Applications of Passive Tunable Liquid Crystal (LC) Devices in the Millimetre-Wave (mmW) and THz Regime</b> M. Jost, Darmstadt University of Technology
16:30h - 17:05h	<b>Breakthroughs from the Antenna Point of View in the THz Gap: Applications to Radioastronomy</b> E. Garcia-Munoz, University Carlos III of Madrid
17:05h - 17:40h	<b>Test and Measurement Equipment to 1 THz: from Devices to System Modules</b> T. W. Crowe, Virginia Diodes Inc.

Duration: 08:30h to 13:00h

Room St. Petersburg

S 01 (EuMC & EuMIC)

Fundamentals of Microwave Power Amplifier Designs



### Organisers:

Ali A. Rezazadeh, University of Manchester, UK  
Franco Giannini, Università di Roma 'Tor Vergata', Italy

### Abstract

Semiconductor power amplifiers are a key component of the circuitry that drives radio frequency and microwave transmission and have received a great deal of attention and development effort over the last decade. This short course aims to provide a comprehensive overview of all aspects of fundamental microwave power amplifiers designs. The course is an introductory module aimed at graduate engineers who have moved into the field of RF design. The speakers are experts in these areas from well-known recognised organisations.

### Programme

08:30h - 08:40h	<b>Introduction</b>
08:40h - 09:25h	<b>Microwave Transistors for Semiconductor Power Amplifiers</b> Ali Rezazadeh, University of Manchester
09:25h - 10:10h	<b>Small and Large Signal Models and Algorithms</b> Giorgio Leuzzi, Università dell'Aquila
10:10h - 10:40h	<b>Coffee Break</b>
10:40h - 11:25h	<b>Design Techniques</b> Gijs van der Bent, TNO
11:25h - 12:00h	<b>High Efficiency Power Amplifiers for High Frequency Application</b> Franco Giannini, University of Roma Tor Vergata
12:00h - 12:50h	<b>Advanced Concepts for Power Amplifier in Communication Systems</b> Alessandro Cidronali, University of Florence, Paolo Colantonio, University of Roma Tor Vergata
12:50h - 13:00h	<b>Discussion and Conclusions</b>

Duration: 08:30h to 12:20h

Room Oslo

S 02 (EuMC & EuMIC)

Completing the Design Flow – A Short Course Covering Component-Level Modelling and Measurement, Circuit Design and Analysis and System Modelling



### Organiser:

Steve Dudkiewicz, Maury Microwave Corporation, USA

### Abstract

In this course, we will explore the design flow from component-level transistor characterization, modelling and validation, to circuit-level amplifier design and stability analysis, to "black-box" model generation for system-level design and customer dissemination. Component-level characterization topics will include compact transistor modelling based on synchronized pulsed-IV and pulsed S-Parameter measurement data and validated through nonlinear load pull measurement. Circuit-level amplifier design will be achieved by importing linear and nonlinear models, or load pull measurement data, into Eesof ADS circuit simulator. Amplifier design techniques will be discussed and demonstrated. The resulting amplifier will be analyzed for stability, and design/repair techniques will be considered. Finally, X-Parameter behavioural modelling through PNA-X-based measurements and ADS extraction will be examined.

### Programme

08:30h - 08:40h	<b>Course Presenter Introduction and Agenda Review</b> Steve Dudkiewicz, Maury Microwave Corporation
08:40h - 09:25h	<b>Compact Transistor Modelling Through Synchronized Pulsed-IV and S-Parameters Measurements</b> Tony Gasseling, AMCAD Engineering
09:25h - 10:10h	<b>Introduction to Load Pull Concepts Including Passive, Active and Hybrid-Active Load Pull</b> Gary Simpson, Maury Microwave Corporation
10:10h - 10:40h	<b>Coffee Break</b>
10:40h - 11:30h	<b>Amplifier Design in ADS</b> Ludwig Eichinger, Agilent Technologies
11:30h - 11:55h	<b>Stability Analysis of ICs</b> Stephane Dellier, AMCAD Engineering
11:55h - 12:20h	<b>Behavioural Modelling Techniques</b> David Ballo, Agilent Technologies



## WORKSHOPS AND SHORT COURSES - SUNDAY

Duration: 08:30h to 17:40h

Room Seoul

### S 03 (EuMC)

#### Substrate Integrated Waveguides

##### Organisers:

Maurizio Bozzi, University of Pavia, Italy

Apostolos Georgiadis, CTTC, Spain

Ke Wu, Ecole Polytechnique du Montreal, Canada

##### Abstract

Substrate integrated waveguide (SIW) technology represents an emerging approach for the implementation of compact, low-loss and cost effective components, circuits, antennas and complete systems at microwave and millimetre-wave frequency. Proposed a decade ago, SIW structures, which belong to the family of substrate integrated circuits (SICs), are based on a planar dielectric substrate metallized over its top and bottom and two rows of metal vias or slot trenches, and permit to implement classical rectangular waveguide-like geometries in planar form. SIW components can be fabricated by PCB standard technique as well as LTCC technology, and recently silicon-based structures have been demonstrated. SIW technology is bound to become the paradigm for the implementation of cost-effective millimetre-wave systems in the next decades. The course will provide a comprehensive description of SIW technology and components. In particular, it include a clear description of the operation principles and loss mechanisms, a detailed overview of the state of the art of SIW components and antennas, the fundamentals of modelling and design methodologies, and a discussion of technological issues and system integration. Theoretical aspects and practical study-cases will be described, providing useful design rules and hints for the design of SIW components.



##### Programme

08:30h - 09:20h

##### Introduction

Ke Wu, Ecole Polytechnique du Montreal

09:20h - 10:10h

##### Operation Principles

Maurizio Bozzi, University of Pavia

10:10h - 10:40h

##### Coffee Break

10:40h - 11:30h

##### Numerical Modelling of SIW Circuits and Antennas

Maurizio Bozzi, University of Pavia

11:30h - 12:20h

##### Technological Solutions

Ke Wu, Ecole Polytechnique du Montreal

12:20h - 13:50h

##### Lunch

13:50h - 14:40h

##### SIW Passive Components

Ke Wu, Ecole Polytechnique du Montreal

14:40h - 15:30h

##### SIW Active Circuits

Apostolos Georgiadis, CTTC

15:30h - 16:00h

##### Coffee Break

16:00h - 16:50h

##### SIW Antennas

Apostolos Georgiadis, CTTC

16:50h - 17:40h

##### Future Trends & Open Discussion

All presenters

Duration: 13:50h to 17:40h

Room Prag

### S 04 (EuMC)

#### Near Field Probes: Useful Tools for RF/MW Engineers

##### Organiser:

Arturo Mediano, University of Zaragoza, Spain

##### Abstract

People in RF/MW fields are usually very interested in EMI fundamentals because they experiment (suffer) their effects on their lab (EMI and "RF black magic") or production work (EMC). A lot of them usually need to solve the problems in a short time, under pressure and by trial and error. In that process, electric and magnetic near field probes are very useful tools. With them, we can "see" magnetic and electric fields, find EMI sources, evaluate cable layouts, test shielding materials or enclosures, etc. Near field probes are useful too in a lot of other jobs for RF/MW engineers as for example tuning circuits in a "noninvasive" way or finding RF spurs. The simple ideas and practical examples presented in this short course will be very useful for that engineers that cannot be considered EMI/EMC specialists but have a good RF/MW knowledge and interest. No hard mathematical treatment of EMI/RF will be used in this tutorial.



##### Programme

13:50h - 14:40h

##### Fundamentals: Commercial and Homebrew Near Field Probes

Arturo Mediano, University of Zaragoza

14:40h - 15:30h

##### Near Field Probes and Instrumentation

Arturo Mediano, University of Zaragoza

15:30h - 16:00h

##### Coffee Break

16:00h - 16:50h

##### Near Field Probe Techniques

Arturo Mediano, University of Zaragoza

16:50h - 17:40h

##### Real World Examples with Near Field Probes

Arturo Mediano, University of Zaragoza

## WORKSHOPS AND SHORT COURSES - SUNDAY

Duration: 13:50h to 17:40h

Room Oslo

### S 05 (EuMC & EuMIC)

#### Introduction to Spaceborne SSPA, Requirements and Future Perspectives

##### Organisers:

Amitabh Chowdhary, ESTEC, European Space Agency, The Netherlands  
Andrew Barnes, ESTEC, European Space Agency, The Netherlands

##### Abstract

In recent years there have been major improvements made in the capabilities of solid-state power amplifiers (SSPAs), with improved output power, efficiency, operating frequency and bandwidth achieved. Due to these improvements, SSPAs are being considered for space applications that were traditionally the realm of vacuum based devices. The aim of this half day course is to give an overview on spaceborne solid state power amplifier (SSPA) applications, technology, design, manufacture and the qualification steps needed for space system insertion.

An introduction to the various building blocks of an SSPA and the related terminology and performance metrics will be given. This will be followed by an introduction on the use of new semiconductor technologies (e.g. GaN) and how this is having a disruptive impact on SSPA development and will include a comparison of SSPA and TWTA performance characteristics. The important design and characterisation steps needed for realising advanced SSPA solutions, including thermal management, design trade-offs for achieving high linearity/power added efficiency, device characterisation and packaging issues shall then be described.

A talk shall be given on the electronic power conditioning (EPC) requirements and design issues needed for SSPA realisation. An overview of the steps needed

to achieve SSPA qualification shall be presented, including an introduction to the various applicable space standards for design, testing and qualification along with important issues, such as de-rating and safe operating area needed to realise a successful design. Finally, the course shall conclude with a presentation on the application of new SSPA concepts that may be used to realise next generation telecommunication payloads and shall close with a question and answer discussion session.

##### Programme

13:50h - 14:30h

#### Introduction to Spaceborne SSPA

Amitabh Chowdhary, ESA

14:30h - 15:10h

#### New Semiconductor Technologies and Techniques for Realising Spaceborne SSPAs

Andrew Barnes, ESA

15:10h - 15:40h

#### EPC Design

Paul Maynadier, TAS

15:40h - 16:00h

#### Coffee Break

16:00h - 16:50h

#### SSPA Qualification and Specific Requirements for Operation in Space

F. Vitobello, Andrew Barnes, Amitabh Chowdhary, ESA

16:50h - 17:40h

#### Spaceborne SSPA and New Concepts

C. R. Green, C. D. Seymour, Astrium UK



## WORKSHOPS AND SHORT COURSES - MONDAY

Duration: 08:30h to 17:40h

Room Kiev

### W 13 (EuMC)

#### RFID Hardware and Physical Layer: Status and Development Directions

##### Organisers:

Apostolos Georgiadis, CTTC, Spain  
Randolf Ebel, University of Erlangen-Nuremberg, Germany  
Ana Collado, CTTC, Spain  
Robert Miesen, University of Erlangen-Nuremberg, Germany

##### Abstract

Radio frequency identification (RFID) technology has matured into a versatile platform combining identification with sensing capabilities, and exploring technological advances in flexible materials and nanotechnology. In addition to recent progress in material and fabrication technologies, RFID system architectures are exploring different frequency bands from UHF to UWB to millimetre-waves in order to address performance and functional challenges and to further improve features such as low profile, interference and low power battery free operation. This workshop addresses primary RFID hardware and the physical layer. Attendees will be brought up to speed with the RFID basics, working principles and special characteristics of RFID devices. After that, the vital topics of antenna design and power transfer will be addressed and supplemented with an in-depth look into RFID radio channel properties. In addition, novel approaches for RFID antennas using smart materials and challenges in energy harvesting will be discussed. Insights in the exciting concepts and technologies exploring higher frequencies in millimetre-wave identification and chipless ultra wideband systems will be given as well. In a talk specifically dedicated to RFIC design and topology of passive transponders, an integrated multi standard RFID transponder with additional sensing capability will be presented. The field of RFID localization in general and in respect to the given limitations by the system and hardware will also be covered.



##### Programme

08:30h - 09:20h

#### RFID Basics

M. Reynolds, Duke University

09:20h - 10:10h

#### Rectenna Design and Wireless Power Transfer Optimization for RFID Systems

A. Georgiadis, A. Collado, CTTC  
M. M. Tentzeris, R. Vyas, S. Kim, Georgia Tech

10:10h - 10:40h

#### Coffee Break

10:40h - 11:30h

#### RFID Radio Channel

D. Arnitz, Duke University

11:30h - 12:20h

#### State of the Art and Recent Developments in RFID Localization Technology

R. Miesen, A. Parr, M. Vossiek, University of Erlangen-Nuremberg

12:20h - 13:50h

#### Lunch

13:50h - 14:40h

#### Millimetre-Wave Identification - MMID: Concept and Applications

T. Vähä-Heikkilä, P. Pursula, VTT

14:40h - 15:30h

#### UWB Chipless RFID Systems, Tags and Sensors

D. Girbau, A. Lazaro, A. Ramos, R. Villarino, Univ. Rovira i Virgili

15:30h - 16:00h

#### Coffee Break

16:00h - 16:50h

#### RFID UHF Antennas Powered with Smart Materials: Carbon-Nanotubes, Shape-Memory Alloys, Hygroscopic Polymers and Nano-rods

G. Marrocco, S. Manzari, C. Occhiuzzi,  
S. Caizzzone A. Catini, C. Di Natale, Tor Vergata University of Rome

16:50h - 17:40h

#### Integrated Circuit Design for Passive RFID Transponders

T. Ussmueller, D. Brenk, J. Essel, J. Heidrich, R. Weigel, University of Erlangen-Nuremberg

## WORKSHOPS AND SHORT COURSES - MONDAY

Duration: 08:30h to 12:20h

Room Krakau

### W 14 (EuMC)

#### Recent Advances in Miniature Multiband, Tunable and Reconfigurable Filters – Results of the FP7 MultiWaveS Project

##### Organiser :

Vesna Cmojevic-Bengin, University of Novi Sad, Serbia

##### Abstract

Recent advances in communication systems have imposed challenging requirements for microwave filters such as low cost, compact size, multi-band operation, tunable or reconfigurable response. FP7 project MultiWaveS (Multiband Electronically Reconfigurable Microwave Devices and Antennas for a New Generation of Wireless Systems, GA-PIRSES 247532) is a joint multiannual research programme between five universities around the world, with a goal to pursue those challenges through several competing approaches: the conventional approach, application of advanced fabrication technologies, and development and application of novel concepts including metamaterials. This workshop will present research results developed within the MultiWaveS framework, including novel techniques for synthesis of multiband and wideband filters, application of emerging technologies such as multilayer liquid crystal polymer, LTCC or high-temperature superconductor technology, development of electronically reconfigurable RF planar filters based on the integration of active tuning/switching elements onto single- or multi-layer planar filtering structures, novel filter configurations based on deployment of fractal curves and other folded resonators, development and application of new concepts such as near-zero propagation of electromagnetic waves to the design of microwave filters with improved performances, and a variety of metamaterial structures which exhibit filtering behaviour including those for applications at THz frequencies. The Workshop will offer a deep insight into recent advances in the development of low-cost miniature multiband, tunable and reconfigurable microwave devices for future multifunctional wireless systems and will seek to encourage the application of emerging technologies in this field, through an open dialog between microwave researchers coming from different backgrounds.

Duration: 08:30h to 12:20h

Room Copenhagen

### W 15 (EuMC & EuMIC)

#### Solid State High Power RF-Amplifiers – Industrial Development Trends in Germany

##### Organisers:

IEEE MTT/AP German Joint Chapter:

Georg Böck, Chapter Chair, TU Berlin, Germany

Peter Knott, Chapter Co-Chair, Fraunhofer FHR, Germany

##### Abstract

This half-day workshop presents topical development trends of the German industry in the field of solid-state high power amplifiers and transmitters. Starting from tube based microwave power generation new transistors based on Si, GaAs and GaN Technology are more and more taking over former tube dominated areas like broadcast, radar, jamming and industrial applications. Pros and Cons of tubes and solid-state devices will be discussed. The talks span from device level to circuit design and system level. Efficiency enhancement of non-constant envelop transmitters is under continuous discussion. It becomes particularly challenging if output power, bandwidth, and crest factor increase. This workshop will discuss efficiency enhancement concepts of very high power broadband transmitters for analog and digital broadcast services. Up to 4 kW peak output power have been realized in the 470 - 862 MHz frequency band with superior efficiency using a modified Doherty architecture. Up to 100 kW RF-power at frequencies 1 to 100 MHz are required for plasma processes and laser excitation. Essential requirements for these generators are high efficiency and extreme ruggedness including the ability of temporarily withstanding 100 % reflected power. This workshop will discuss several amplifier- and power-combining topologies suitable for the realization of those amplifiers with highly reflective loads. A technology suitable to overcome the limitations of conventional "housed" transistors with regard to excess package parasitics is the "chip-and-wire" approach. The development of "chip-and-wire" pallet amplifiers covering the 2.5-6 GHz frequency range will be reported. 35 W



##### Programme

08:30h - 08:45h

##### Introduction – FP7 Project MultiWaveS

Vesna Cmojevic-Bengin, University of Novi Sad

08:45h - 09:25h

##### Miniature, Low-Cost and Reconfigurable RF Planar Filters

Jiasheng Hong, Shilong Qian, Jia Ni,  
Francisco Cervera, Heriott-Watt University

09:25h - 10:10h

##### Multiband and Wideband Filters based on Narrowband Synthesis Techniques or Multimode Resonators with Perturbations

Riana Geschke, University of Cape Town  
Gerdus Brand, Theunis Beukman,  
Petrie Meyer, Stellenbosch University  
Vesna Cmojevic-Bengin, Nikolina Jankovic, Vasa Radonic,  
University of Novi Sad

10:10h - 10:40h

##### Coffee Break

10:40h - 11:15h

##### Miniature Multi-Band Microwave Filters with Independently Controlled Passbands

Nikolina Jankovic, Vesna Cmojevic-Bengin, Vasa Radonic,  
University of Novi Sad  
Riana Geschke, University of Cape Town  
Kiril Zemlyakov, Irina Vendik, St. Petersburg Electrotechnical  
University

11:15h - 11:50h

##### Near-Zero Propagation in Quasi-TEM Circuits and Its Application to the Design of Microstrip Filters

Vesna Cmojevic-Bengin, Norbert Cslyuska, Nikolina Jankovic,  
University of Novi Sad  
Riana Geschke, University of Cape Town

11:50h - 12:20h

##### Advanced Microwave and THz Devices

Irina Vendik, Michail Odit, Dmitry Kozlov, Irina Munina,  
Viacheslav Turgaliev, St. Petersburg Electrotechnical University



output power at 1 dB power compression with harmonic suppression greater than 20 dBc have been achieved with this development. Moreover, insights with respect to product qualification, lifetime testing and industrialized, cost effective high volume production will be outlined.

