EUROPEAN MICROWAVE WEEK 2019
PARIS EXPO PORTE DE VERSAILLES, PARIS, FRANCE
1 place de la Porte de Versailles
29TH SEPTEMBER - 4TH OCTOBER 2019

CONFERENCE PROGRAMME
EUROPE’S PREMIER MICROWAVE, RF, WIRELESS AND RADAR EVENT

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*European Microwave Week Future Events*

*EuMW 2020 - Utrecht*

*EuMW 2021 - 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*
Welcome to the 22nd European Microwave Week

Welcome to France where the Declaration of the Rights of Man and the Citizen was written in 1789 and Welcome to Paris “La Ville Lumière”! It is our great pleasure to welcome you to the 22nd European Microwave Week (EuMW) to be held at the Paris expo Porte de Versailles, Paris, from Sunday 29th September 2019 to Friday 4th October 2019.

“Universality through microwave” is our motto to express how the microwave technologies are fundamental for all human beings who will have to face the challenge of integrating artificial intelligence into their modern way of communicating.

The European Microwave Week was initiated by the European Microwave Association (EuMA) in 1998. EuMW 2019 continues the series of successful microwave events held in Amsterdam, London, Munich, Milan, Manchester, Nuremberg, Paris, and Madrid. The week comprises:
- the 49th European Microwave Conference (EuMC) to be held from 1st to 3rd October 2019,
- the 14th European Microwave Integrated Circuits Conference (EuMIC) which will take place from 30th September to 1st October, and
- the 16th European Radar Conference (EuRAD) which will run from 2nd to 4th October.

Thanks to the excellent work of the 434 reviewers, the 110 members of the Technical Program Committee were able to prepare 78 technical regular sessions representing 391 presentations. The programme is complemented by 24 Workshops and 5 Short Courses covering the most relevant topics ranging from Antenna Booster Technology for IoT Applications to Multibeam Antennas, from Power Amplifiers to Automotive Radar, and from Modern Advances in Computational Imaging at Microwave and Millimetre-Wave Frequencies to High Data Rate Communications. Two other Special Sessions highlight the research activities in Latin America and in the Asia Pacific Region.

This year’s programme will boost and intensify the interaction between industry and academia thanks to 32 keynote presented by internationally recognized industrial experts who will open selected sessions with presentations on challenges and state-of-the-art achievements in their field.

Internationally renowned speakers will discuss the latest trends and developments in their keynotes at the conferences Plenary Sessions. At the Opening Session of the EuMW, special talks will be dedicated to technical « souvenirs » of 50 years of EuMC from London in 1969 to this year’s edition. Then, Paolo Di Prisco, Wireless Transport Product Strategy leader from NOKIA in Italy will give a presentation on “Beyond 100GHz transport technology and applications”. The EuMIC opens with presentations by Pr. Dietmar Kissinger, from Ulm university, Germany, outlining the use of “BiCMOS Integrated Millimeter-Wave Circuits for Short-Range Wireless Communications and Sensing” and by Yves Mancuso, Distinguished Engineer in Thales Defence Mission Systems, France, on “Trends in Active Antennas and T/R Modules for Radar and Multi-Function Systems”. Nataanay Ayllon, Head of the RF Equipment and Technologies Section at ESA-ESTEC, The Netherlands, has accepted the invitation to close the EuMIC with a presentation on the “Trends in microwave technologies for space applications”. During the EuRAD Opening, which is held in conjunction with the DSS Forum, Florent Jangal, Radar Architect from the French Defence Procurement Agency (Direction Générale de l’Armement) will present some research and development activities supported by the Defence Innovation Agency. Then, Thomas Carpenter, Ground MFR Product Line Manager, from Thales Land & Air System, France, will present the new 5F500 radar for the next generation of FTI frigates for the French Navy. Dominic Walker, Chief Executive Officer at Aveillant Ltd, Great Britain, will describe the latest advances in Holographic Radar at the EuRAD Closing Session. The EuMW will close with a presentation about the “Soil Moisture and Ocean Salinity: A Microwave Instrument in Space” by François Deborgies, RF Technology Advisor at ESA-ESTEC, The Netherlands.