##### Programme

08:30h - 08:40h

##### Welcome and Introductory Remarks

Georg Böck, TU Berlin  
Peter Knott, Fraunhofer FHR

08:40h - 09:25h

##### Solid State - Contra TWT- Solid State Versus Vacuum Tube Based Microwave Transmitters

Friedrich Maile, Rainer Unseld, Timo Lehmann, CASSIDIAN

09:25h - 10:10h

##### UHF Doherty Power Amplifiers for Broadcast Applications

Uwe Dalisda, Rohde & Schwarz

10:10h - 10:40h

##### Coffee Break

10:40h - 11:25h

##### High Power RF Amplifiers Beyond 1 kW for Laser and Plasma Excitation

Andre Grede, Daniel Gruner, Florian Maier, Anton Labanc,  
Christian Thome, Christian Wangler, Alexander Alt,  
Trumpf Huettinger GmbH + Co. KG

11:25h - 12:10h

##### Design of a 35 W Class-A GaN Power Amplifier Module for Broadband Applications

Florian Ohnimus, Rohde & Schwarz

12:10h - 12:20h

##### Closing Remarks

Georg Böck, TU Berlin  
Peter Knott, Fraunhofer FHR

## WORKSHOPS AND SHORT COURSES - MONDAY

Duration: 08:30h to 17:40h

Room Stockholm

### W 16 (EuMC & EuMIC)

#### RF-MEMS RFIC/MMIC Technologies for Highly Adaptive and Reliable RF Systems - Results of the FP7 NANOTEC Project

##### Organisers:

Afshin Ziaei, TRT, Palaiseau, France

Mehmet Kaynak, IHP, Frankfurt/Oder, Germany

##### Abstract

RF communication and remote sensing (radar/radiometric) systems are facing the demands of increasing complexity/number of frequency bands, increased bandwidths and higher frequencies for higher data throughput, while at the same time the power consumption, the form factor of the systems, and the overall system costs need to be reduced. Smart micro-/mm-wave systems will have to achieve self-reconfigurable operations for real-time efficient self-optimization of their performance. For such adaptive systems, high-performance tuning components and strategies for building monolithically integrated miniaturized reconfigurable RF circuits/front-ends are highly needed. The NANOTEC project aims to generate innovative approaches towards novel RF/mm-wave systems with increased functionality and potentially lower cost addressing future needs of the European industry. NANOTEC will develop 3 Demonstrators (1: 10-24 GHz reflect arrays for aerospace; 2: 94 GHz high-sensitivity front-ends for passive imaging; 3: 140 GHz radar front-ends for active imaging) with advanced functionalities based on enabling technologies and via monolithic integration of high-performance RF-MEMS switches in GaN/GaAs/SiGe IC foundry processes. NANOTEC will aim to improve reliability of RF-MEMS by using NANO structured materials and to demonstrate added-value by employing the proposed GaN/GaAs/SiGe MEMS-ICs for 10-140 GHz applications. The emergence of European sources (SiGe/GaAs/GaN MEMS-IC foundries) will play a key role towards increasing the availability of RF-MEMS Technology and related products (thus shortening the time-to-market). If successful, NANOTEC will also lead to improved safety/security thus creating novel business opportunities/jobs for existing/new companies in Europe.

##### Programme

08:30h - 09:05h	<b>GaAs/SiGe RF-MEMS and MMIC Based Front-End Circuits for W-Band Passive Imaging Application</b> Robert Malmqvist, FOI
09:05h - 09:40h	<b>RF-MEMS Switch Embedded with Ultra Low Noise 70nm GaAs Technology</b> Brice Grandchamp, OMMIC



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09:40h - 10:10h	<b>Wafer Level Packaging for RF-MEMS Components</b> Katrin Kaletta, Fraunhofer IZM Berlin
10:10h - 10:40h	<b>Coffee Break</b>
10:40h - 11:10h	<b>Development and Validation of Key Building Blocks for an F-Band FMCW Radar Front-End</b> Vaclav Valenta, Ulm University
11:10h - 11:50h	<b>RF MEMS: Research, Development and Applications</b> Gabriel M. Rebeiz, UCSD
11:50h - 12:20h	<b>MIMO-Radar for Imaging Applications</b> Ulrich Prechtel, EADS
12:20h - 13:50h	<b>Lunch</b>
13:50h - 14:25h	<b>Charging Mechanisms in Nanostructured Dielectrics for MEMS Capacitive Switches</b> George Papaioannou, NKUA
14:25h - 14:55h	<b>Implementation of Capacitive RF MEMS Switches into a Monolithic GaN on Silicon Microwave Technology</b> Afshin Ziaei, TRT, Palaiseau
14:55h - 15:30h	<b>RF-MEMS Switch Technology in a BiCMOS Platform for Millimetre-Wave Imaging Applications</b> Mehmet Kaynak, IHP
15:30h - 16:00h	<b>Coffee Break</b>
16:00h - 16:30h	<b>Monolithically Integrated RF-MEMS Actuated Patch-Slot Element for X-Band Reconfigurable Reflectarrays</b> Dragos Dancila, Uppsala University
16:30h - 16:55h	<b>Plasma Enhanced CVD Growth of Carbon Nanotubes for RF Applications</b> Johan Liu, Chalmers University
16:55h - 17:15h	<b>Modelling of SiGe BiCMOS Embedded RF MEMS Switch Using Coventor Tools</b> Alexandre Mehdaoui, COVENTOR Sarl
17:15h - 17:40h	<b>On-Chip Antennas for 94 GHz and 140 GHz Fabricated Using Silicon Micromachining</b> Dan Neculoiu, Alina Bunea, IMT

Duration: 08:30h to 12:20h

Room Seoul

### W 17 (EuMC)

#### Microwave Sensors and Applications

##### Organisers:

Andreas Penirschke, Technische Universität Darmstadt, Germany

Reinhard Knöchel, Christian Albrechts Universität zu Kiel, Germany

##### Abstract

Microwave-based methods and sensors can be used to determine physical-properties of materials including composition, moisture content, thickness, purity and defects. Knowledge of sensors function, principles and limitations is essential for selection and successful use. Microwave sensors can be applied in industrial processes, medical purposes, environmental monitoring and many other fields. This workshop will present novel microwave sensors and applications. Research results as well as commercially available products utilizing microwaves will be presented. Speakers affiliated with research institutes, universities and commercial companies will cover this great variety of microwave sensor concepts and applications.

##### Programme

08:30h - 08:35h	<b>Welcome Address</b>
08:35h - 09:10h	<b>Resonant Substrate-Integrated Microwave Near-Field Sensors for Biomedical Applications</b> Nora Haase, Arne Jacob, Technische Universität Hamburg-Harburg



09:10h - 09:45h	<b>Moisture Measurement in Wood Working Industries using the 2 Parameter Microwave Resonance Technology</b> R. Otto, J. Doescher, AMS Advanced Microwave Systems GmbH
09:45h - 10:20h	<b>Microwave sensors in Flow Measurement Devices for the Oil Industry Made by Roxar</b> Ebbe Nyfors, Roxar, Emerson Process Management
10:20h - 10:50h	<b>Coffee Break</b>
10:50h - 11:30h	<b>Ultra-Wideband Sensors for Non-Contacting Material Characterization Using Multivariate Calibration</b> Henning Mextorf, Reinhard Knöchel, Christian Albrechts Universität zu Kiel
11:30h - 12:10h	<b>Microwave Mass Flow Sensors for Industrial Processes</b> Andreas Penirschke, Technische Universität Darmstadt
12:10h - 12:20h	<b>Conclusion</b>



## WORKSHOPS AND SHORT COURSES - MONDAY

Duration: 08:30h to 15:30h

Room Shanghai

### W 18 (EuMC)

#### IntelliSpektrum Project Overview: Intelligent Spectrum Management for Energy-Efficient and Optimized Access to Flexible Hierarchical Mobile Communication Networks

##### Organisers:

Dirk Wiegner, Alcatel-Lucent Deutschland AG, Bell Labs, Germany  
Andreas Wich, Alcatel-Lucent Deutschland AG, Bell Labs, Germany  
Andreas Pascht, Alcatel-Lucent Deutschland AG, Bell Labs, Germany

##### Abstract

Next generation of mobile communication networks has to be equipped to deal with a large number of end-use appliances as well as high and fluctuating mobile data transmission. IntelliSpektrum project takes a closer look at small cellular hierarchical network structures for mobile communications – smaller, local mobile communication cells embedded in larger macro cells. The objective is to develop innovative approaches for energy efficiency for such network structures with simultaneous high spectral efficiency. Part of the project analyses the scenario of flexible, dynamic spectrum allocation in hierarchical cellular networks. This scenario includes different cell types and relays as well as elements which are self-sufficient in energy terms. The project focus is on dynamic spectrum management between the cells and network elements and flexible, dynamic and highly efficient transmitters needed for base stations. Self-optimization of the base-station transmitter is also regarded. Another focus is on development of an energy profiler in the end-use appliance which will be used to analyse the interaction of network and end appliance with regard to energy and spectral efficiency. The results should contribute to a mobile communications network with better performance, optimized services and improved energy efficiency. This includes flexible hardware concepts and algorithms for network management. "IntelliSpektrum" is supported by the German Federal Ministry of Economics and Technology.



IntelliSpektrum

Gefördert durch:



Bundesministerium  
für Wirtschaft  
und Technologie



##### Programme

08:30h - 08:40h	<b>Introduction</b>
08:40h - 09:00h	<b>IntelliSpektrum – Global Project Overview</b> Andreas Wich, et al., Alcatel-Lucent Bell Labs
09:00h - 09:20h	<b>Spectrum Dynamic Heterogeneous Radio Networks</b> Andreas Wich, et al., Alcatel-Lucent Bell Labs
09:20h - 09:45h	<b>RF Transmitter for IntelliSpektrum Application</b> Dirk Wiegner, et al., Alcatel-Lucent Bell Labs
09:45h - 10:10h	<b>Neural Networks Based Intelligent Algorithms for RF Transceiver Concepts</b> P. Jüschke, et al., Alcatel-Lucent Bell Labs
10:10h - 10:40h	<b>Coffee Break</b>
10:40h - 11:05h	<b>Multiband/Broadband AlGaIn/GaN HPA/LNA Used in Modern Transceiver</b> V. Carrubba, et al., Fraunhofer Institute of Applied Solid-State Physics
11:05h - 11:30h	<b>Cognitive Interference Coordination in a Heterogeneous Network Topology</b> K. Börner, Fraunhofer Heinrich Hertz Institute
11:30h - 11:50h	<b>Design of Energy Efficient Cellular Enhanced by Energy Harvesting</b> Miguel Angel Gutierrez, Fraunhofer Heinrich Hertz Institute
11:50h - 12:20h	<b>Energy Profiling for Mobile User Terminals in New Heterogeneous Network Environments</b> I. Karls, Intel Mobile Communications
12:20h - 13:50h	<b>Lunch</b>
13:50h - 15:20h	<b>Poster Presentation, Exhibits and Discussion</b> Alcatel-Lucent Bell Labs, Intel Mobile Communications, Fraunhofer Heinrich Hertz Institute, Fraunhofer Institute of Applied Solid-State Physics
15:20h - 15:30h	<b>Conclusion</b>

Duration: 08:30h to 12:20h

Room Singapur

### W 19 (EuMC & EuMIC)

#### Ultra High Speed Wireless Communication: Approaches and Ideas to Achieve Wireless 100 Gb/s Communication

##### Organiser:

Rolf Kraemer, BTU-Cottbus and IHP GmbH, Frankfurt (Oder), Germany

##### Abstract

Wireless communication systems today can be considered as ubiquitous available in almost every place. The communication speed extends to several Gb/s if the new standards IEEE802.11ac and IEEE802.11ad are in the field. Several researchers are working already on solutions going to even higher data rates. Within the German Research Society (DFG) special focus project (SPP) "Wireless 100 Gb/s and beyond" several initiatives are working on solutions for this challenge. It is not just a linear scaling of parameters known from conventional wireless communication systems but really a search for break-through results. One of the problems to investigate is the analogue/digital dilemma that determined the division of the communication systems between digital and analogue parts. Today's trends are clearly towards more digital systems, since the scaling factors allow more and more elements with very high digital performance to be integrated on a single chip. On the other side with data-rates of 100 Gb/s we have to handle symbol rates of several GS/s and we have to convert the symbols into the digital domain before processing. Thus, it might be also valid to process symbols directly in the analogue domain to reduce energy consumption and complexity. The workshop will address these questions. It will contain 9 talks of work in progress from the DFG SPP "Wireless 100 Gb/s and beyond". Since the projects started only recently no results will be presented but concepts, architectures and ideas how to solve the challenging questions will be outlined. One invited speaker will give an introduction into the interesting area of research.



##### Programme

08:30h - 08:50h	<b>A New View on Analogue-Digital-Balance with System Design</b> Georg Fischer, Friedrich-Alexander-Universität Erlangen-Nürnberg
08:50h - 09:10h	<b>Optimization of 100 Gb/s Short Range Wireless Transceivers Under Processing-Energy Constraints</b> Renato Negra, Gerd Ascheid, RWTH Aachen Norbert Wehn, TU-Kaiserslautern
09:10h - 09:30h	<b>Strategies for Energy-Efficient 100 Gb/s Baseband Processing Using Mixed Analogue/Digital Signal Processing</b> Christoph Scheytt, Universität Paderborn Rolf Kraemer, TU Cottbus Ingmar Kallfass, Universität Stuttgart
09:30h - 09:50h	<b>Low-Power System Architectures for Future 100 Gb/s Wireless Communication Systems</b> Dietmar Kissinger, Martin Vossiek, Robert Weigel, Friedrich-Alexander-Universität Erlangen-Nürnberg Manfred Berroth, Universität Stuttgart Frank Ellinger, TU Dresden

## WORKSHOPS AND SHORT COURSES - MONDAY

Duration: 08:30h to 12:20h

Room Singapur

### W 19 (EuMC & EuMIC) Continued

- 09:50h - 10:10h** *Visions for On-Chip Integrated Distributed Amplifier and Antenna Systems in Locally-Backside-Etched SiGeBiCMOS for Receivers with Ultra-Large Bandwidth*  
Frank Ellinger, Dirk Plettemeier, TU Dresden
- 10:10h - 10:40h** *Coffee Break*
- 10:40h - 11:00h** *Ultra Wideband Communications Based on Massive MIMO and Multi-Mode Antennas Suitable for Mobile Handheld Devices – A Project Outlook*  
Dirk Manteuffel, Peter Adam Hoeher, Christian-Albrechts-Universität zu Kiel
- 11:00h - 11:20h** *Towards a Fully Integrated, Multi-Purpose Radio Front-End for Wireless 100 Gb/s*  
Thomas Zwick, Karlsruher Institut für Technologie  
Ulrich Pfeiffer, Universität Wuppertal

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- 11:20h - 11:40h** *Front-Ends for High-Speed Mobile Data Communications at W-Band*  
Christian Friesicke, Arne F. Jacob, TU Hamburg-Harburg  
Amin Hamidian, Georg Böck, TU Berlin
- 11:40h - 12:00h** *Tera50 – A 10-1000 GHz Wireless Measurement System with 50 GHz Bandwidth*  
Andreas Stöhr, Andreas Czulwik, Thomas Kaiser, Klaus Solbach, Universität Duisburg-Essen
- 12:00h - 12:20h** *Maximum Spectral Efficiency Through Parallelized Multiple-Input-Multiple-Output (MIMO) Transmission Using High-Resolution 3D Antenna Topologies*  
Gerhard Fettweis, Stefan Krone, TU Dresden  
Berthold Lankl, Universität der Bundeswehr München, Eckhard Grass, Humboldt Universität Berlin

Duration: 13:50h to 17:40h

Room St. Petersburg

### W 20 (EuMC) Integrated Radar Sensors for Automotive and Industrial Applications

#### Organisers:

Andreas Stelzer, Johannes Kepler University Linz, Austria  
Erich Kolmhofer, Danube Integrated Circuit Engineering, Linz, Austria  
Rudolf Lachner, Infineon Technologies AG, Munich, Germany

#### Abstract

The tremendous success of recent developments in the area of SiGe-based radar circuits for automotive applications motivates the use of such integrated radar sensors for a broader range of applications. Thus, in this workshop the state-of-the-art of SiGe-based integrated radar sensors will be reviewed and challenges in the integrated design, for testing, as well as concepts for future applications will be treated. One topic deals with an upcoming high-frequency SiGe-technology with additional CMOS support, followed by insights from an application driven design to a qualified product. Additionally requirements and solutions to online monitoring of integrated radar sensors are presented. Next, concepts for multi-channel systems and antennas in a package for highly integrated solutions are presented. With the introduced radar companion chip various compact application scenarios are feasible. Finally, some industrial applications at 77 GHz and new topics above 100 GHz are presented.

#### Programme

- 13:50h - 14:00h** *Integrated Radar Sensors – Current Challenges and Developments*  
Andreas Stelzer, Johannes Kepler University Linz

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- 14:00h - 14:30h** *SiGe-Technology: State-of-the-Art and Road Map for Future Applications*  
Rudolf Lachner, Infineon Technologies
- 14:30h - 15:00h** *Application-Driven Design and Characterization of a 77-GHz Radar Transceiver – From Customer Requirements to a Qualified Product*  
Christoph Wagner, Danube Integrated Circuit Engineering
- 15:00h - 15:30h** *Integrated Radar Sensors for Automotive and Industrial Applications*  
Dirk Steinbuch, Raik Schnabel, Robert Bosch AG
- 15:30h - 16:00h** *Coffee Break*
- 16:00h - 16:30h** *Compact Multichannel Radar Sensors – Challenges and Solutions for the Realization of Integrated Beamforming Systems*  
Reinhard Feger, Christian Doppler Research Laboratory for Integrated Radar Sensors
- 16:30h - 17:00h** *Antenna in Package for Integrated Sensor Solutions*  
Abouzar Hamidipour, Ziqiang Tong, Johannes Kepler University Linz
- 17:00h - 17:25h** *A Companion Chip for Integrated Radar Sensors*  
Markus Lang, Danube Integrated Circuit Engineering
- 17:25h - 17:40h** *Integrated Radar Sensors – Applications and Systems Above 100 GHz*  
Andreas Stelzer, Johannes Kepler University Linz

Duration: 13:50h to 17:40h

Room Istanbul

### W 21 (EuMC) Chipless RFID and Wireless Sensing: Technologies Beyond SAW

#### Organisers:

Rolf Jakoby, Technische Universität Darmstadt, Germany  
Christian Mandel, Technische Universität Darmstadt, Germany  
Martin Schüßler, Technische Universität Darmstadt, Germany  
Martin Vossiek, University of Erlangen-Nuremberg, Germany

#### Abstract

Wireless sensing and radio frequency identification technologies are already used within today's industrial processes, supply chains and high-tech medicine. They

will become key technologies for future concepts such as "smart dust" and the "internet of things." State-of-the-art wireless sensor and RFID tags are almost entirely based on semiconductor "chip" technology, including on-board power supply. However, this "chip-based technology" faces high unit prizes compared to bar code technology and is limited in the operating frequency range. Moreover, it is not suitable to operate in harsh environments, e.g. with high temperatures, radioactive radiation and limited accessibility. Future chipless wireless sensing and RFID technologies aim for low unit prizes compared to chip-based ones and to allow for operation in harsh environments. Chipless tags based on surface acoustic wave (SAW) technology already made their way to the market. However, this technology faces similar problems as the chip-based one. Beyond SAW technology,

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## WORKSHOPS AND SHORT COURSES - MONDAY

Duration: 13:50h to 17:40h

Room Istanbul

### W 21 (EuMC) Continued

various emerging chipless tag approaches, entirely based on electromagnetic (em) principles, aim to overcome these limits. These em-based chipless technologies open up a vast amount of opportunities especially for wireless sensors. Many sensing principles are applicable to chipless tag approaches, but they have to be tailored specifically for the wireless readout. Commonly used among others are for example microwave resonators loaded with (gas) sensitive graphene layers or temperature-dependent functional materials or ones that are mechanically detuned, e.g. for strain or pressure measurement. On the other side, the reader technology for these tags becomes more and more affordable, since silicon microwave circuits are approaching higher and higher frequencies. This workshop aims to give an overview of the latest scientific achievements in the field of chipless wireless sensor and RFID technologies beyond the well-known SAW technology. Furthermore, state-of-the-art industrial applications as well as future industrial demands will be discussed.



#### Programme

13:50h - 14:05h

**Welcome and Introduction**

14:05h - 14:45h

**Chipless RFID: Revolution in Identification in the New Millennium**

Nemai Karmakar, Monash University

14:45h - 15:20h

**Advances in Coding Techniques for Chipless RFID Tags**

Smail Tedjini, Grenoble INP

15:20h - 16:00h

**Coffee Break**

16:00h - 16:35h

**Chipless Passive Wireless Sensors with Electromagnetic Transduction**

Patrick Pons, LAAS-CNRS Toulouse

16:35h - 17:10h

**RFID-Enabled Wireless Sensors Combining Nanotechnology and Inkjet-Printed Approaches**

Manos M. Tentzeris, Georgia Institute of Technology

17:10h - 17:40h

**Challenges of Chipless Sensing and RFID: Channel Equalization and Multiple Access Schemes**

Christian Mandel, Technische Universität Darmstadt

Duration: 13:50h to 17:40h

Room Copenhagen

### W 22 (EuMC)

#### RF- and Microwaves as an Enabler for the Internet of Things

##### Organisers:

Ruediger Quay, Fraunhofer IAF, Germany

Franz Dielacher, Infineon Technologies AG, Villach, Austria

##### Abstract

RF- and microwave technology is an indispensable part of all aspects for the "Internet of Things" (IoT), which is THE common vision of the internet of the future connecting anymedia-anytime-anywhere. Leadership in this technology is a strong requirement for societies and industries worldwide. IoT includes integration of several technologies and communications solutions, identification and tracking technologies, and wired and wireless sensor- and actuator-networks. The workshop is to provide an overview on the European microwave technology roadmap for the IoT. Leading edge researchers, a scientific officer from the European commission, and a market analyst will be the presenters of the following presentations.



#### Programme

13:50h - 14:00h

**Introduction: The Internet of Things**

14:00h - 14:35h

**RF Market Implications for the Internet of Things**

Eric Higham, Strategy Analytics

14:35h - 15:10h

**IoT Overview and the Importance of RF- and Microwaves**

Yevgeni Koucheryavy, Tampere University of Technology

15:10h - 15:45h

**Opportunities of RFID in the IoT**

Heikki Seppä, VTT

15:45h - 16:00h

**Coffee Break**

16:00h - 16:40h

**Graphene RF Electronics for the IOT**

Jan Stake, Chalmers University

16:40h - 17:20h

**IoT: Connecting all of Those Connected "Things"**

Franz Dielacher, Infineon Technologies Austria

17:20h - 17:40h

**Panel Discussion**

Duration: 13:50h to 17:30h

Room Seoul

### W 23 (EuMC & EuMIC)

#### Signal Integrity of Digital and Analogue Systems

##### Organiser:

Christian Schuster, Technische Universität Hamburg-Harburg, Germany

##### Abstract

Signal integrity is a highly active, cross disciplinary topic that deals with measurement, modelling, and control of signal quality in all kinds of digital and analogue links over wired connections. In this workshop professionals from academia and industry will introduce the audience to this field of research and present latest trends and results based on their own work. The effect of signal integrity issues will be shown in applications ranging from RFICs to automotive communication networks. Effective methods for assessing and improving signal integrity will be presented.

##### Programme

13:50h - 14:00h

**Fundamentals of Signal and Power Integrity**

Christian Schuster, Technische Universität Hamburg-Harburg

14:00h - 14:30h

**High-Frequency Modelling of Interconnects for Signal Integrity and EMC**

Ivan Ndip, RF & High-Speed System Design Group, Fraunhofer Institute for Reliability and Microintegration IZM



14:30h - 15:00h

**Wideband Power Isolation and Signal Balancing Topologies in High Speed Serial Interface**

Jong-Gwan Yook, School of Electrical and Electronic Engineering, Yonsei University

15:00h - 15:30h

**Simulation Methods for Signal Integrity of Automotive Bus Systems**

Stephan Frei, Technische Universität Dortmund

15:30h - 16:00h

**Coffee Break**

16:00h - 16:30h

**Floorplanning and Grounding Strategies for Optimal RFIC Performance**

Jan Niehof, NXP Semiconductors

16:30h - 17:00h

**Macromodelling and Its Applications to Signal and Power Integrity**

Stefano Grivet-Talocia, Politecnico di Torino

17:00h - 17:30h

**Modelling of Carbon-Based Interconnects**

Wen-Yan Yin, Zhejiang University / Shanghai Jiao Tong University

## WORKSHOPS AND SHORT COURSES - MONDAY

Duration: 13:50h to 17:40h

Room Hongkong

### S 06 (EuMC)

#### Introduction to Advanced Measurement Techniques for Material Characterization

##### Organisers:

Giovanni D'Amore, Agilent Technologies EMEA

Michael Janezic, National Institute of Standards and Technology (NIST)

Shelley Begley, Agilent Technologies USA

##### Abstract

The purpose of this half-day workshop is to provide an overview of the state-of-the-art techniques used to measure the dielectric properties of materials that are widely incorporated into microwave devices and components. We will provide a framework for selecting the appropriate measurement technique and will overview the most relevant techniques for accurately measuring low-loss and high-loss solid and liquid dielectric materials at frequencies ranging from MHz to THz. Also we will look at new measurement technologies aim to bridge the gap between electric characteristics and chemical analysis.

##### Programme

- 13:50h - 14:10h** *Overview and Selection of Dielectric Measurement Techniques*  
Michael Janezic, NIST
- 14:10h - 14:30h** *Liquid Measurements Using an Open-Ended Coaxial Probe*  
Shelley Begley, Agilent Technologies



14:30h - 15:00h

*The Application of Quasi-Optical Techniques to Determine the Complex Permittivity and Polarization Based Permeability of Faraday Rotation Based Circulators in the mm-Wave Region*  
Richard Wylde, Thomas Keating Ltd

15:00h - 15:30h

*Towards Developing a Dielectric Metrology for the Life Sciences*  
Robert Donnan, Queen Mary University London

15:30h - 16:00h

*Coffee Break*

16:00h - 16:30h

*CPW-Based Complex Permittivity Extraction and Associated Uncertainties*  
Uwe Arz, Physikalisch-Technische Bundesanstalt (PTB)

16:30h - 17:00h

*Dielectric Measurements for the Determination of the State of Organic Materials*  
Frank Daschner, University of Kiel

17:00h - 17:30h

*Dielectric Measurements of Functional Material Mixtures for Microwave Applications*  
Andreas Penirschke, Alexander Gaebler, TU Darmstadt

17:30h - 17:40h

*Conclusions*

## WORKSHOPS AND SHORT COURSES - TUESDAY

Duration: 08:30h to 17:40h

Room Shanghai

### W 24 (EuMC & EuRAD)

#### Automotive Radar

##### Organiser:

Holger Meinel, Daimler AG, Germany

##### Abstract

Adaptive cruise control (ACC) systems in the 77 GHz frequency range has been the focus of significant research for several decades now. In 1997 the Mercedes-Benz "Distronic" system at 77 GHz became operational as the first series product within the S-class sedan. In 2006 this was followed by the "Distronic Plus" system combining a 77 GHz long radar sensor (LRR) with e.g. two 24 GHz short range radar sensors (SRR). Today this technology has moved to commercial stage with all major OEMs worldwide, having very active programmes to introduce platform wide ACC systems within the immediate future. With the introduction of the new Mercedes-Benz B-class in November 2011 "Distronic Plus" became available as a series product for smaller cars as well. Besides 77 GHz the 24/ 26 GHz frequency range was adopted for automotive SRR sensors, being employed for Blind Spot Detection (BSD), or as a Lane Change Warner (LCW). Narrow Band systems, operating in the ISM-Band (24.00 – 24.25 GHz) und Ultra Wide Band (UWB) systems (21.65 – 26.65 GHz) are on the market today. The employment of the 79 GHz band for such applications is foreseen and actually comes into reach.

##### Programme

- 08:30h - 08:55h** *Frequencies Above 100 GHz and Their Advantages*  
Mike Koehler, L.-P. Schmidt, University of Erlangen-Nuremberg
- 08:55h - 09:20h** *Polarimetric Radar & Millimetre-Waves*  
Alexis Paolo Garcia Ariza, MEDAV GmbH
- 09:20h - 09:45h** *DBF for Automotive Applications*  
Christoph C. Fischer, Daimler AG  
Wolfgang Menzel, University of Ulm
- 09:45h - 10:10h** *OFDM Radar for Automotive Applications*  
Thomas Zwick, KIT- Karlsruhe Institute of Technology
- 10:10h - 10:40h** *Coffee Break*



10:40h - 11:35h

*The Role of Radar Sensing for Driver Assistance Systems – Today and Tomorrow*  
Ralf G. Herrtwich, Daimler AG

11:35h - 12:20h

*Open Air Event: Adaptive Cruise Control & Blind Spot Detection – A Live Demo Outside on the Roads of Nuremberg*  
Stefan Max, VW et. al.

12:20h - 13:50h

*Live Demo Continued & Lunch*

13:50h - 14:25h

*General Overview and State of the Art*  
Jürgen Dickmann, Daimler AG

14:25h - 15:00h

*Comfort & Driving Assistance Systems – ADAS Production and Application Trends*  
Bernhard Schuermann et al., Valeo

15:00h - 15:30h

*Global Radar Frequency Certification Status*  
Sylvain Germaine, TRW-Autocruise S.A., CLEPA/OICA speaker for "79 GHz"

15:30h - 16:00h

*Coffee Break*

16:00h - 16:20h

*More Robustness of Radar Sensors due to MOSARIM*  
Martin Kunert, Bosch GmbH

16:20h - 16:35h

*Road Course Estimation Based on Imaging Radar*  
Jens Klappstein, Daimler AG

16:35h - 16:50h

*Probabilistic Environment Mapping and Free-Space Estimation Using SRRs Only*  
Markus Hahn, Daimler AG

16:50h - 17:10h

*Scenario Simulation Platform for Designing and Testing Automotive Radar Systems*  
Jason Wang, Agilent Technologies

17:10h - 17:40h

*Radar Development Status and Trends at Volkswagen*  
Stephan Max, Volkswagen AG



## WORKSHOPS AND SHORT COURSES - WEDNESDAY

Duration: 08:30h to 17:40h

Room Hongkong

W 25 (EuMC & EuMIC)

### High Efficiency Microwave Power Amplifiers and Smart Transmitters

#### Organisers:

Georg Böck, TU Berlin, Germany

Renato Negra, RWTH Aachen, Germany

#### Abstract

A wide range of advanced transmitter architectures which exploit the characteristics of highly efficient power amplifiers for wireless application has been the focus of international research over the past two decades. This full-day workshop combines international academic specialists to outline the most recent activities, achievements and future possibilities in this area. The talks span from circuit design to system level and introduce both progresses in the design of multiband Doherty and highly efficient power amplifiers, as well as their application in digital-centric flexible transmitter architectures. Special emphasis is on transmitters beyond the state-of-the-art technology of envelop tracking. The principles of pulse shaping, outphasing and active load-pulling transmitter architectures will be introduced and their potential will be illustrated through practical implementations and measurement results. An emphasis on critical issues and limitations in realising these amplifiers and systems will be given. The interactive panel discussion between the attendees and the speakers, which closes the workshop, will be a great opportunity to discuss the future directions as well as challenges which have to be tackled in a broader context.



#### Programme

08:30h - 08:40h	<b>Welcome and Introductory Remarks</b> Georg Böck, TU Berlin Renato Negra, RWTH Aachen
08:40h - 09:25h	<b>Evolving the Doherty Amplifier Towards and Beyond Octave Bandwidths</b> David Gustafsson, Christer Andersson, Christian Fager, Chalmers University, Gothenburg
09:25h - 10:10h	<b>Multiband Doherty Power Amplifiers</b> P. Colantonio, University of Roma
10:10h - 10:40h	<b>Coffee Break</b>
10:40h - 11:20h	<b>Digitally Driven Doherty Amplifier Architectures for Broadband and Multistandard Wireless Transmitters</b> Fadhel M. Ghannouchi, University of Calgary
11:20h - 11:50h	<b>Harmonically Tuned Broadband Power Amplifiers</b> Daniel Gruner, Khaled Bathich, Sebastian Preis, Tareq Arnous, Ahmed Al Tanany, Georg Böck
11:50h - 12:20h	<b>Broadband/Multiband "Continuous" Power Amplifier Modes</b> Vincenzo Carrubba, Rüdiger Quay, Stephan Maroldt, IAF Freiburg
12:20h - 13:50h	<b>Lunch</b>
13:50h - 14:20h	<b>Voltage-Mode Class-D PA: A High-End Building Block for Compact &amp; Flexible Next-Generation Mobile Communication Infrastructure</b> Andreas Wentzel, FBH Berlin
14:20h - 14:50h	<b>High Dynamic LINC-Like RF Transmitters</b> Renato Negra, RWTH Aachen
14:50h - 15:30h	<b>Efficient Linear Power Amplifiers for Use in 4G systems</b> Kevin Morris, University of Bristol
15:30h - 16:00h	<b>Coffee Break</b>
16:00h - 16:40h	<b>Digitally Assisted CMOS Power Amplifiers for Handset Applications</b> Bumman Kim, Postech
16:40h - 17:40h	<b>Panel Discussion and Closing Remarks</b>

## WORKSHOPS AND SHORT COURSES - WEDNESDAY

Duration: 08:30h to 17:40h

Room Neu-Delhi

### W 26 (EuRAD)

#### Advances in the State-of-the-Art of 76-81 GHz Automotive Radar and Current Issues in Increasing Their Commercial Deployment

##### Organisers:

Hiroshi Kondoh, EHF Consulting, Japan  
Ian Gresham, NXP Semiconductors, USA

##### Abstract

Since their first introduction into commercial markets in 2001, 76-77 GHz-band automotive radars have been widely accepted and have greatly expanded their deployment into a variety of vehicle models around the world. Their deployment so far has been largely limited to driver aid and assistance features (e.g. Adaptive Cruise Control (ACC)), passive safety applications (pre-crash preparation/ seat-belt pre-tensioning), and integration with short-range sensors for stop-and-go operation. However, the possibilities that arise from a vehicle having awareness of its environment, has extended interest into radars' use for dynamic, active safety operation. This extends their operation from highway use to city streets for pedestrian and bicycle protection, as well as the capability for active avoidance manoeuvring. This inevitably requires both high resolution in the spatial domain, and target recognition capabilities in order to reliably detect objects like pedestrians in a complex surrounding environment. Although 24/26 GHz UWB radars have been introduced for this purpose with great success, world-wide regulation issues; limited EIRP; and a sunset date limit their long-term use. The 77-81 GHz (79 GHz-band) UWB band has been widely acclaimed as an ultimate home for high-resolution automotive radars; is already approved in the EU and Japan and is undergoing positive discussion in the USA. The next phase of deployment for automotive radar necessitates expanding the deployment of both the long-range 76-77 GHz and 77-81 GHz UWB radar systems while increasing their performance and complexity without a simultaneous increase in cost. This necessitates addressing both technical and regulatory issues to establish a high penetration ratio in a global market. With the situation described above in mind, the purpose of this proposed workshop is:

- 1) Provide an overall review of the current status and future trends of the 76-81 GHz radars,
- 2) Review state-of-the-art achievements of R&D/Production activities in hardware and software development for the mm-wave radars,
- 3) Clarify and discuss both technical and legislative challenges which require consideration for global deployment of the radars with high-penetration ratios.