A selection of workshops and short courses presented by internationally recognized lecturers will be offered in addition to the three conferences. Moreover, the Defence, Security and Space (DSS) Forum continues to be a major event. This year the Forum will focus on New Radio Architectures and their Evolution for Satellite Constellations. The DSS Forum organisers have succeeded in attracting high-level speakers to discuss the need of new radio architectures using less power and having lower latency while still being low cost. Keynote speakers will consider the state of the art of leading technologies and systems for satellite constellations, the estimated evolution of technologies and trends and consider expected functionalities to address future challenges.

For the first time, a new automotive forum is organised to provide an open platform for industrial experts to discuss technical aspects and market issues in the area of microwaves in automotive industry. The forum will focus on hot topics such as system architectures for advanced radar, advanced methods for radar interference suppression, artificial intelligence in radar signal processing and Radar-based generation of digital maps.

Several events will occur in parallel with the conference sessions. The traditional Women in Microwave Engineering (WiM) event, co-sponsored by the IEEE MTT-Society, will focus on the topic of Instrumentation and Metrology, and both women and men are welcome. Attendees will have the chance to follow in the footsteps of inventors of progress and explore a one-of-a-kind repository of scientific knowledge visiting the “Musée des Arts et Métiers – CNAM”. For the third time, the WiM attendees will have the opportunity to interact with high school students who are invited to participate in this event. Early registration is encouraged, since the number of participants is limited.

For the younger generation, the EuMW 2019 will propose a very stimulating Student Challenge, competed on place, expected as successful as in previous years. Another event, the Student Design Competition will comprise 3 thrusts (PAs and filters) to be prepared in advance. Prototypes will be measured in front of an industrial panel. Two Schools dedicated to Software Defined Radio, with hands-on activities, will be proposed with a full-day high level lectures for master students and a half-day on the latest research topics for PhDs. The Career Platform, finally, will continue to offer students opportunities for speed dating with industrial recruiters.

Another important event of EuMW is the European Microwave Exhibition, the largest traditional microwave and RF trade show in Europe. EuMW 2019 will see an estimated 5,000 visitors, with 1,700 – 2,000 conference delegates and in excess of 300 international exhibitors.

We will offer several social events such as Monday’s EuMIC Get-Together, Tuesday’s Welcome Reception sponsored by Keysight Technologies, and the EuRAD lunch on Friday.

Enjoy Paris, the City of Lights, its rich and attractive cultural scene with shows and activities, festivals, expositions, new gallery openings, performing arts, art shops and its emblematic museums Le Louvre, Le Musée Rodin and more.

WELCOME MESSAGES

Denis Barataud
General Chair
Christian Person
General Co-Chair
Promoting European Microwaves

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For more information and contact, visit: www.eumwa.org

Join the EuMA Community
On behalf of the European Microwave Association (EuMA), I warmly welcome you to the 22nd edition of the European Microwave Week in Paris! EuMA stands up for our microwave and RF community. We promote our microwave discipline wherever we can. We foster networking between scientists, engineers, decision makers and end-users. We pursue this in various ways but our main asset and key event to do so is the European Microwave Week (EuMW).

Most of you are familiar with EuMA, but for those who aren’t yet: We offer a membership to all working in the field of microwaves. Our 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 Middle East. If you are not a EuMA member yet, I encourage you to join. Among other benefits, you will enjoy reduced fees for attending the Week and other EuMA-sponsored conferences and workshops as well as the IEEE International Microwave Symposium. Moreover, you will have access to the internal part of our website, which provides an archive of publications, the on-line version of the International Journal on Microwave and Wireless Technologies and further 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 3 conferences composing 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 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 organised by our long-standing partner Horizon House / Microwave Journal forms an integral part of it.

As everybody knows, preparing and hosting the EuMW is a major effort, from paper submission and review to on-site organisation at the venue, and this is accomplished by a team of volunteers year by year. Therefore, my special and sincere thanks go to Denis BARATAUD and Christian PERSON 2019 General Chair and Vice-chair; to Nathalie DELTIMPLE, General TPC Chair; to Cédric QUENDO, Rozenn ALLANIC and Fabien NDAGIJIMANA Workshops and Short Courses Chair and Co-chairs; to Serge VERDEYME Treasurer; as well as to Stéphane BILA and Anthony GHIOTTO, EuMC Chair and TPC Chair, to Farid MEDJDOUB and Jean-Christophe NALLATAMY, EuMIC Chair and TPC Chair; and to Philippe EUDELINE and Jean-Yves DAVIGNAC, EuRAD Chair and TPC Chair - just to name a few on behalf of the entire team. Thank you!

The European Microwave Week is back again in Paris after the successful events in 2015, 2010, 2005 and in 2000. All members of the team have been working hard to set up an outstanding technical and scientific programme for you and I am sure they will make your stay in Paris exciting, enjoyable, and a rewarding experience of French hospitality.

I would like to cordially invite you to EuMW 2019. Come to the wonderful city of Paris. Join us at EuMW2019 and discover information you won’t get anywhere else. Take the opportunity to meet and talk to colleagues and friends from all over the world you don’t see every day. I hope to see you in Paris! And most of all: Get involved in our community!

Welcome from the President of the European Microwave Association

Frank van den Bogaart
President
European Microwave Association
We are extremely pleased to welcome you in Paris for this new edition of the European Microwave Conference. This year is very special since we are celebrating 50 years of this flagship event of the European Microwave Week.

It is therefore a great honor for us to welcome delegates from around the world for the main annual European forum, which will allow the best researchers in the field of microwave, millimeter wave, and terahertz systems and technologies, to present the state of the art and future trends. These topics related to high frequencies, from materials and technologies to circuits, systems and applications, will be addressed in all their aspects: theory, simulation, design and measurement. EuMC will also share several sessions with EuMIC, in the field of active devices, circuits and subsystems (low noise circuits and modules, tuning and reconfigurable circuits and systems, efficiency enhancement and linearization for power amplifiers, microwave photonic components, circuits and systems...) and with EuRAD, in the areas of millimeter waves, THz technologies and systems, antennas and propagation (millimeter-wave, THz technologies and systems, antenna design and characterization, passive and active phased arrays, Tx / Rx module technologies...).

The EuMC opening session will take place on Tuesday 1st October at 10:50 and the closing session on Thursday 3rd October at 13:50. These sessions will be common to EuMC and EuMW and will be presented during the welcome address of the EuMW General Chair. They will include presentations by distinguished speakers and award ceremonies, for the EuMC Microwave Award and the EuMC Young Engineer Awards.

EuMC TPC received 469 submissions; and 54% of these contributions were selected to build a dense and high-quality conference program consisting of workshops, short courses to be held on Sunday, Monday and Wednesday, as well as special sessions that will be held in parallel with ordinary sessions from Tuesday to Thursday.

Special oral sessions will be held to highlight invited speakers from two EuMC sister conferences: the Asia-Pacific Microwave Conference (APMC) and the Latin-America Microwave Conference (LAMC).

Each of the 37 ordinary oral sessions will allow five speakers to present their most recent results. During these sessions, 22 Industrial Keynotes (including 8 shared with EuMIC and EuRAD) will allow industry leaders to expose market needs and trends.

Interactive forums will be organized on Tuesday, Wednesday and Thursday in the exhibition area, allowing participants to listen, discuss and exchange ideas.

The exhibition will run parallel to the conference, providing us with the opportunity to acquire updated information from companies active in our fields of interest.