##### Programme

08:30h - 09:20h	<b>Overview of World-Wide Regulations and Legislation</b> Satoshi Oyama, ITU-R WG5 Chair
09:20h - 10:10h	<b>76-81 GHz Radar Systems</b> Ralf Reuter, Freescale
10:10h - 10:40h	<b>Coffee Break</b>
10:40h - 11:30h	<b>Architecture Tradeoffs for 77/79 GHz Radar</b> Andreas Stelzer, JKU Linz
11:30h - 12:20h	<b>Phased Array Radar Architectures and Realization</b> Gabriel Rebeiz, UCSD
12:20h - 13:50h	<b>Lunch</b>
13:50h - 14:40h	<b>76-81 GHz Low-Cost, High-Performance Radar Hardware</b> Christoph Wagner, Infineon
14:40h - 15:30h	<b>Radar-to-Radar Interferences: Simulations and Solutions</b> Thomas Zwick, Karlsruhe Institute of Technology
15:30h - 16:00h	<b>Coffee Break</b>
16:00h - 16:50h	<b>Overview: Technologies for Practical Deployment of mm-Wave Radar</b> Juergen Hasch, Bosch
16:50h - 17:40h	<b>Influence of Intra Vehicle Factors on Radar Performance</b> Thomas Binzer, Bosch



Duration: 08:30h to 17:40h

Room Singapore

### W 27 (EuRAD)

#### Synthetic Aperture Radar

##### Organiser:

Alberto Moreira, German Aerospace Center (DLR), Germany

##### Abstract

This workshop is well suited for engineers and researchers interested in learning theory, techniques, new concepts, and applications related to spaceborne synthetic aperture radar (SAR) systems. Today, spaceborne SAR systems are generating images of the Earth surface with a resolution better than 1 meter. Due to their ability to produce high-resolution radar images independent of sunlight illumination and weather conditions, SAR systems have demonstrated their outstanding capabilities for a multitude of applications. Examples are geoscience and climate change research, environmental and Earth system monitoring, 2-D and 3-D mapping, change detection, 4-D mapping (space and time), security-related applications and even planetary exploration. The workshop starts with an overview on the principles, theory and applications of SAR systems. The second lecture will focus on SAR interferometry and will cover the design and system aspects of the mission TanDEM-X, the first radar interferometer in space that employs two satellites operating in a closely controlled formation flight. This mission has the goal to generate a new digital elevation model of the Earth's topography with unprecedented accuracy. The third lecture will present several advanced concepts for future SAR systems and missions. Examples are new digital beamforming and MIMO techniques in combination with unfoldable reflector antennas, and the

use of satellite formations with multiple receivers for tomographic applications. The last lecture is focused on the principles and applications of SAR polarimetry as well as polarimetric SAR interferometry. These techniques are essential for the derivation of qualitative and quantitative physical information from SAR images on a reliable way.

##### Programme

08:30h - 10:00h	<b>Synthetic Aperture Radar: Principles, Theory and Applications</b> Marwan Younis, German Aerospace Center (DLR)
10:00h - 10:40h	<b>Coffee Break</b>
10:40h - 12:10h	<b>Spaceborne SAR Interferometry and TanDEM-X</b> Manfred Zink, German Aerospace Center (DLR)
12:10h - 13:50h	<b>Lunch</b>
13:50h - 15:20h	<b>Advanced Spaceborne SAR Concepts</b> Gerhard Krieger, German Aerospace Center (DLR)
15:20h - 16:00h	<b>Coffee Break</b>
16:00h - 17:40h	<b>SAR Polarimetry and Polarimetric SAR Interferometry</b> Wolfgang-Martin Boerner, University of Illinois at Chicago



## WORKSHOPS AND SHORT COURSES - FRIDAY

Duration: 08:30h to 12:20h

Room Riga

### W 28 (EuMC)

#### What Are the Roles of Photonics and Electronics in Millimetre-Wave Multigigabit/s Wireless Communications?

##### Organisers:

Christian G. Schäffer, Helmut Schmidt Universität, Hamburg, Germany  
Andreas Stöhr, Universität Duisburg-Essen, Duisburg, Germany

##### Abstract

In this workshop challenges of using photonic (Radio-over-Fibre systems) and electronic technologies to generate, distribute, receive and process multigigabit/s wireless signals at mm-wave frequencies will be discussed. Proof-of-Concept wireless system demonstrations show the potential and the challenges of photonic/electronic architectures supporting multi-standard wireless communication within the mm-wave frequency bands for data speeds exceeding 10 Gbps. As a possible technology, millimetre-wave-over-fibre techniques have been exploited for high-capacity wireless systems over many years. Successful multigigabit/s systems were realized since around 2007. The advantages of using RoF techniques are manifold: it provides a scalable technology that allows seamless integration of the optical access network and the transmitting antenna by providing direct optical baseband to optical RF up-conversion. The low transmission loss of optical fibre allows for distributed antenna remoting. In addition the recent progress in coherent optical systems allows the generation and transmission of spectrally-broad and efficient ultra-high capacity data signals. The modern coherent optical receivers are based on sophisticated software for equalization and detection of multi-format complex valued baseband signals which can be used in electronic systems too. This workshop will examine the changing roles of analogue photonics (RoF) and electronics in the multigigabit/s wireless communications world.



##### Programme

08:30h - 09:10h

##### *Millimetre-Wave-over-Fibre Technologies*

Christian G. Schäffer, Helmut Schmidt Universität

09:10h - 09:50h

##### *Photonic Millimetre-Wave Technologies for Broadband Wireless*

Andreas Stöhr, Universität Duisburg

09:50h - 10:30h

##### *High-Frequency Millimetre-Wave Circuits for Wireless Communications*

I. Kallfass, Universität Stuttgart

10:30h - 11:00h

##### *Coffee Break*

11:00h - 11:40h

##### *Nonlinear Signal Processing for Advanced Signal Detection*

D. Zibar, Technical University of Denmark

11:40h - 12:20h

##### *High Data-Rate Wireless Systems*

T. Kawanishi, NICT

Duration: 08:30h to 12:20h

Room Krakau

### W 29 (EuMC)

#### Technologies for Embedded Wireless Systems

##### Organisers:

Gerald Ulbricht, Fraunhofer IIS, Germany  
Torsten Klie, Friedrich-Alexander University of Erlangen-Nuremberg, Germany  
Jochen Rascher, Friedrich-Alexander University of Erlangen-Nuremberg, Germany

##### Abstract

The proposed workshop is organized by the "Embedded Systems Initiative", a joint activity by Friedrich-Alexander-Universität of Erlangen-Nuremberg (FAU) and Fraunhofer-Institut für Integrierte Schaltungen (Fraunhofer IIS). It shall give an overview of advanced technologies for embedded wireless systems. The demands on embedded wireless systems are challenging. Their functionality is steadily increasing while available space and power consumption shall decrease. Less time to market requires new design methodologies and tools that assist the designer in optimizing space usage and power consumption. The device shall be able to communicate simultaneously with different devices and different modulation schemes. The workshop will give an overview of different technologies investigated within the Embedded Systems Initiative and its partners that help to meet these demands. The workshop comprises digital and analog/RF design techniques from heterogeneous multicore processors, linear and efficient power amplifiers and adaptive frontends to embedded antennas. It will be completed by system design aspects such as an actor-oriented methodology for power modelling, TX leakage suppression and embedded wireless system design.



##### Programme

08:30h - 09:05h

##### *Extending Heterogeneous Multicore Processor Architecture for Embedded Wireless Applications*

Dietmar Fey, Marc Reichenbach, Friedrich-Alexander University of Erlangen-Nuremberg

09:05h - 09:35h

##### *An Actor-Oriented Methodology for Power Modeling at ESL*

Rafael Rosales, University of Erlangen-Nuremberg

09:35h - 10:10h

##### *Embedded Wireless System Design*

Hans-Martin Tröger, Christof Schlund, Fraunhofer IIS

10:10h - 10:40h

##### *Coffee Break*

10:40h - 11:05h

##### *Integrated Reconfigurable CMOS Power Amplifiers*

Jochen Rascher, Amr Zohny, Friedrich-Alexander University of Erlangen-Nuremberg

11:05h - 11:30h

##### *Adaptive Frontend Modules*

Anthony Thomas, Friedrich-Alexander University of Erlangen-Nuremberg

11:30h - 11:55h

##### *TX Leakage Suppression in 4G Transceivers*

Ahmed Elmaghraby, Martin Simon, Friedrich-Alexander University of Erlangen-Nuremberg

11:55h - 12:20h

##### *Embedded Antennas*

Rainer Wansch, Mario Schuehler, Fraunhofer IIS

## WORKSHOPS AND SHORT COURSES - FRIDAY

Duration: 08:30h to 17:40h

Room Budapest

### W 30 (EuMC)

#### Photonics: From Devices to Circuits and Systems Including Testing

##### Organisers:

Daniel Gloria, STMicroelectronics, France  
Guillaume Ducournau, IEMN, France

##### Abstract

The proposed workshop will aim to address Photonics technologies for high data rate communication. It will cover technologies description at device level including their characterization with a special focus on "on wafer testing" which is a challenge to consider for the requested technologies development and modelling. In addition circuits and systems design will be presented in the field of high data rate communication. Attendance will be engineers and researchers involved in:

- the development of such technologies: from process, characterization and modelling
- in circuits and systems design based on this devices.

##### Programme

08:30h - 09:20h	<b>Silicon Photonics Including High Speed and Low Power Consumption Optoelectronic Devices</b> Laurent Vivien, IEF
09:20h - 10:10h	<b>Photonic Devices for High-Freq Generation and Wireless Communications Applications</b> Guillaume Ducournau, IEMN



10:10h - 10:40h

**Coffee Break**

10:40h - 11:30h

**O/E Device on Wafer Testing Approach**  
Lars Zimmermann, IHP

11:30h - 12:20h

**Integrated Optical Noise Source Characterization for THZ Applications**  
Sandrine Oeuvarard, STMicroelectronics

12:20h - 13:50h

**Lunch**

13:50h - 14:50h

**Si-photonics Circuits Solutions for Communications**  
Sylvie Menezo, CEA-LETI

14:50h - 15:50h

**Radio-Over-Fibre Techniques Within Home Networks. Focus on VCSELs and Photoreceivers (SiGe HPT and Commercial ROSA)**  
Jean-Luc Polleux, Carlos Viana, ESIEE

15:50h - 16:20h

**Coffee Break**

16:20h - 17:20h

**60 GHz Radio Systems on Fibre for High Data Rate Applications**  
Yannis Le Guennec, IMEP-G, Ghislaine Maury, INPG

17:20h - 17:40h

**Discussion and Conclusions**

Duration: 08:30h to 12:20h

Room Helsinki

### W 31 (EuMC)

#### Do You Have Confidence in Your RF Waveforms? Developments in Waveform Metrology and Uncertainty Propagation for RF and Digital Signals

##### Organiser:

Mark Bieler, Physikalisch-Technische Bundesanstalt, Germany

##### Abstract

Ultrafast electronics and high-speed communications are among the technologies with the strongest growth worldwide. Yet recent developments also face unsolved challenges in metrology regarding (i) the exact measurement of ultrafast time-domain waveforms, (ii) the uncertainty propagation between the time and frequency domain for very large data files, (iii) the exact measurement of digital signals like error vector magnitude, as well as (iv) the exact characterization of the temporal behaviour of propagation channels. This workshop intends to cover these topics from different viewpoints. First, the underlying metrology and current research will be presented. These talks will mainly focus on effort that is undertaken to make waveform measurements traceable to the SI and, thus, allow for reliable characterization of high-frequency instrumentation. Second, the user needs will be addressed. This includes an introduction to freely available software that can be employed for the propagation of uncertainties for pulsed and digital signals. Moreover, an informal discussion will clarify the needs of industrial users, which in turn will help to steer the direction of future research at metrology institutes. The addressed audience ranges from instrument manufactures (e.g., Agilent, Rohde & Schwarz, Anritsu, LeCroy, Tektronix) and corresponding users to National Metrology Institutes, calibration laboratories, and research institutes.



##### Programme

08:30h - 09:05h

**Waveform Covariance Matrices and Propagation of Uncertainty**  
Paul Hale, Dylan Williams, National Institute of Standards and Technology

09:05h - 09:40h

**Laser-Based Waveform Measurements and Uncertainty Propagation for Large Data Files**  
Heiko Füsler, Physikalisch-Technische Bundesanstalt  
David Humphreys, National Physical Laboratory

09:40h - 10:10h

**Characterisation of Vector Signal Generators and Analysers**  
Martin Hudlicka, Czech Metrology Institute

10:10h - 10:40h

**Coffee Break**

10:40h - 11:10h

**Uncertainty Propagation for Digital Signals**  
Faisal Mubarak, VSL

11:10h - 11:40h

**Transfer Function Determination for mm- and Sub mm-Wave Communication Links**  
Mohammed Salhi, Physikalisch-Technische Bundesanstalt

11:40h - 12:20h

**Introduction to Freely Available Software for Uncertainty Propagation and Clarification of User Needs**  
Roundtable discussion (includes contributions from Paul Hale, Dylan Williams, National Institute of Standards and Technology, Dongsheng Zhao, VSL; Kari Ojasalo, MIKES)



## WORKSHOPS AND SHORT COURSES - FRIDAY

Duration: 08:30h to 12:20h

Room Seoul

W 32 (EuMC)

PCB Design up to 67 GHz



### Organiser:

Stefan Zorn, Rohde&Schwarz, Germany

### Abstract

This workshop wants to present new insights and lessons learned from the BFS- (Bavarian Research Foundation) research project "Printed circuit boards for higher frequency systems" (PHERES) on microwave PCB design and manufacturing. As possible audience we consider designers/researchers in the field of RF-PCB layout for the 10 to 67 GHz range and beyond. Design aspects including

- design rules for PCB layout (line/space, micro vias, layer stack, ...)
- upcoming PCB-technologies
- measuring and handling relative permittivity and loss factor of PCB cores and prepregs with respect to conductor surface influence (e.g. roughness)
- robust RF filter design
- embedded foil resistors
- measurement automation
- and much more

will be discussed. In addition to the lectures, measuring equipment will be available: thus new RF connectors for 50 GHz and 67 GHz and also demonstrator boards from project PHERES can be evaluated live.

### Programme

08:30h - 09:00h

**Modern Radio Frequency PCB Manufacturing**

Stefan Zorn, Rohde & Schwarz

09:00h - 09:30h

**PCBs for Microwave Applications up to 40 GHz and Beyond: Material Characterization, Surface Roughness Consideration, Modeling and Design Perspectives**

Gerald Gold, University of Erlangen-Nuremberg

09:30h - 10:10h

**Field Distributions and Effective Permittivities Along Microstrip Structures on Homogeneous and Inhomogeneous Substrates up to 110 GHz**

Armin Talai, University of Erlangen-Nuremberg

10:10h - 10:40h

**Coffee Break**

10:40h - 11:15h

**Influence of Fabrication Tolerances on Planar PCB Microwave Filters and Investigation for More Robust Filter Structures**

Johannes Jakob, HDU Deggendorf

11:15h - 11:50h

**Embedded Resistors: Using the Integrated Thin Film Resistor Technology for High Frequency Applications on PCBs**

Ramzi Gmiha, HDU Deggendorf

11:50h - 12:20h

**Application of a New Automatic Test Robot for 67 GHz PCB**

Christian Riedel, Rohde & Schwarz

Duration: 08:30h to 12:20h

Room Shanghai

W 33 (EuMC)

Metamaterials in Communications and Sensing: Reality or Fiction?



### Organisers:

Christian Damm, Technische Universität Darmstadt, Germany

Martin Schüßler, Technische Universität Darmstadt, Germany

### Abstract

Metamaterials have gained a lot of attention in many different research communities in the past years. Many interesting phenomena like negative index of refraction, backward wave propagation, epsilon and mu near zero and nearfield amplification have been reported. Based on these unusual properties, a multitude of new types of antennas, couplers, filters, phase shifters, hybrids, diplexers and sensors have been introduced and studied. This workshop will give an overview over existing ideas and concepts for microwave applications and their drawbacks and opportunities. Moreover, commercially available products relying on Metamaterials will be presented. Furthermore, the role of fundamental research in building startups and how visionaries and entrepreneurs help commercialize breakthrough technologies by working closely with academia will be shown. Speakers affiliated with startups, universities and companies will cover this great variety of topics. The workshop will give the participants the opportunity of interactive discussions with the speakers as well as other experienced professionals from the audience.

### Programme

08:30h - 09:10h

**From Fundamental Research to Successful Commercialization: Steps, Risk, and Challenges**

Maha Achour, Polycceed Inc.

09:10h - 09:50h

**Metamaterial Surface Antenna Technology**

Ryan Stevenson, Kymeta Corp.