We hope you will enjoy the conference.
Welcome to the 14th European Microwave Integrated Circuits Conference, EuMIC 2019

It is a great pleasure for us to welcome you to Paris, France, for the 14th European Microwave Integrated Circuits (EuMIC 2019) Conference that will be held on Monday 30th September and 1st October 2019. The EuMIC conference has been jointly organised by the GAAS® Association and EuMA since 2006. The city of Paris is proud to receive the visit of the Passionate European Microwave Community.

This conference is the result of huge efforts made by the panel of reviewers and TPC members. We would like to thank all of them. We also want to thank all authors, workshop and short-course organisers for their submissions and proposals, which has allowed to guarantee that this event will have great interest and high quality levels. We would especially like to acknowledge the extremely generous help received from previous EuMIC teams.

The aim of the conference is to promote the discussion of recent developments and trends, and to encourage the exchange of scientific and technical information covering a broad range of high-frequency related topics, from materials and technologies to integrated circuits and applications, that will be addressed in all of their aspects: theory, simulation, design and measurement.

The scientific panel is composed of 10 regular EuMIC sessions and 2 EuMC/EuMIC joint sessions covering topics from device to system level. Our intention is to stimulate the scientific discussion among experts from competing and complementary semiconductor technologies addressing the microwave to Terahertz frequency regimes, encompassing all aspects from device technologies, modelling and characterization, to the application oriented design of integrated circuits. The interactive poster session has been organised jointly with the EuMC and will be held on Tuesday, enjoying the lively atmosphere of the Exhibition. Several high quality and topical workshops complement the EuMIC technical sessions and you are strongly encouraged to register for those of interest to you. Finally, it is worth mentioning that EuMIC has included 5 relevant Industrial Keynotes thanks to the kind participation of prominent speakers from OMMIC, TTI Norte, EpiGaN and ENKRI. Invited manufacturers will take the floor during the traditional ‘Foundry Session’ hosted by the GAAS® Association.

The EuMIC Opening and Closing plenary sessions will feature three invited speakers, world-class in their fields. During the Opening ceremony Prof. Dr.-Ing. habil. Dietmar Kissinger, Institute of Electronic Devices and Circuits, Ulm University, Germany will present on BiCMOS Integrated Millimeter-Wave Circuits for Short-Range Wireless Communications and Sensing. In addition, Yves Mancuso, Distinguished Engineer in Thales Defence Mission Systems (TDMS), Microwave and AESA Technologies Design Authority, Elancourt Paris, will address the Trends in Active Antennas and T/R Modules for Radar and Multi-Function Systems. During the Closing session Natanael Ayllon, Head of the RF Equipment and Technologies Section at European Space Agency, ESTEC, The Netherlands, will talk about the Trends in microwave technologies for space applications.

Also during the Closing ceremony, the best contributed paper to EuMIC 2019 and the Young Engineer Prize will be awarded by the EuMIC Technical Program Committee and the EuMW Steering Committee. Three GAAS® Association PhD student fellowships will also be celebrated.

The members of the Organising Committee of this EuMIC 2019 have done our utmost to make this event possible. EuMIC 2019 is from now on mostly in your hands and we hope you will enjoy days of fruitful discussion, knowledge exchange and networking. We are looking forward to welcoming you in Paris.

Farid MEDJDOUB
EuMIC 2019 Chair
University of Lille – IEMN – France

Hervé BLANCK
EuMIC Co-chair
UMS-GmbH, Ulm - Germany

Jean-Christophe NALLATAMBY
EuMIC TPC Chair
University of Limoges, CNRS, XLIM – France

Joaquin PORTILLA
EuMIC TPC Co-Chair
University of the Basque Country - Spain
It is a pleasure for me, on behalf of the EURAD 2019 organisation team, to welcome you, in Europe, to this important event for Radar professionals, scientists, researchers and students. The European Radar Conference reaches this year its 16th edition, demonstrating the importance of such event to share state of the art on numerous topics with the Radar community and being a key element within the European Microwave Week.

This year we are proud to host the EuRAD in Paris, at Porte de Versailles, from 2nd to 4th October. During these days, top professionals will present their latest research and development, and discuss about the present status and future trends in the fields of radar technology, system design and performance, radar components, radar propagation and target modelling, advanced signal processing techniques, as well as the most innovative radar architectures, concepts and applications.

On Wednesday October 2nd, in the opening session, we will enjoy the presence of two keynote Speakers, one from the French defence procurement agency (DGA) and the second one from Thales. The first speaker, Florent Jangal from the French MoD, will present the actual and future visions about electromagnetic detection and electronic warfare challenges. Then the second speaker, Mr Thomas Carpentier from Thales Land & Air System, France, will present the new SF500 radar for the next generation of FTI frigates for the French Navy, in which advanced concepts are included. For the closing session our keynote speaker, Mr Dominic Walker from Aveillant, Great Britain, will describe the latest advances in Holographic Radar.

This year, 145 papers were submitted to the conference, and after a rigorous selection process, 83 papers have been accepted and were organised into almost 17 oral sessions and two interactive sessions, some of them shared with EuMC. Prominent industrial keynotes speakers will open seven of these sessions, showing the latest industry approaches to the addressed technologies. A new event is organized in EuMW2019 about automotive subjects and will be held on 30th of September. The objectives of this automotive forum are to discuss technical aspects and market issues in the area of microwaves in automotive industry. Many points will be discussed through 20-minute presentations, as system architectures for advanced radar systems, radar interference suppression, artificial intelligence in radar signal processing, fusion or radar and camera, radar-based generation of digital maps.

An attractive topical workshops program will be running alongside the conference programme, some of them shared with EuMC. Three workshops will be focused on radar topics with one on advanced passive radar techniques and applications, the second one will deal with the new radar concepts and processing for autonomous driving while the third one will address news concepts in integrated circuits and transceiver frontends for mm Wave automotive radar. We should have also two workshops with wider topics as the interference risk between high frequency GHz radar devices or the test procedures and validation sensor functions for automotive radar and autonomous driving. One short course will address the modern advances in computational imaging.

Finally, we would like to express our gratitude to all the reviewers and the TPC members for undertaking their task in a professional and timely manner, and for their contribution to the success of the conference. We look forward to meeting you in our nice city, at the EuRAD 2019 conference, and wish you a very pleasant stay in Paris.
Welcome from the General TPC Chair

This year the European Microwave Week is held in Paris and we are thrilled about this excellent opportunity for the microwave community to meet, share advances and interact. As General Technical Programme Committee Chair, I am grateful for the excellent scientific revision and management of the submitted manuscripts by the reviewers and TPC members, meeting all the required deadlines. The total number of contributions submitted was 737. The reviews were performed by 109 TPC members and more than 434 reviewers, listed in the programme book. The TPC meeting was held in April 6th in Bordeaux, where an intense scientific activity took place in a friendly atmosphere. The TPC members and reviewers are fundamental to preserve the high scientific standards of the EuMW and I strongly recognize their dedication, which guarantees a thorough and fair decision, typically based on six reviews per paper. Eventually, a total of 391 regular papers were accepted (297 oral papers and 94 posters), arranged in 74 oral sessions (including special, opening and closing) and 6 interactive sessions. In addition to the regular papers, and following an initiative started in the past EuMW, there are 32 invited industrial keynotes, which will open some of the technical sessions of the three conferences.

It has been a unique opportunity to chair the TPC, both scientifically and personally. Going through all the submitted papers for the initial review setup, we have been able to appreciate the high global quality of the contributions and the significant advances in the broad diversity of topics covered by EuMW. At a personal level, I have had the pleasure to fruitfully interact with TPC members and reviewers for an optimum execution of the revision procedure. I am grateful to the previous TPC chairs and EuMW teams for their precious help and availability, especially to Prof. Almuneda Suarez and Juan-Mari Collantes for their timely answers to numerous questions and the valuable documents they provided us. I would also like to acknowledge Prof. Lorentz-Peter Schmidt for organising and chairing the hand-over meetings, as well as the members of the EuMA BoD for their useful comments and suggestions.