09:50h - 10:30h

**Metamaterial Inspired Microwave Sensors**

Martin Schüßler, Technische Universität Darmstadt

10:30h - 11:00h

**Coffee Break**

11:00h - 11:40h

**Microwave Components and Sensors Based on Resonant Type Metamaterial Transmission Lines**

Ferran Martin, Universitat Autònoma de Barcelona

11:40h - 12:20h

**Industrial Application of Advanced 1D Periodical Structures at SPINNER GmbH**

Kai Numssen, Spinner GmbH

## WORKSHOPS AND SHORT COURSES - FRIDAY

Duration: 08:30h to 12:55h

Room Neu-Delhi

### W 34 (EuMC)

#### Current and Future Use of Spectrum by PMSE

##### Organisers:

Matthias Fehr, President Association of Professional Wireless Production Technologies (APWPT)

Dre Klaassen, President Association of Professional Wireless Production Technologies (APWPT)

Note: The workshop will be translated German <-> English

##### Abstract

Frequencies are a precious commodity; and due to the potential for considerable profit margins, billions of Euros are paid for their use. In this regard the focus is mainly on mobile communication services and wireless Internet. Presently, the activities of mobile telecommunications operators are dominating the headlines. However, frequency policy for terrestrial broadcasting and wireless production tools (Programme Making and Special Events – PMSE) is not therefore less important. The allocation of frequencies, whether on a regional, national, pan-European or international level, is based on a complex procedure. The European Union decided that frequencies in the range of 790 and 862 MHz shall be assigned to mobile communication services in the framework of the “Digital Dividend I”. During the World Radiocommunication Conference held in February 2012, the participants agreed on preparing measures for the “Digital Dividend II” in order to also assign the frequencies between 694 and 790 MHz to mobile services. This spectrum is still in use by TV and PMSE. We would like to discuss the prerequisites for the spectrum for PMSE, which alternatives would be appropriate and available, what has to be investigated and which decisions need to be taken at the different level.



##### Programme

08:30h - 08:40h

##### Introduction

Helmut G. Bauer, Telecommunications Lawyer

08:40h - 09:35h

##### Results of the DKE Spectrum Recording Based on Several Years of Event Observations

Matthias Fehr, APWPT & DKE WG 731.0.8

09:35h - 10:15h

##### Measurement Approach for Specialized Antennas to Observe the Spectrum Use by PMSE

Andreas Stöckle, University Erlangen-Nuremberg

10:15h - 10:45h

##### Coffee Break

10:45h - 11:15h

##### Requirements on Spectrum for PMSE

Norbert Hilbich, Sennheiser electronic

11:15h - 11:45h

##### Into Consideration: Impact of Current Discussions About Changes in the Use of Radio Spectrum

Sebastian Schweda, Institute of European Media Law (EMR)

11:45h - 12:15h

##### A Study of Future Spectrum Requirements in the 700 MHz Band and the Present Discussions

Rainer Wegner, Federal Ministry of Economics and Technology

12:15h - 12:45h

##### Discussion of a Framework for an Alternative Spectrum Use by PMSE

Georg Fischer, Chairman ETSI STF386

12:45h - 12:55h

##### Closing Remarks

Matthias Fehr, APWPT

Duration: 08:30h to 17:40h

Room Singapur

### W 35 (EuMC)

#### THz Systems and Components in Communications, Sensing and Imaging

##### Organisers:

Viktor Krozer, Goethe University Frankfurt/Main, Germany

Nils Weimann, Ferdinand-Braun Institut, Germany

##### Abstract

THz technology has advanced rapidly and is now being implemented in various application areas. An important push has come from novel components and systems, which enabled to move from the lab to the field. This workshop will present recent advances in applications related to THz communications, THz sensing with particular emphasis on biomedical applications, THz non-destructive testing, and THz imaging. These areas are considered among the most important application areas for THz technologies. The workshop will commence with components exhibiting improved performance and their technologies, which are key to system development. It will then focus on Communications, Imaging, and Biomedical Applications. Topics covered during the workshop include:

- 1) THz active components: III/V, SiGe, CMOS technologies
- 2) THz antennas and components
- 3) Emerging terahertz applications and systems: Communications
- 4) Emerging terahertz applications and systems: Imaging
- 5) Emerging terahertz applications and systems: Non-destructive testing
- 6) Emerging terahertz applications and systems: Biomedical imaging

The goal of the workshop is to emphasize the new opportunities available on component and system level and to promote discussion among researchers and industry in the above areas. It will be shown that the current trend has moved from explaining the current principles to demonstrating system performance. It will also be demonstrated that component and system requirements become a driving force in technology development and scientific research.



##### Programme

08:30h - 08:55h

##### THz Arrays and Their Applications

Imran Mehdi, Jet Propulsion Laboratory

08:55h - 09:20h

##### Low-Cost System Development Above 100 GHz

Jesus Grajal de la Fuente, Universidad Politecnica de Madrid

09:20h - 09:45h

##### The Next Frontier for Circuit Designers: CMOS THz Systems

Ehsan Afshari, Cornell University

09:45h - 10:10h

##### Highly Integrated MMICs for THz Communication, Sensing and Imaging

Herbert Zirath, Chalmers University

10:10h - 10:40h

##### Coffee Break

10:40h - 11:05h

##### Heterointegrated MMIC for Sensing Applications

Wolfgang Heinrich, Viktor Krozer, Ferdinand-Braun-Institute

11:05h - 11:30h

##### Terahertz Sensing and Imaging with MOSFETs from Microwaves up to 9 THz

Hartmut Roskos, J. W. Goethe University Frankfurt/Main

11:30h - 11:55h

##### Point-to-Point Communication at 240 GHz with up to 40 Gbit/s Data Rate

Ingmar Kallfass, University Stuttgart

11:55h - 12:20h

##### THz Wireless Communications: Progress and Future Directions

John F. Federici, New Jersey Institute of Technology

12:20h - 13:50h

##### Lunch

13:50h - 14:20h

##### High Throughput Passive mm-Wave (Body) Security Scanners in FP7 – Alfa Imaging Involvement

Naomi Alexander, Alfa Imaging

14:20h - 14:50h

##### Passive, Video-Rate Submillimetre-Wave False Colour Imaging: Recent Developments

Arttu Luukanen, VTT

## WORKSHOPS AND SHORT COURSES - FRIDAY

Duration: 08:30h to 17:40h

Room Singapur

### W 35 (EuMC) Continued



**14:50h - 15:20h** *Inspection of Aeronautic Multi-Layered Composite*

*Structures Using 3D Terahertz Techniques*

Johan Jonuscheit, Fraunhofer Institute IPM

**15:20h - 15:50h** *THz Gas Sensing*

Naofumi Shimizu, NTT Microsystem Integration Laboratories

**15:50h - 16:20h** *Coffee Break*

**16:20h - 16:50h** *Fibre-Based THz Imaging in Vivo*

Chi-Kuang Sun, National Taiwan University

**16:50h - 17:20h**

*Immobilization- and Label-Free Sensing of Biomolecules*

*Solvated in Nanolitre Liquids at (Sub-) THz Wave*

*Frequencies with Resonating Sensor Structures*

*Featuring Loaded Q-factors above 10.000*

Johan Stiens, Vrije University Brussels

**17:20h - 17:40h**

*Discussion and Summary*

Duration: 13:50h to 17:40h

Room Prag

### W 36 (EuRAD)

**Status and Trends for Active Electronically Scanning Arrays for Radar and Communication**



#### Organisers:

Heinz-Peter Feldle, Cassidian, Ulm, Germany

Peter Knott, Fraunhofer FHR, Wachtberg, Germany

#### Abstract

The technology of active electronically scanning arrays (AESA) has proven indispensable for advanced fighter air, space, ground and naval applications. The outstanding antenna performance, flexible scan strategies and adaptive pattern control are the prerequisites for highest situational awareness and advanced communication. The integration of GaN RF power technology, mixed-signal devices based on SiGe/BiCMOS, and continuous increase of processing power will foster the use of wideband and multi-band antenna systems for multi-functional systems. This workshop will present the actual results and trends on AESA for Radar/SAR and communications presented by the international industry and the major research laboratories. The critical bottle-neck issues of performance, architectures, life-cycle cost, and reliability will be addressed.

#### Programme

**13:50h - 14:15h** *Space-Borne C-Band Phased-Array Antenna with Digital*

*Beam Forming Capability*

Christoph Schaefer, Christoph Heer, Astrium

**14:15h - 14:40h**

*Status and New Trends of Active Electronically Scanned Antennas*

Peter Rützel, Markus Böck, Cassidian

**14:40h - 15:05h**

*AESA Trends*

Peter Drackner, Fredrik Wising, Saab AB

**15:05h - 15:30h**

*Airborne AESA*

Stephen Moore, DSTL

**15:30h - 16:00h**

*Coffee Break*

**16:00h - 16:25h**

*Recent Advances in Phased Array Radar*

René de Jongh, Thales Nederland

**16:25h - 16:50h**

*Present and Future of Wideband Multifunction Phased Array Systems*

Mario La Manna, SELEX ES

**16:50h - 17:15h**

*Progress in Phased-Array Radar Applications*

Joachim Ender, Fraunhofer FHR

**17:15h - 17:40h**

*Design of Wideband Multilayer Printed Antenna Arrays*

B. Rivière, H. Jeuland, S. Bolioli, ONERA

Duration: 13:50h to 17:40h

Room Kopenhagen

### W 37 (EuMC & EuRAD)

**Radio Intelligence and Reconnaissance**



#### Organisers:

Ulla Uebler, MEDAV GmbH, Germany

Birgit Endres, MEDAV GmbH, Germany

#### Abstract

The HF/VUHF frequency spectrum is used by radio communication services relevant for different applications, for example for the correct use of radio licences. The workshop will focus on detection, identification and processing of relevant signals, including those in particular not following standards and regulations. We will talk about the chaotic signal scenario outlining the challenges in the HF domain. In this workshop we will show the chances and benefits of automation in wideband radio reconnaissance environments. You will be given detailed information regarding wideband technologies, detection and classification of emitters in the first part. The second part will deal with the automation of processing through the complete chain - from the radio signal acquisition to the decoded content. Challenges and solutions of demodulators, decoders and processing of signals from other sensors will be presented.

#### Programme

**13:50h - 14:40h**

*Overview and Needs in Radio Intelligence and Reconnaissance*

Hans-Joachim Kolb, MEDAV GmbH

**14:40h - 15:30h**

*Acquisition Technology for HF, VUHF*

Uwe Trautwein, MEDAV GmbH

**15:30h - 16:00h**

*Coffee Break*

**16:00h - 16:50h**

*Direction Finding Solutions in HF and VUHF (Watson Watt and Interferometer)*

Uwe Trautwein, MEDAV GmbH

**16:50h - 17:40h**

*TDoA Solutions in Moving Target and Moving Sensor Scenarios*

Dirk Kolb, MEDAV GmbH

## WORKSHOPS AND SHORT COURSES - FRIDAY

Duration: 13:50h to 17:40h

Room Helsinki

### W 38 (EuMC)

#### Software Defined and Reconfigurable Radio



##### Organiser:

Rainer Wansch, RF and Microwave Design Department, Fraunhofer IIS, Germany

##### Abstract

The focus of the proposed workshop is on techniques for implementing software defined and reconfigurable radio systems. Topics include the architecture of the frontends for receive and transmit, antennas, tuneable filters, ADC technologies. This could be expanded by talks on digital signal processing and suitable waveforms for cognitive radio approaches as well as an overview of system topologies for implementing cognitive radio.

##### Programme

**13:50h - 14:20h** *RF Front-End Architectures for Opportunistic Radio*  
Mario Schühler, Fraunhofer IIS

**14:20h - 14:55h**

*The ADC Challenge: Bandwidth and Dynamic Range*  
Gerald Ulbricht, Fraunhofer IIS

**14:55h - 15:30h**

*Tuneable Filters in Frequency-Agile RF Front-Ends*  
Alexander Jaschke, Fraunhofer IIS

**15:30h - 15:55h**

*Coffee Break*

**15:55h - 16:30h**

*Chances, Challenges and Limitations of RF DACs*  
Christof Schlund, Fraunhofer IIS

**16:30h - 17:05h**

*FBMC: A Flexible and Low Interference Radio Technology for TVWS*  
Dominique Noguet, CEA-LETI

**17:05h - 17:40h**

*Dynamic Spectrum Access, Spectrum Management and Coexistence as Key Enablers for Upcoming Mobile Communications*  
Bernd Bochow, Fraunhofer FOKUS

Duration: 13:50h to 17:40h

Room Seoul

### W 39 (EuMC & EuRAD)

#### Introduction to Ultra-Wideband Localization



##### Organisers:

Hasari Celebi, Gebze Institute of Technology, Turkey  
Hakan P. Partal, Yildiz Technical University, Radarcomm Ltd.Co., Turkey & Syracuse University, USA  
Omer Cetin, The Scientific & Technological Research Council of Turkey, Turkey  
Hakki Nazli, The Scientific & Technological Research Council of Turkey, Turkey

##### Abstract

This half-day workshop covers the following talks:

- 1) Introduction to UWB Localization: An introduction to UWB localization systems and technologies and, an overview of hardware and algorithms for UWB positioning techniques are presented. UWB system and component design techniques and challenges are summarized.
- 2) UWB Ranging and Positioning Algorithms: Main positioning and ranging techniques are presented. The angle of arrival (AOA), time of arrival (TOA) and time difference of arrival (TDOA) algorithms are discussed. Besides the theoretical limits, drawbacks of the algorithms and main sources of the positioning errors are discussed.
- 3) UWB Transceiver Architectures: Base Band: Main UWB transmitter architectures are presented. Pulse rep rates and output pulse amplitudes, the pros and cons of the traditional delay-line type, step-recovery diode (SRD), and avalanche transistor based transmitters are discussed. As for the receivers, coherent and non-coherent architectures are discussed and examined according to the correlator schemes. Energy detector and matched filter based receivers are compared. Direct sampling

and parallel time-domain sampling concepts are presented. The role of the digital signal-processing unit as FPGA is summarized. Other digital receiver architectures are also outlined.

4) UWB Transceiver Architectures: RF Front End Design: RF Front End design challenges for UWB systems are discussed in this talk. Components of an RF Front End such as wideband antennas, LNAs, filters and matching networks are considered and design techniques to obtain wideband circuit performances are outlined. Different technologies which serve for UWB RF circuit design are discussed and a brief comparison study is presented.

##### Programme

**13:50h - 14:30h** *Introduction to Ultra-Wideband Localization*  
Hakan P. Partal, Yildiz Technical University, Radarcomm & Syracuse University

**14:30h - 15:30h** *UWB Ranging and Positioning Algorithms*  
Hasari Celebi, Gebze Institute of Technology

**15:30h - 16:00h** *Coffee Break*

**16:00h - 16:50h** *UWB Transceiver Architectures: Base Band*  
Hasari Celebi, Gebze Institute of Technology

**16:50h - 17:40h** *UWB Transceiver Architectures: RF Front End Design*  
Hakan P. Partal, Yildiz Technical University, Radarcomm & Syracuse University

Duration: 08:30h to 12:20h

Room Prag

### S 07 (EuRAD)

#### Electronic Scanned Arrays Design



##### Organiser :

John S. Williams, The Aerospace Corporation, USA

##### Abstract

The vast majority of high performance radars developed in the last two decades is based on electronic scanned arrays (ESA). Their design and performance were understood and published in the early part of the 20th century but only found wide application near the end of the century when government investment and consumer electronics provided the technology base to develop and field low cost high performance systems. The objective of this short course is to provide an

introduction to the theory and application of electronic scanned arrays. The focus will be antenna hardware and specifically radar antennas.

1) The presentation will describe the general design principles of aperture antennas applied to the specific case of ESA design. System applications will be discussed to set the framework for requirements allocation and flowdown.

2) The advantages and disadvantages of ESA and reflector antennas as well as ESA feeds for reflectors will be compared and contrasted. Common ESA design issues will be described, including array partitioning and subarrays, lattice tradeoffs, feed design, causes and mitigation of sidelobes, beam steering approaches and techniques for beam shaping. Numerical examples using Matlab will illustrate performance of specific designs.



## WORKSHOPS AND SHORT COURSES - FRIDAY

Duration: 08:30h to 12:20h

Room Prag

### S 07 (EuRAD) Continued



#### Programme

08:30h - 09:20h

#### *Design Principles and Approaches*

John S Williams, The Aerospace Corporation

09:20h - 10:10h

#### *Antenna Architectures and Functional Partitioning*

John S Williams, The Aerospace Corporation

10:10h - 10:40h

#### *Coffee Break*

10:40h - 11:30h

#### *Practical Design Considerations*

John S Williams, The Aerospace Corporation

11:30h - 12:20h

#### *Proposed and Operational Examples*

John S Williams, The Aerospace Corporation

3) ESA performance is largely determined by the selection and limitations of specific components. The presentation will discuss the contribution of radiating elements, T/R modules, monolithic microwave integrated circuits (MMICs), microwave distribution and packaging to performance goals including tradeoffs to meet size, weight, power and thermal dissipation constraints.

4) Recent radar satellite designs will be described to illustrate actual performance and design tradeoffs. A conceptual L-band antenna will be discussed.

Duration: 13:50h to 17:40h

Room Riga

### S 08 (EuMC & EuRAD)

#### Wide Band RF Technologies and Antennas at Microwave and Millimetre-Wave Frequencies



#### Organiser:

Albert Sabban, ORT Braude College, Karmiel Israel

#### Abstract

Communication and Radar industry in microwave and millimetre-wave frequencies is currently in continuous growth. The demand for wide bandwidth makes the Ka-band attractive for future commercial communication and Radar industry. Radio Frequency modules such as Frontend, Filters, Power Amplifiers, Antennas, Passive Components and Limiters are important modules in Radar and communication links. The electrical performance of the modules determines if the system will meet the required specifications. Moreover, in several cases the modules performance limits the system performance. Minimization of the size and weight of the RF modules is achieved by employing MMIC and MIC technology. However, integration of MIC and MMIC components and modules raise several technical challenges. In millimetre-wave frequencies the length and width of connecting bonds affects the electrical performance of RF module and systems. Design parameters that may be neglected at low frequencies cannot be ignored in the design of wide band integrated RF modules. Powerful RF design software, such as ADS and HFSS, are required to achieve accurate design of RF modules in millimetre-wave frequencies. Accurate design of millimetre-wave RF modules is crucial. It is an impossible mission to tune millimetre-wave RF modules in the fabrication process. In this course highlight of the design and development of integrated low cost Wideband millimetre-wave RF modules and systems are given. Design and fabrication considerations will be presented. Useful and practical information will be given to RF designer and managers in this course.