The TPC has been managed with the CONVERIA software. I want to thank Marc van Heijningen, Cristina Andrei, Matthias Rudolph and the staff from CONVERIA, who have actively supported us during the whole review process and TPC meeting. Their help has been invaluable. I am also very grateful to the three conference TPC Chairs and co-Chairs, the Chairs of the Workshops and Short courses, the Chairs of the Special and Focus Sessions, and the whole EuMW 2019 team who have been extremely responsive during the whole process.

I wholeheartedly hope that you will enjoy the technical programme of EuMW 2019 and the lively city of Paris, with its renowned museums and historic neighborhoods and landmarks.

My warmest welcome to EuMW 2019 in Paris, France!

Dr. Nathalie DELTIMPLE
EuMW General TPC Chairwoman
Awards Coordination Co-Chair
Bordeaux INP – IMS – France

SPECIAL ISSUE

International Journal of Microwave and Wireless Technologies: EuMW 2019 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 eight 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 European Microwave Week 2019.

The authors of several 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 Anthony Ghiotto, TPC chair of EuMC 2019, Jean-Christophe Nallatamby, TPC chair of EuMIC 2019, and Jean-Yves Dauvignac, TPC chair of EuRAD 2019. Accepted papers will be published online at http://journals.cambridge.org/MRF and can be referenced using their DOI (Digital Object Identifier). Once all submissions are received, the articles will be collated into the Special Issue and published in print, which is expected to appear in June 2020.

Anthony Ghiotto and Alexandru Takacs - EuMC 2019 TPC Chair and Co-Chair
Jean-Christophe Nallatamby and Joaquin Portilla - EuMIC 2019 TPC Chair and Co-Chair
Jean-Yves Dauvignac and Stéphane Méric - EuRAD 2019 TPC Chair and Co-Chair

Anthony Ghiotto and Alexandru Takacs - EuMC 2019 TPC Chair and Co-Chair
Jean-Christophe Nallatamby and Joaquin Portilla - EuMIC 2019 TPC Chair and Co-Chair
Jean-Yves Dauvignac and Stéphane Méric - EuRAD 2019 TPC Chair and Co-Chair

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2018 European Microwave Week in Madrid
Best Paper Prizes

EuMC Microwave Prize (sponsored by Val Space Consortium and European Space Agency)

A 5.8 GHz 64-Channel Phased Array Microwave Power Transmission System Based on Space-Time Beamforming Algorithm for Multiple IoT Sensors

Kentaro Murata, Toshiya Mitomo, Makoto Higaki, Kohei Onizuka.
Toshiba Corporation Japan

EuMC Young Engineer Prizes (sponsored by Universidad Carlos III de Madrid)

Near-Field Beam Focusing and Steering Generator Based on 3D Curved Substrate Integrated Waveguide

Ya Fei Wu, Prof. Yu Jian Cheng
University of Electronic Science and Technology of China

Frequency Selective Ferrite Circulators with Quasi-Elliptic Transmission Response

Andrea Ashley, Laila Marzall; Prof. Zoya Popovic; Prof. Dimitra Psychogiou
University of Colorado, Boulder, USA

EuRAD Young Engineer Prize (sponsored by Hensoldt Sensors GmbH)

Expanding the Unambiguous Velocity Limitation of the Stepped-Carrier OFDM Radar Scheme

Benedikt Schweizer, Daniel Schindler; Christina Knill; Dr. Jürgen Hasch; Prof. Christian Waldschmidt
University of Ulm, Germany

EuMIC Best Paper Prize

A 112 µW F-band Standing Wave Detector in 40nm CMOS for Sensing and Impedance Detection

Bart Philippe, Patrick Reynaert, KU Leuven, Belgium

EuMIC Young Engineer Prize

Design of an S-Band Chireix Outphasing Power Amplifier Based on a Systematic Bandwidth Limitation Analysis

Anna Piacibello, Dr. Roberto Quaglia; Prof. Marco Pirola; Prof. Steve Cripps
Politecnico de Torino, Italy

EuRAD Best Paper Prize (sponsored by Thales Netherlands)

IQ Imbalance Robust OFDM Radar Waveform

Prof. André Bourdoux; Dr. Marc Bauduin; Dr. Claude Desset
IMEC, Belgium
2019 EuMA Outstanding Career Award

In 1977, Alain Cappy joined the Semiconductor and Microwave Centre, former name of the Institute of Electronics, Microelectronics and Nanotechnology (IEMN), a joined research unit between CNRS and the University of Lille. He received the PhD and the ‘Docteur es Sciences’ degrees from the University of Lille, in 1981 and 1986 respectively. He is now Professor Emeritus of Electronics and Electrical Engineering.

For more than 30 years, his research interests were concerned with the modelling, fabrication and characterisation of low noise Field effect transistors based on III-V materials. He was an actor of the amazing FET revolution that began in the early 1980s with the development of AlGaAs/GaAs heterostructures showing high mobility 2D electron gas. Afterwards, he was involved in the modelling, design and fabrication of strained layer PM-HEMT, InP HEMT, InAs-AlSb-HEMT and even THz-HEMT based on plasma oscillations. He is the author or co-author of about 200 scientific papers and communications and he gave 25 invited papers in international conferences and workshops. He was the supervisor of 25 PhD students and he participated in more than 140 PhD thesis and ‘Habilitation’ committees.

Since 2010, he completely change his research field to work on artificial neurons and neuro-inspired circuits for information processing and medical applications.

In parallel with this scientific activity, he has worked from 2002 to 2010 as the director of IEMN, a research institute that gathers more than 250 scientists and 160 PhD students. From 2010 to 2014 he was appointed as the director of IRCICA, a laboratory specifically created by CNRS and the University of Lille to promote interdisciplinary research. From 2009 to 2017, he joined the national agency for evaluation of research and higher education (Hcéres) where he was the coordinator for the evaluation of the research laboratories of the Science and Technology domain.

2019 EuMA Distinguished Service Award

Wolfgang Heinrich received the Dipl.-Ing., Dr.-Ing. and habilitation degrees in 1982, 1987, and 1992, respectively, all from the Technical University of Darmstadt, Germany. In 1993, he joined the Ferdinand-Braun-Institut (FBH) at Berlin, Germany, where he has been head of the microwave department and deputy director of the institute. Since 2008, he has been also professor with the Technical University of Berlin, where he holds the chair of High-frequency Technologies.

The subject of his PhD dealt with distributed effects in GaAs MESFETs. He then worked on planar transmission lines, pioneering models for coplanar circuits. At FBH, he broadened the scope of his research to III-V MMICs in general. His present activities focus on GaN power amplifiers, mm-wave integrated circuits and their packaging, and electromagnetic simulation.

Wolfgang Heinrich has authored or co-authored more than 350 publications and conference contributions. He is member of the editorial board of the leading scientific journals in his field and has been serving on the Technical Program Committee of the European Microwave Conference and the International Microwave Symposium for many years. Also, he acted as reviewer in European projects and in advisory functions. He is a Fellow of the IEEE.

He has been serving the microwave community in various functions, e.g., as chairman of the German IEEE MTT/AP Chapter from 2002 to 2007, as IEEE MTT-S Distinguished Microwave Lecturer for the term 2003-2005, as chair of the MTT-12 Committee on interconnects, packaging, and manufacturing from 2006 through 2008, and as Associate Editor of the IEEE Transactions on MTT from 2008 until 2010. In 2007, he was General Chair of the European Microwave Week in Munich, Germany.