#### Programme

13:50h - 14:00h

#### *Introduction*

Albert Sabban, ORT Braude College

14:00h - 14:20h

#### *MIC and MMIC Technology*

Albert Sabban, ORT Braude College

14:20h - 14:40h

#### *RF-MEMS*

Albert Sabban, ORT Braude College

14:40h - 15:05h

#### *Millimeter Wave Microstrip Antenna Arrays*

Albert Sabban, ORT Braude College

15:05h - 15:30h

#### *LTCC*

Albert Sabban, ORT Braude College

15:30h - 16:00h

#### *Coffee Break*

16:00h - 16:25h

#### *18 to 40 GHz Integrated Compact Switched Filter Bank Module*

Albert Sabban, ORT Braude College

16:25h - 16:50h

#### *Receivers*

Albert Sabban, ORT Braude College

16:50h - 17:15h

#### *Power Amplifiers*

Albert Sabban, ORT Braude College

17:15h - 17:40h

#### *Wearable Antennas*

Albert Sabban, ORT Braude College

Duration: 13:50h to 17:40h

Room Krakau

### S 09 (EuRAD)

#### Radar Waveform Design and Analysis



#### Organiser:

Rao Nuthalapati, Lockheed Martin, USA

#### Abstract

This course reviews the principles of waveform design and analysis for radar systems. A primary goal of this course is to present waveform design trade space and choices a designer should make in optimizing the waveform parameters for a given radar sensor application. Several waveform design examples are presented that are suitable for typical radar applications. Waveform design considerations are reviewed and characteristics are compared for selecting an optimal waveform for a given application. Waveform modulations covered in this course include LFM, NLFM, poly-phase codes, Costas codes, Barker codes, shift-register codes, quadratic residue codes, and chaotic codes. Waveform sidelobe suppression techniques are also presented. High Range Resolution (HRR) waveform design and super-resolution concepts are reviewed for wideband processing.

#### Programme

13:50h - 14:40h

#### *Introduction to Waveform Design and Analysis*

Rao Nuthalapati, Lockheed Martin

14:40h - 15:30h

#### *Waveform Modulations in Phase and Frequency*

Rao Nuthalapati, Lockheed Martin

15:30h - 16:00h

#### *Coffee Break*

16:00h - 16:45h

#### *Non-Linear FM, HRR Radar Waveforms and Superresolution Principles*

Rao Nuthalapati, Lockheed Martin

16:45h - 17:30h

#### *Waveform Sidelobe Suppression Techniques*

Rao Nuthalapati, Lockheed Martin

17:30h - 17:40h

#### *Conclusion*

## Rohde & Schwarz Workshops

- Free to attend -

For more information, details and registration:  
<http://www.eumw.rohde-schwarz.com/>

**Location: Room Budapest, Level 2**

**Tuesday 8th October 10:30h – 11:30h**

### ***Basics of Modern Signal Generators***

In this session, the fundamental concept of an RF and microwave generator will be discussed. The attendee will learn how a signal with a constant output power is generated. Related to the concept of a modern signal generator, typical specifications as well as the realization of fundamental analog modulations will be discussed.

The following topics are covered:

- Fundamental synthesizer concepts of RF and microwave generators
- How to achieve low phase noise and high output power
- Fundamental specifications of RF and microwave generators
- Principles of analog and pulse modulations

**Tuesday 8th October 12:30h – 13:30h**

### ***Advanced Methods of Modern Signal Generators***

Setting a frequency on a signal generator should always be fast and accurate. This workshop will look at different synthesizer concepts fulfilling this task. The attendee will learn about the advantages and disadvantages of YIG- and VCO-based synthesizers. To set a specific low output power on a signal generator, an internal step attenuator is normally used, which should again be fast and accurate. Two different concepts will be shown in detail – the mechanical and the electronic step attenuator – as well as their advantages and limitations.

The following topics are covered:

- Advanced synthesizer concepts of RF and microwave generators
- Comparison of YIG-based and VCO-based synthesizers
- Challenges involved in low phase noise and high output power
- High-performance analog and pulse modulations

**Tuesday 8th October 14:00h – 15:00h**

### ***Modern Way of Generating Millimeter-waves from 50 GHz to 110 GHz***

Generating millimeter waves with traditional frequency multipliers is not an easy task. The setup normally requires a signal generator, a frequency multiplier, a power meter and an external attenuator. Power calibration must be carried out for each frequency that is used. Modern frequency multipliers operate differently. They offer built-in attenuators and can be directly controlled from the front panel of the signal generator. Since the entire setup acts as a single instrument, generating accurate millimeter waves up to 110 GHz is very easy. This workshop shows how to save time and space on the workbench and avoid measurement errors by using the frequency multipliers available today.



# ROHDE & SCHWARZ

**Wednesday 9th October 10:00h – 10:45h**

### ***Easy and Precise Phase Noise Measurement Using Advanced Spectrum Analyzers***

In this session, the fundamental concepts and ideas of measuring phase noise parameters on a wide range of devices under test (VCXO, OCXO, etc.) will be introduced and demonstrated using a state-of-the-art signal and spectrum analyzer in combination with the dedicated phase noise measurement application. The combination of an analyzer with a very good internal reference signal source, high-performance analog-to-digital converters and signal processing, and sophisticated algorithms generates a measurement tool for all needs of modern phase noise measurement.

The following topics are covered:

- Fundamental concepts of RF and digital processing concerning phase noise
- All results at a glance – state-of-the-art user interfaces
- Special phase noise measurement functions – spot noise, residuals, spurs, limits
- Digital PLL, monitoring and tracking fast-drifting devices

**Wednesday 9th October 11:30h – 12:15h**

### ***Realtime Extension of High-End Spectrum Analyzers to 160 MHz as Powerful Tool for Monitoring and R&D Applications***

Interference caused by sporadic and brief events in the frequency range, spectral behavior of signal sources during frequency changeovers, digital circuits that affect RF signals – these are problems that are all too familiar to developers in the field of RF engineering. Using realtime mode, advanced signal and spectrum analyzers seamlessly record RF signals with a bandwidth of up to 160 MHz, convert them into the frequency domain and display them as a spectrum. Since all the data captured is processed in realtime without any gaps, users do not miss even very short intermittent signals. With more than 200 000 spectra every second, events as short as a few  $\mu$ s can be detected with true power reading. This workshop will describe typical realtime applications in radar or wireless communications.

The following topics are covered:

- Details of realtime processing including realtime spectrum displays
- Probability of intercept (POI) for identifying brief intermittent events
- Scalable resolution bandwidth by scalable FFT length
- Frequency mask trigger for detecting sporadic signals in the frequency domain

**Wednesday 9th October 13:30h – 14:00h**

### ***Extending the Frequency Range of Spectrum Analyzers by External Harmonic Mixing for Measurement of Radio Links in the E-band***

As data rates of new services increase, network operators are building up radio links in the E band at around 80 GHz. At these frequencies, network operators have the freedom to use bandwidths in the GHz range. However, the spectra have to follow a predefined spectrum emission mask, and the emitted power and modulation quality have to be measured. For these applications, signal and spectrum analyzers are normally used in combination with external mixers. An image-free frequency range of more than 2 GHz is needed, especially for analyzing wideband signals.

The following topics are covered:

- External harmonic mixing up to 90 GHz
- Image-free frequency range of 2.6 GHz
- Vector signal analysis of signals with 250 MHz bandwidth

**Wednesday 9th October 14:30h – 15:15h**

### ***320 MHz Analysis Bandwidth for Wideband Applications such as Pulse Analysis for Radar Signals or Multicarrier Group Delay Measurement for Satellite Communications***

A demodulation bandwidth of 320 MHz makes today's high-end signal and spectrum analyzers a powerful tool for wideband applications such as the analysis of very small pulses in the ns range. A dedicated pulse measurement option greatly simplifies all elements of pulse characterizations such as rise and fall time, droop, pulse width, duty cycle, settling time and pulse-to-pulse trending. Another wideband application is the measurement of group delay utilizing a multicarrier CW signal for calibration and group delay measurement. This is a critical specification, for example, in satellite communications terminals. The necessary option now enables engineers and technicians to perform this measurement easily with minimal external hardware and calibration steps, using a spectrum analyzer instead of a vector network analyzer for a 320 MHz wide channel.

The following topics are covered:

- Demodulation bandwidth of 320 MHz for:
- Pulse analysis for evaluating the performance of radar systems
- Multicarrier group delay measurement for characterizing transmission path quality

**Wednesday 9th October 16:00h – 17:00h**

### ***Calibrating and Verifying Network Analyzers – How to Achieve Reliable Measurement Results***

For many users, calibration (to be more precise: system error correction) of network analyzers is a mystery. Selecting the optimal calibration method, defining the calibration standard and doing the calibration are always potential sources of error. And after calibration, the question users are faced with is: What degree of accuracy was actually achieved using the specified parameters? The workshop describes individual calibration methods; Rohde & Schwarz network analyzers offer the widest range of possibilities. In addition, ways to verify accuracy will be discussed.

**Thursday 10th October 10:00h – 10:45h**

### ***Noise Figure Measurement of Non-Frequency-Converting and Frequency-Converting Components Using the Internal Standard Measurement Receiver of Vector Network Analyzer***

Noise figure is a key figure of merit for low-noise amplifiers and low-noise receiver frontends. Noise figure results are utilized along with S-parameters, compression characteristics and intermodulation performance during all phases of design, verification testing, and device production to enable optimal engineering decisions focused on performance vs. cost vs. yield.

This workshop shows how to perform frequency- and non-frequency-converting noise-figure measurements by using the standard measurement receivers of a high-end vector network analyzer. It also shows the impact of the system error correction on the measurement results.

**Thursday 10th October 11:30h – 12:15h**

### ***Group Delay Measurements of Mixers With Embedded LO and Without the Need of a Reference Mixer***

Mixers are one of the fundamental components of many receivers and transmitters, especially in the microwave range. Any mixer-based receive or transmit system requires that the mixers have well-controlled amplitude, phase and group delay responses. Especially phase and group delay linearity are essential for low bit error rates (BER) of data transmission in wireless and satellite communications systems or high target resolution for phased array antenna modules of surveillance systems.

In particular for satellite applications, it is difficult to perform absolute group delay measurements because of the requirement for a reference mixer. This workshop will show how to measure the absolute group delay of mixers by using a vector network analyzer without the need of a reference mixer.

### Anritsu Workshops

- Free to attend -

**Location:** Room Prag, Level 2

**Tuesday 8th October 10:00h – 10:40h**

#### ***Accurate Differential Device Characterization Using VectorStar***

Differential devices are used in a variety of applications. This seminar will explain how a Vector Network analyzer can be used to characterize these devices and given an overview of the methodologies available to make such measurements. In particular the appropriate use of superposition and true mode stimulus methodologies will be covered. In addition, test fixtures are often used thereby further increasing the likelihood of inappropriate DUT evaluation. This workshop will discuss how the advanced capabilities of fixture de-embedding within VectorStar, together with a real time display of corrected measurements, can improve the device analysis and device characterization.

**Tuesday 8th October 11:00h – 11:40h**

#### ***Expanding Waveguide Boundaries in Device Characterization: Broadband 70 GHz to 145 GHz VNA***

The continuing push for higher data throughput in wireless communication systems has resulted in a need for communication channels operating at higher frequencies and a demand for accurate device characterization beyond 110 GHz. Until now, coaxial connector frequency limitations and VNA source and receiver mm-wave limitations have prevented device characterization above 110 GHz using a vector network analyzer. This workshop will discuss the different industry-first developments that are included in the design of the VectorStar 145 GHz Broadband System. The discussion will provide an overview of a 0.8mm connector and describe the architecture of a 145 GHz mm-Wave module technology development.

**Tuesday 8th October 13:00h – 13:40h**

#### ***What Have You Been Missing In Your Pulsed VNA Measurements?***

This workshop will discuss pulse measurement methods used by VNAs and the associated trade-offs. The differences between narrowband and wideband methodologies will be explained and the associated benefits to the user will be presented. Application to component measurements and on-wafer measurements will be discussed.



Discover What's Possible™

**Tuesday 8th October 14:00h – 14:40h**

#### ***Demystify Noise Figure Measurements***

This workshop will discuss different approaches to noise figure measurements and the associated advantages and disadvantages. Secondly, implementation techniques and trade-offs for the cold-source noise figure measurement method will be examined. Finally, a model for uncertainties will be presented, highlighting those areas which often need the most attention.

**Tuesday 8th October 15:00h – 15:40h**

#### ***Improved Measurements Overcome High-Speed Interconnect Challenges***

As speeds increase, signal integrity engineers increasingly have to make measurements using microwave vector network analyzers. Various considerations will be highlighted including the importance of the extent of the measurement frequency range at low and high ends, how this affects achieving correlation between 3D-EM simulation and measurement, and some practical de-embedding techniques.

**Tuesday 8th October 16:00h – 16:40h**

#### ***Advances in mm-Wave and TeraHz Region Materials Measurements***

Materials measurement possibilities in the mm-wave range have improved in terms of repeatability, accuracy, and sample configurations. This supports those interested in the spectroscopic nature of the measurements and those wanting to identify specific biological, pharmacological or simple molecular behaviors. Waveguide-fixtured measurements of liquids and solids will be presented in W-band including those parameterized with temperature. Free-space measurements of sheet-like materials based on horn antenna configurations from 70 GHz to 500 GHz will also be shown.



### National Instruments Workshops

- Free to attend -

Location: Room Krakau, Level 2

Wednesday 9th October 09:00h – 12:00h

#### ***The Fundamentals of Vector Network Analysis***

Today, vector network analysis and s-parameter measurements are well-established techniques in both R&D and production. At this workshop, explore the fundamentals of vector network analysis. Starting with the definition and the application domain of s-parameters, examine the different functional blocks of the vector network analyzer. Learn how to remove systematic errors with different calibration techniques and discover how even the best calibration techniques fail with improper connector care or inadequate cables.

Also discuss how multiport devices are growing increasingly important. You can extend a two-port vector network analyzer in a scalable way to perform multiport measurements. See how vector network analyzer architectures can extend frequencies into the millimeter wave domain.



Wednesday 9th October 13:00h – 18:00h

#### ***National Instruments RF Wireless Hand-on Seminar***

##### ***Software-Defined Test Strategies***

The landscape of RF test is changing with the proliferation of new wireless standards. Attend the 2013 RF Wireless Hands-on Seminar to learn the techniques for testing these new standards and how to improve measurement accuracy and speed. Receive hands-on instruction with the latest in RF instrumentation, including the world's first vector signal transceiver.

### AWR Design Forum 2013

#### **- European User Group Meeting**

- Free to attend -

Location: Room Krakau, Level 2

Tuesday 8th October,

09:30h – 12:00h and 13:00h – 15:30h

The AWR European User Group Meeting is scheduled for Tuesday 8th of October during EuMW 2013. This -Free to Attend - event provides a forum for the presentation of interesting and informative papers from AWR users and partners working in RF/ Microwave designs as well as talks from AWR's system design, circuit simulation and EM experts.

For up to date information, registration and agenda visit:

<http://www.awrdesignforum.com> or

<http://www.awrcorp.com>



### ANSYS Workshops

- Free to attend -

Location: Room Prag, Level 2

Information and Registration on our Stand # 108, Hall 7A

Wednesday 9th October 09:00h – 11:00h

#### ***Speeding up RF Simulation by Cosimulation between Electromagnetic and Circuit Simulation***

An introduction will be given on the theory, the usage with the software packages ANSYS® HFSS™ and ANSYS® DesignerRF™ and a validation of the data obtained by a coupled simulation. Some practical examples will be shown such as tuning of coupled resonant structures, a spectral emission test fed by a transient signal source and an RF amplifier with layout and connectors. Using these examples it will be demonstrated how the software can be used for efficient design steps including parameterization and optimization processes.



Wednesday 9th October 11:10h – 13:00h

#### ***HFSS for ECAD***

HFSS Solver on Demand technology enables users to drive HFSS directly from the intuitive stack-up based layout interface of ANSYS DesignerRF. It is an ideal design flow for Electrical CAD (ECAD) import (Virtuoso®, Allegro®...). During this session direct link with Virtuoso®, Allegro®, APD® as well as ODB++ import will be demonstrated. This session is a mix of presentation, test case and hands-on.

Wednesday 9th October 14:00h – 18:00h

#### ***Antenna Workshop***

This session will introduce and demonstrate the use of HFSS for antenna simulation. The workshop will highlight existing and new features in the latest HFSS release which enable a new range of antenna problems to be analyzed. This session is a mix of presentation, test case and hands-on.

### EUMW MICROAPPS 2013

- Free to attend -

Stand 117

Welcome to the third annual European Microwave Week Microwave Application Seminars (MicroApps). MicroApps will be held from Tuesday 8th October through to Thursday 10th October 2013.

MicroApps are sponsored by AWR, Rohde & Schwarz and Horizon House and will take place in the MicroApps Auditorium, which is located within the exhibition hall. EuMW exhibitors will present technical applications based seminars describing state-of-the-art products, design techniques, and processes of interest to the RF and microwave community. The intent of this free to attend open forum is to highlight products and techniques useful to engineers in their day to day work.



#### ***MicroApps Highlights:***

- MicroApps feature practical application papers describing novel products and processes
- Daily keynotes are presented by leading industry names
- All MicroApps sessions are held on the exhibition floor at the MicroApps Auditorium
- Exhibition Only Badges or Conference Badges enable free access to all MicroApps sessions
- A free CD of papers presented will be available
- A free notepad and pen are available for all attendees and a complimentary bottle of water

Once finalized, a detailed agenda will be made available at the MicroApps website: [www.eumicroapps.com](http://www.eumicroapps.com) and published in the official EuMW Show Guide. Additionally, printed copies will also be made available at the EuMW registration desks.

We hope to see you at EuMW MicroApps 2013!






MicroApps Committee

Sponsored by:



# CONFERENCE SESSIONS MATRIX - SUNDAY

Room	08:30h - 10:10h	Coffee Break	10:40h - 12:20h	Lunch	13:50h - 15:30h	Coffee Break	16:00h - 17:40h
Kiev	<b>W01 EuMIC</b> Low-power RFIC Frontends and Components						
Riga	<b>W02 EuMC</b> Wireless Power Transmission – Techniques and Applications						
St. Petersburg	<b>S01 EuMC/EuMIC</b> Fundamentals of Microwave Power Amplifier Designs						
Krakau	<b>W03 EuMC/EuMIC</b> Energy Harvesting, Circuit and System Advances for Battery-less Radio Frequency Identification (RFID) and Near Field Communication (NFC) Sensors						
Prag	<b>W04 EuMC/EuMIC</b> Modulators and Power Amplifier for Power-efficient Transmitters				<b>S04 EuMC</b> Near Field Probes: Useful Tools For RF/MW Engineers		
Budapest	<b>W05 EuMC</b> Biomedical Applications of Microwaves: Challenges and New Opportunities						
Istanbul	<b>W06 EuMC/EuMIC</b> RFIC Design, Assembly, and Packaging Towards Sub-mm and THz Waves						
Oslo	<b>S02 EuMC/EuMIC</b> Completing the Design Flow – A Short Course Covering Component-Level Modelling and Measurement, Circuit Design and Analysis and System Modelling				<b>S05 EuMC/EuMIC</b> Introduction to Spaceborne SSPA, Requirements and Future Perspectives		
Kopenhagen	<b>W07 EuMC/EuMIC</b> RF-MEMS: From Monolithic Device Integration to Circuit and System Design						
Stockholm	<b>W08 EuMIC</b> Growing and Designing GaN in Europe						
Helsinki	<b>W09 EuMC/EuMIC</b> Future RF Fingerprinting and On-Chip Security						
Seoul	<b>S03 EuMC</b> Substrate Integrated Waveguides						
Shanghai	<b>W10 EuMC/EuMIC</b> Microwave Metamaterial Concepts, Circuits and Applications						
Neu-Delhi	<b>W11 EuMC</b> Advances in Multilayer Microwave and Millimetre-wave Technologies and Emerging MCM/SoP Applications						
Singapur	<b>W12 EuMC/EuMIC</b> Terahertz Technologies - from Materials to Devices and their Applications						

	EuMW		Joint EuMC/ EuMW
	EuMC		Joint EuMC/ EuMIC
	EuMIC		Joint EuMC/ EuRAD
	EuRAD		

# CONFERENCE SESSIONS MATRIX - MONDAY

Room	08:30h - 10:10h	Coffee Break	10:40h - 12:20h	Lunch	13:50h - 15:30h	Coffee Break	16:00h - 17:40h	18:00h - 21:00h
Hongkong					S06 EuMC Introduction to Advanced Measurement Techniques for Material Characterization			
Kiew	W13 EuMC RFID Hardware and Physical Layer: Status and Development Directions							
Riga					EuMIC07 CMOS and BiCMOS ICs for Frequency Generation		EuMIC12 CMOS and SiGe Mixers, Phase Shifters, Attenuators and Circulators	
St. Petersburg	EuMIC01 Millimeter-Wave Integrated Receivers		EuMIC06 EuMIC Opening		W20 EuMC Integrated Radar Sensors for Automotive and Industrial Applications			
Foyer St. Petersburg								EuMIC Get Together
Krakau	W14 EUMC Recent Advances in Miniature Multiband, Tunable and Reconfigurable Filters – Results of the FP7 MultiWaveS Project				EuMIC08 Focused Session - Sub-Millimeterwave Monolithic Integrated Circuits			
Prag	EuMIC02 Integrated Passive and Tunable Components				EuMIC09 Silicon mm-Wave Circuits		EuMIC13 Sub-mm-Wave MMICs: Technologies and Applications	
Budapest	EuMIC03 Mixed Signal Integrated Circuits				EuMIC10 Power Amplifier ICs		EuMIC14 Semiconductor Devices and Characterization	
Istanbul	EuMIC04 CMOS Radio Frequency Power Amplifiers				W21 EuMC Chipless Sensing and RFID Technologies Beyond SAW			
Oslo	EuMW European Microwave Student School							
Kopenhagen	W15 EuMC/EuMIC Solid State High Power RF-Amplifiers – Industrial Development Trends in Germany				W22 EuMC RF- and Microwaves as an Enabler for the Internet of Things			
Stockholm	W16 EuMC/EuMIC RF-MEMS RFIC/MMIC Technologies for Highly Adaptive and Reliable RF Systems - Results of the FP7 NANOTEC Project							
Helsinki	EuMIC05 Novel Circuits for Millimeter-Wave Frequency Signal Generation and Transmission				EuMIC11 Focused Session - High Frequency Technologies		EuMIC15 III/V mm-Wave Circuits	
Seoul	W17 EuMC Microwave Sensors and Applications				W23 EuMC/EuMIC Signal Integrity of Digital and Analogue Systems			
Shanghai	W18 EuMC Intelligent Spectrum Management for Energy-efficient and Optimized Access to Flexible Hierarchical Mobile Communication Networks - Results of the BMWi IntelliSpektrum Project							
Singapur	W19 EuMC/EuMIC Ultra High Speed Wireless Communication: Approaches and Ideas to Achieve Wireless 100Gb/s Communication - Introduction of the DFG Priority Program SPP 1655							

	EuMW		Joint EuMC/ EuMW
	EuMC		Joint EuMC/ EuMIC
	EuMIC		Joint EuMC/ EuRAD
	EuRAD		



# CONFERENCE SESSIONS MATRIX - TUESDAY

Room	08:30h - 10:10h	Coffee Break	10:40h - 12:20h	Lunch	13:50h - 15:30h	Coffee Break	16:00h - 17:40h	18:30h - 22:00h
Hongkong	<b>EuMC01</b> Bridging RFID and Nanotechnology				<b>EuMW</b> Special Forum on Internet of Things and Cyber Physical Systems - Women in Microwave Engineering Event	<b>EuMW</b> Reception Women in Microwave Engineering		
Sydney								<b>Welcome Reception</b>
Kiew	<b>EuMC/EuMIC01</b> Switch-Mode Power Amplifiers				<b>EuMC/EuMIC05</b> Innovative Design Approaches for GaN Power Amplifiers		<b>EuMC08</b> Recent Advances in RF-ID Systems and Circuits	
Riga	<b>EuMC/EuMIC02</b> RF MEMS Based Components				<b>EuMC/EuMIC06</b> III/V Transceiver Circuits		<b>EuMC09</b> Recent Advances on Power Dividers	
St. Petersburg	<b>EuMC02</b> Novel Filter Geometries				<b>The Defence &amp; Security Forum</b>		<b>EuMIC20</b> EuMIC Closing	
Istanbul	<b>EuMC/EuMIC03</b> Ferroelectric Materials and Characterisation				<b>EuMIC18</b> CMOS Transceiver Circuits		<b>EuMC10</b> Recent Advances in Filter Technology	
Oslo	<b>EuMW</b> European Microwave Student School							
Kopenhagen	<b>EuMC/EuMIC04</b> Non-Linear Device Characterisation				<b>EuMC04</b> Novel Measurement Techniques and Evaluation		<b>EuMC11</b> Millimeter and High-Power Measurement Techniques	
Stockholm	<b>EuMC03</b> Integrated and Millimeter Wave Antennas 1				<b>EuMC05</b> Integrated and Millimeterwave Antennas 2		<b>EuMC12</b> Antennas - Applications and Concepts	
Helsinki	<b>EuMIC16</b> Advanced Transceiver Building Blocks				<b>EuMIC19</b> MEMS and FBAR RF Tunable Devices		<b>EuMC13</b> 3-D Integration and Packaging	
Tokio			<b>EuMW01</b> EuMW Opening		<b>EuMW</b> Student Challenge			
Shanghai	<b>W24 EuMC/EuRAD</b> Automotive Radar			<b>W24 EuMC/EuRAD</b> Automotive Radar				
Neu-Delhi	<b>EuMIC17</b> Device Modeling and Simulation				<b>EuMC06</b> Electromagnetic Simulation and its Impact on Microwave Design - Special Session to Honour Ingo Wolff on the Occasion of his 75th Birthday		<b>EuMC14</b> Focused Session - Time Domain Electromagnetics	
Singapur					<b>EuMC07</b> Advanced RF Interconnect Technologies		<b>EuMC15</b> Large Signal Device and Circuit Characterisation for Accurate Modelling and Precise Design Verification	
Exhibition Hall		<b>EuMC/EuMIC</b> Poster Session						

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<span style="background-color: #ffd700; color: white; padding: 2px 5px;">EuMIC</span>	<span style="background-color: #d8bfd8; color: white; padding: 2px 5px;">Joint EuMC/ EuRAD</span>
<span style="background-color: #ff4500; color: white; padding: 2px 5px;">EuRAD</span>	

# CONFERENCE SESSIONS MATRIX - WEDNESDAY

Room	08:30h - 10:10h	Coffee Break	10:40h - 12:20h	Lunch	13:50h - 15:30h	Coffee Break	16:00h - 17:40h	17:40h - 19:00h
Hongkong	<b>W25 EuMC/EuMIC</b> High Efficiency Microwave Power Amplifiers and Smart Transmitters							
Kiew	<b>EuMC16</b> Doherty Based PA Design		<b>EuMC23</b> Predistortion Techniques for Power Amplifiers		<b>EuMC30</b> Supply Modulation Techniques and Switched Mode PAs		<b>EuMC37</b> High Efficiency Power Amplifiers	
Riga					<b>EuMC31</b> Digital Communications for Wireless Systems		<b>EuMC38</b> Wireless Technologies and Measurements for Biological Problems	
St. Petersburg	<b>The Defence &amp; Security Forum</b>		<b>EuRAD01</b> EuRAD Opening	<b>The Defence &amp; Security Forum</b>				
Foyer St. Petersburg								The Defence & Security Forum Cocktail Reception
Istanbul	<b>EuMC17</b> New Concepts for Passive Couplers		<b>EuMC24</b> Novel Technologies for Passive Components		<b>EuMC32</b> Recent Development in Passive Components		<b>EuMW</b> Executive Panel Discussion on Production of Electronics in Europe	
Oslo	<b>EuMC18</b> Material Characterisation		<b>EuMC25</b> Network Analysis and Frequency Measurement		<b>EuMW</b> "Presidents' Panel on How Can We Do Better for the Microwave Community?"		<b>EuMC/EuRAD01</b> Teaching	
Kopenhagen	<b>EuMC19</b> Localisation Algorithms		<b>EuMC26</b> Microwave Biosensing		<b>EuMC33</b> Microwave Systems for Characterisation and Heating		<b>EuMC39</b> Measuring and Communication Techniques	
Stockholm	<b>EuMC20</b> Focused Session - Focusing Antenna Systems at mm and Sub-Millimeterwave		<b>EuMC27</b> Focused Session - Leaky Wave Antennas		<b>EuMC34</b> Numerical Modeling and Optimisation		<b>EuMC40</b> Sub-Millimeter and Millimeter-Wave Communications and Sensing	
Helsinki	<b>EuMC21</b> Focused Session - Advances on Carbon-based Nano-Antennas		<b>EuMC28</b> Far-Field and Near-Field Techniques for Wireless Power Transfer and Energy Harvesting		<b>EuMC35</b> Multiband and UWB Antennas		<b>EuMC41</b> Novel Materials and Reconfigurable Antennas	
Shanghai	<b>EuMC22</b> Special Session Eastern Europe 1 - Microwave Spectroscopy and Broadband Systems		<b>EuMC29</b> Special Session Eastern Europe 2 - Emerging Materials for Microwave Applications		<b>EuMC36</b> Special Session Eastern Europe 3 - New Concepts for Filters and Antennas			
Neu-Delhi	<b>W26 EuRAD</b> Advances in the State-of-the-Art of 76-81 GHz Automotive Radar and Current Issues in Increasing their Commercial Deployment							
Singapur	<b>W27 EuRAD</b> Synthetic Aperture Radar							
Exhibition Hall		<b>EuMC</b> Poster Session						
Corridor to Exhibition Hall							<b>EuMW</b> Student Design Competition Measurement Campaign	

	EuMW	Joint EuMC/ EuMW
	EuMC	Joint EuMC/ EuMIC
	EuMIC	Joint EuMC/ EuRAD
	EuRAD	

# CONFERENCE SESSIONS MATRIX - THURSDAY

Room	08:30h - 10:10h	Coffee Break	10:40h - 12:20h	Lunch	13:50h - 15:30h	Coffee Break	16:00h - 17:40h
Hongkong			<b>EuMC/EuRAD05</b> Beam Forming Techniques for Phased Array Antennas				
Kiew	<b>EuMC42</b> Emerging Microwave Technologies		<b>EuMC47</b> Emerging Microwave Applications		<b>EuRAD04</b> Radar for Space and Security Applications		
Riga					<b>EuMC54</b> Wireless Technologies for Industrial Applications		
St. Petersburg	<b>EuMC/EuRAD02</b> Advances in Six-Port Technology		<b>EuRAD03</b> MIMO Systems		<b>EuRAD05</b> Radar Subsystems and Phenomenology		
Istanbul	<b>EuMC43</b> Tunable and Reconfigurable Filters 1		<b>EuMC48</b> Wideband and UWB Filters		<b>EuMC55</b> Tunable and Reconfigurable Filters 2		
Oslo	<b>EuMW</b> European Microwave Doctoral School						
Kopenhagen	<b>EuMC/EuRAD03</b> Millimeter-Wave Phased Arrays for Communications and Radar		<b>EuMC/EuRAD06</b> Dielectric and Lens Antennas		<b>EuMC/EuRAD07</b> Antenna Arrays for Radar and Radiometry		
Stockholm	<b>EuRAD02</b> Multi Sensor Radar and Compressive Sensing		<b>EuMC49</b> Multi-Domain Multi-Source Wireless Energy Systems		<b>EuMC56</b> Non-Linear, Controllable, and Terahertz Metamaterials		
Helsinki	<b>EuMC/EuRAD04</b> Microwave Imaging Principles and Systems		<b>EuMC50</b> Microwave Applications of Metamaterials		<b>EuMC57</b> Metamaterial-Based Antennas		
Tokio							<b>EuMW02</b> EuMW Closing
Shanghai	<b>EuMC44</b> Signal Generators		<b>EuMC51</b> Transceiver Components		<b>EuMC58</b> Exploring White Spaces by SDR/CR Technology		
Neu-Delhi	<b>EuMC45</b> Special Session on APMC		<b>EuMC52</b> Physics-Based Modeling of Microwave Structures		<b>EuMC59</b> Hybrid Analytical-Numerical Electromagnetic Modeling		
Singapur	<b>EuMC46</b> Focused Session - Microwaves in Agriculture, Environment and Earth Observation (MAGEO)		<b>EuMC53</b> Focused Session - Energy Harvesting and Wireless Power Transfer		<b>EuMC60</b> Focused Session - Ultra Fast Real Time EM Spectrum and EM Interference Measurement Techniques		
Exhibition Hall		<b>EuMC/EuRAD</b> Poster Session					
Corridor to Exhibition Hall					<b>EuMW</b> Student Challenge Poster Presentation		

	EuMW		Joint EuMC/ EuMW
	EuMC		Joint EuMC/ EuMIC
	EuMIC		Joint EuMC/ EuRAD
	EuRAD		

# CONFERENCE SESSIONS MATRIX - FRIDAY

Room	08:30h - 10:10h	Coffee Break	10:40h - 12:20h	Lunch	13:50h - 15:30h	Coffee Break	16:00h - 17:40h
Kiew	<b>EuRAD06</b> UWB Imaging		<b>EuRAD11</b> SAR and ISAR				
Riga	<b>W28 EuMC</b> What are the Roles of Photonics and Electronics in Millimeter-Wave Multigigabit/s Wireless Communications?				<b>S08 EuMC/EuRAD</b> Wide Band RF Technologies and Antennas at Microwave and Millimetre-Wave Frequencies		
St. Petersburg	<b>EuRAD07</b> Front-End Subsystems		<b>EuRAD12</b> Short Range Systems		<b>EuRAD16</b> EuRAD Closing		
Foyer St. Petersburg				<b>EuRAD Lunch</b>			
Krakau	<b>W29 EuMC</b> Technologies for Embedded Wireless Systems				<b>S09 EuRAD</b> Radar Waveform Design and Analysis		
Prag	<b>S07 EuRAD</b> Electronic Scanned Arrays Design				<b>W36 EuRAD</b> Status and Trends for Active Electronically Scanning Arrays for Radar and Communication		
Budapest	<b>W30 EuMC</b> Photonics: From Devices to Circuits and Systems Including Testing						
Istanbul	<b>EuRAD08</b> Industrial Radar		<b>EuRAD13</b> Automotive Radar				
Oslo	<b>EuMW</b> Doctoral School						
Kopenhagen	<b>EuRAD09</b> Focused Session - Future Radar		<b>EuRAD14</b> Focused Session - Polarimetric/ Interferometric Synthetic Aperture Radar POLinSAR		<b>W37 EuMC/EuRAD</b> Radio Intelligence and Reconnaissance		
Stockholm	<b>EuRAD10</b> Doppler and Micro-Doppler Processing		<b>EuRAD15</b> Passive Radar				
Helsinki	<b>W31 EuMC</b> Do You Have Confidence in Your RF Waveforms? Developments in Waveform Metrology and Uncertainty Propagation for RF and Digital Signals				<b>W38 EuMC</b> Software Defined and Reconfigurable Radio		
Seoul	<b>W32 EuMC</b> PCB Design up to 67 GHz				<b>W39 EuMC/EuRAD</b> Introduction to Ultra-Wideband Localization		
Shanghai	<b>W33 EuMC</b> Metamaterials in Communications and Sensing: Reality or Fiction?						
Neu-Delhi	<b>W34 EuMC</b> Current and Future Use of Spectrum by PMSE						
Singapur	<b>W35 EuMC</b> THz Systems and Components in Communications, Sensing and Imaging						

	EuMW		Joint EuMC/ EuMW
	EuMC		Joint EuMC/ EuMIC
	EuMIC		Joint EuMC/ EuRAD
	EuRAD		

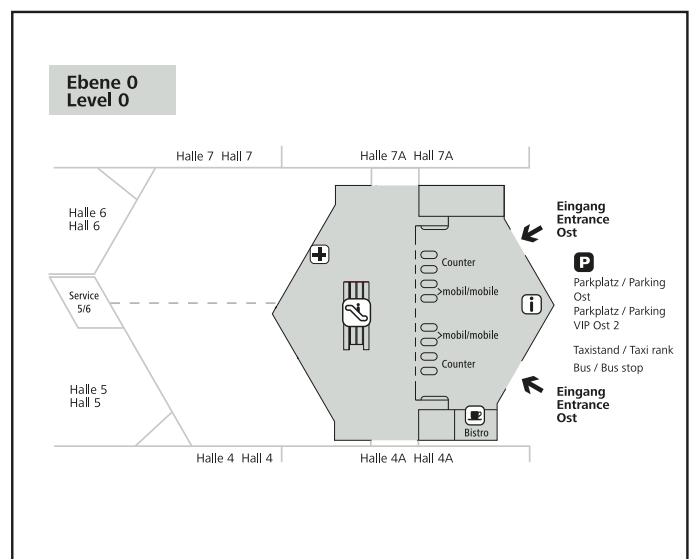
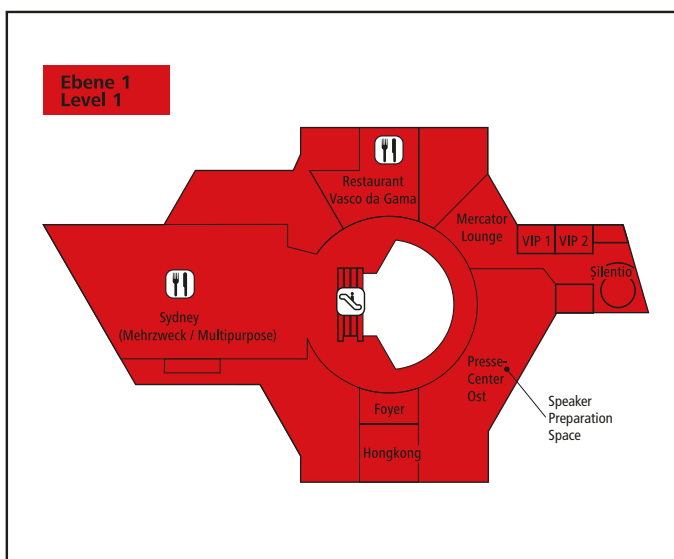
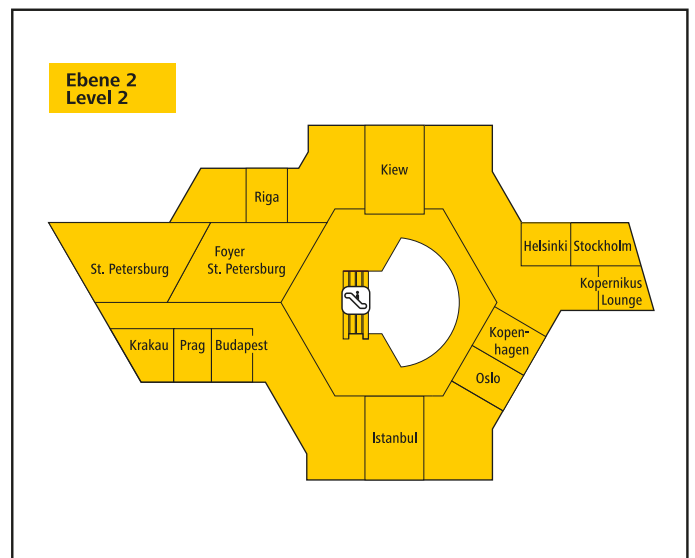
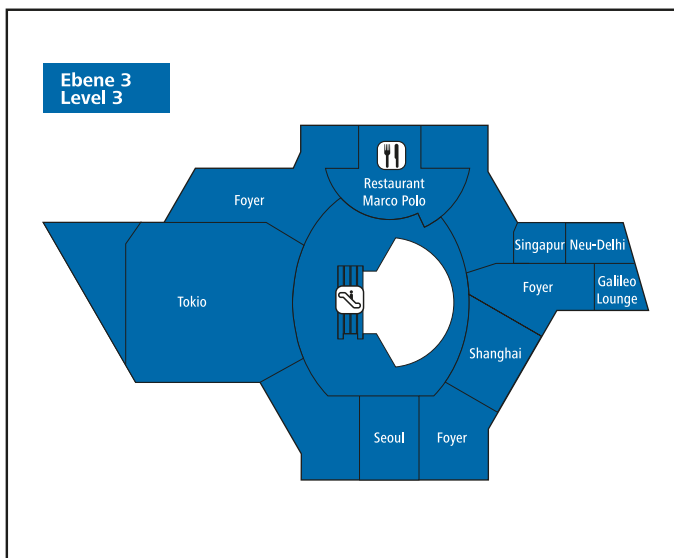
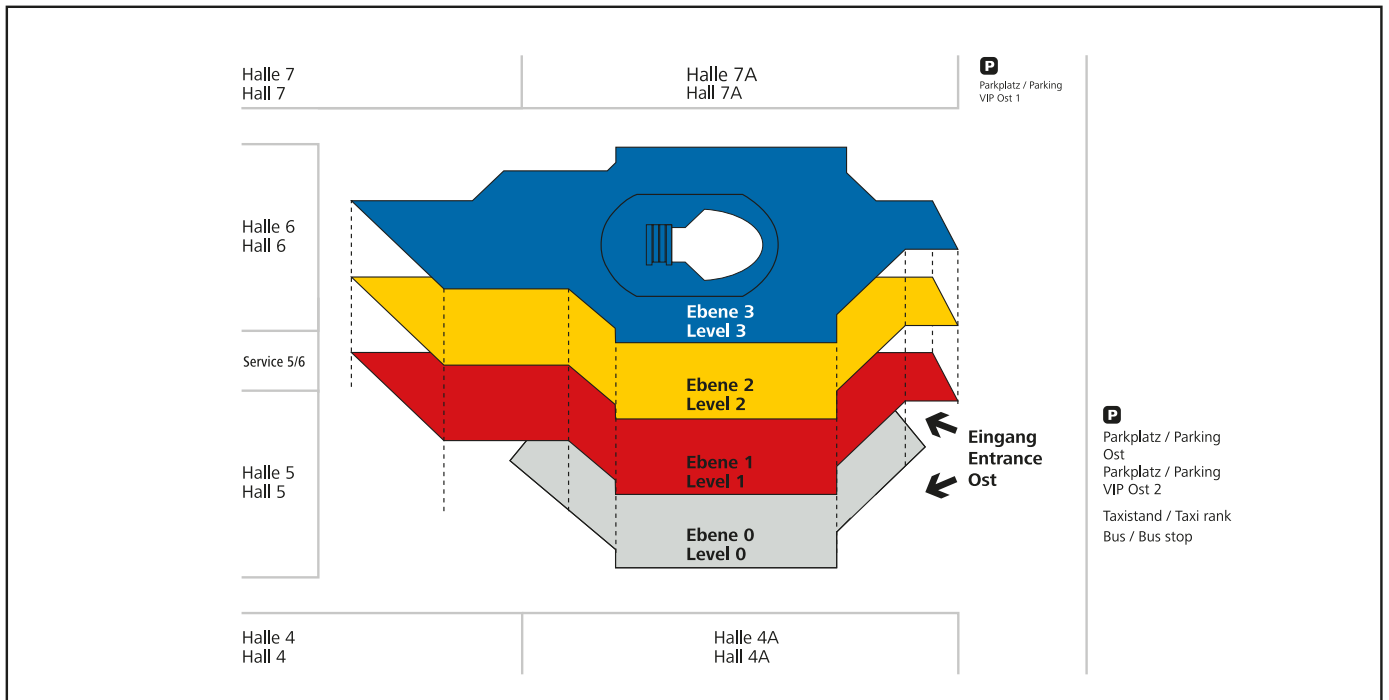


## EXHIBITOR WORKSHOP MATRIX

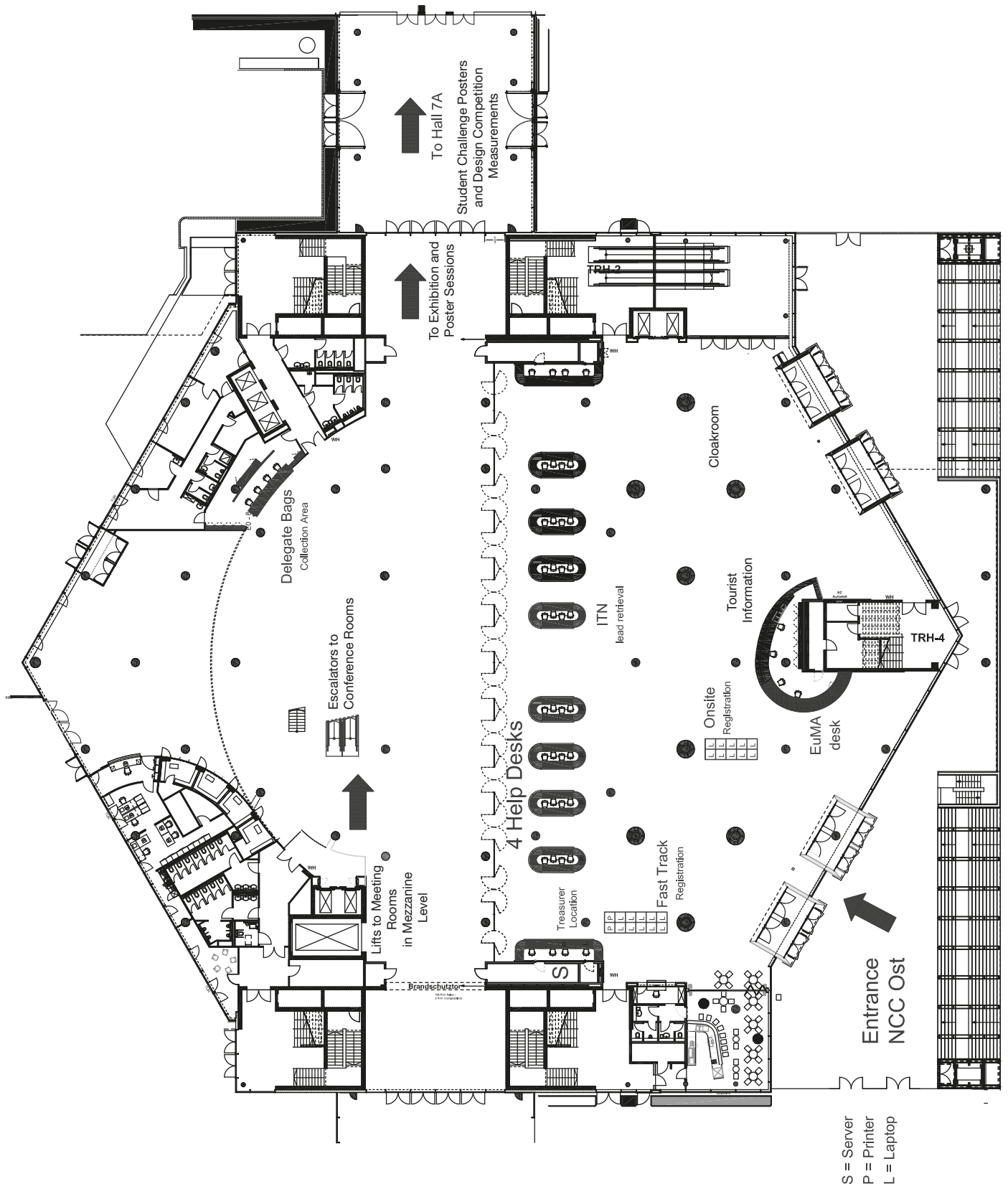
Date	Room		
Tuesday 8th October	Budapest	10:30h - 13:30h Rohde & Schwarz Workshops	14:00h - 15:00h Rohde & Schwarz Workshops
	Prag	10:00h - 11:40h Anritsu Workshops	13:00h - 16:40h Anritsu Workshops
	Krakau	09:30h - 12:00h AWR Workshops	13:00h - 15:30h AWR Workshops
Wednesday 9th October	Budapest	10:00h - 12:15h Rohde & Schwarz Workshops	13:30h - 17:00h Rohde & Schwarz Workshops
	Prag	09:00h - 13:00h Ansys Workshops	14:00h - 18:00h Ansys Workshops
	Krakau	09:00h - 12:00h National Instruments Workshops	13:00h - 18:00h National Instruments Workshops
Thursday 10th October	Budapest	10:30h - 12:30h Rohde & Schwarz Workshops	
	Prag	9.00h – 12.00h 8.30h Registration Agilent Workshops	13:30h – 16:30h 13.00h Registration Agilent Workshops

- Anritsu Workshops
- National Instruments Workshops
- Rohde & Schwarz Workshops
- Ansys Workshops
- AWR Workshops
- Agilent Workshops

# FLOOR PLAN



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## EXHIBITOR LIST

AA-MCS	ETS-Lindgren	GmbH
Aaronia AG	EuMW 2014	MM Microwave
Acal Bfi Germany GmbH	Farran Technology Ltd.	Municom GmbH
AFT Microwave GmbH	Ferrite Microwave Technologies	National Instruments
Agilent Technologies	Flexiguide	NovaCap
Aldetec Microwave Inc.	Focus Microwaves Inc.	NXP Semiconductors
Analog Microwave Design (AMD)	Fraunhofer FHR	OMMIC SAS
Anritsu EMEA Limited	Fraunhofer IAF	Optiprint AG
ANSYS Germany GmbH	Germania Elektronik	Pascall Electronics Ltd.
Antenna Giken Co. Ltd.	Gerotron Communication GmbH	Phase 2 Microwave Ltd.
API Technologies Corp.	Gigacomp GmbH	PICO Technology Ltd.
AR Europe Ltd.	Globes Elektronik GmbH	Pole Zero
Arlon MED	HF-Praxis	Premix Oy
Artech House	High Frequency Electronics	Printech Circuit Laboratories Ltd.
Aspocomp Group Oyj	Hittite Microwave Deutschland GmbH	Q-Par Angus Ltd.
AT Wall Company	Huang Liang Technologies Co. Ltd.	Quest Microwave Inc.
Auriga Microwave	HUBER+SUHNER AG	QWED Sp z.o.o.
Aurora Software And Testing SL	IEEE Communications Magazine	Radar Systems Technology Inc.
AWR	IEEE Microwave Magazine	RFHIC Corp.
AXON Kabel GmbH	IHP GmbH	RFHIC USA Corp.
BAE Systems	IMS 2014	Rogers Corp.
BL Microwave Ltd.	IMST GmbH	Rohde & Schwarz
BONN Elektronik GmbH	Infineon Technologies AG	Rosenberger Hochfrequenztechnik GmbH & Co. KG
BONN Hungary Electronics	Ingun Prüfmittelbau GmbH	Schmid & Partner Engineering AG
BSC Filters Ltd.	Interference Technology	Schott AG, Electronic Packaging
BSW TestSystems & Consulting AG / bv	Isola GmbH	Selex
Cambridge University Press	K&L Microwave	SHF Communication Technologies AG
Cascade Microtech Inc.	Kuhne Electronic GmbH	Signal Technology
Ceramic & Microwave Products (CMP)	L-3 Communications Narda Microwave-East	Sonnet Software Inc.
CETC-41	Leader Tech Inc.	Southwest Microwave Inc.
Chengdu Tiger Microwave Technology Co. Ltd.	Link Microtek Ltd.	Spinner GmbH
Chin Nan Precision Electronics Co. Ltd.	LPKF Laser & Electronics AG	Sumitomo Electric Europe Ltd.
Chinese Pavilion	M/A-COM Technology Solutions	Syfer
Copper Mountain Technologies LLC	Maury Microwave	Teledyne
Crane Aerospace & Electronics	Mega Industries LLC	Teledyne LeCroy GmbH
Cree Inc.	MegaPhase	Teledyne Microwave Solutions
CST-Computer Simulation Technology AG	Melatronik Nachrichtentechnik GmbH	Teledyne Relays
Daa Sheen Technology Co. Ltd.	Merrimac Industries	Telemeter Electronic GmbH
Diconex	Mician GmbH	TriQuint Semiconductor
Dielectric Laboratories Inc.	Micro Apps	United Monolithic Semiconductors (UMS)
Dong Jin Technology Innovation Co. Ltd.	Micro Systems Engineering GmbH & Co	Varioprint AG
Dow-Key	Microwave Engineering Europe	VIA electronic GmbH
Elbit Systems EW and SIGINT-Elisra	Microwave Journal	Voltronics Corp.
Electro Rent Europe NV	Microwave Product Digest	Wainwright Instruments GmbH
Elspec GmbH	Microwaves & RF	Weinschel Associates
EM Software & Systems GmbH	MIG Microwave Innovation Group	Wiley
Emerson & Cuming Microwave Products	Mitsubishi Electric Europe BV	WIN Semiconductors Corp.
ERM-Mikrowellentechnik	MIWEKO-Mikrowellen und Hochfrequenz Vertriebs	WL Gore & Associates GmbH

The Exhibitor List is correct at the time of going to press. It is subject to change.

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