Wolfgang Heinrich was elected to the EuMA Board of Directors in 2009. He became President of the European Microwave Association on Jan 1, 2010, and served for 3 terms until the end of 2018.
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<td>Weigel Robert</td>
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<tr>
<td>Weiß Matthias</td>
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<tr>
<td>Wiesbeck Werner</td>
</tr>
<tr>
<td>Will Bianca</td>
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<td>Wnuk Marian</td>
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<td>Wu Ke-Li</td>
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<td>Yioultsis Trainos</td>
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<tr>
<td>Yu Ming</td>
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<tr>
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<td>Zirath Herbert</td>
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<td>Zwamborn Peter</td>
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<td>Zwick Thomas</td>
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</tbody>
</table>
Welcome to EuMW 2019

European Microwave Week 2019 takes place at the heart of the ville lumiere, Paris! Bringing industry and academia together, European Microwave Week 2019 is a SIX day event, including THREE cutting edge conferences and ONE exciting trade and technology exhibition featuring leading players from across the globe. EuMW 2019 provides access to the very latest products, research and initiatives in the microwave sector. It also offers you the opportunity for face-to-face interaction with those driving the future of microwave technology.

The 22nd European Microwave Week combines:

• Three Major Conferences
• Associated Workshops
• Tailored Courses and Seminars for industrialists, academics and researchers
• Leading International Trade Show.

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

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, conference attendees can collect the proceedings which are on a USB stick and the delegate bag. 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 in Pavilion 7, Level 3 as signposted.

Those who have not pre-registered can do so on site. There will be onsite registration terminals located within the registration area, where delegates can enter their details and 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 email: eumwreg@aventri.com.

CONFERENCES

Choose from three separate but complementary conferences. Spanning the length of the week, starting from Sunday 29th September, the conferences and workshops are scheduled as follows:

- **European Microwave Integrated Circuits Conference (EuMIC)**
  - 30th September - 1st October 2019
- **European Microwave Conference (EuMC)**
  - 1st - 3rd October 2019
- **European Radar Conference (EuRAD)**
  - 2nd - 4th October 2019
- **Plus Workshops and Short Courses (29th September - 4th October 2019)**
- **In addition, EuMW 2019 will include the Defence, Security and Space Forum on 2nd October 2019.**
- **For the first time, EuMW 2019 will propose a new Automotive Forum on 30th September 2019.**

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

Onsite registration opens in June 2019 and remains open up to and during the event until 4th October. During the event, you can also register onsite from Saturday 28th September 2019 (16.00 -19.00) and from 08:00 each morning from Sunday 29th 2019 to Friday 4th October 2019.

Conference rooms are located in Pavilion 7 as signposted. 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 can 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.

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

PROCEEDINGS ON USB STICK

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. No hard copies of workshop slides will be provided. Slides for the workshops and short courses will be provided at the conference for workshop and short courses participants.

INTERACTIVE SESSIONS

The interactive poster papers will be presented on electronic screens, which are located in the exhibition as signposted on Tuesday, Wednesday and Thursday.

SPEAKER PREPARATION SPACE

A speaker preparation area is located in Pavilion 7, Level 3 (to the left in the exhibition hall).

EXHIBITION HOURS

The exhibition area will be located in Pavilion 7, Level 3 as shown on the Floor Plan in this booklet. As a registered delegate you will have full access to the exhibition area.

The exhibition opening hours are:

- **Tuesday 1st October 9.30-18.00 (followed by the Welcome Reception)**
- **Wednesday 2nd October 9.30 -17.30**
- **Thursday 3rd October 9.30-16.30**

See the back cover for a full listing of the exhibitors (correct at the time of going to press).
EuMA MEMBERSHIP
One can apply for EuMA membership by ticking the appropriate box during registration for EuMW. Membership is valid for 1 year, starting when the subscription is completed. The discount for the EuMW fees applies immediately.

EuMA membership fee is €25 for Professionals and €15 for Students. Members have full e-access to the International Journal of Microwave and Wireless Technologies. The printed version of the Journal is no longer available.

EuMA offers a three-year free membership for people residing in NIS and some African countries.

EU MA KNOWLEDGE CENTRE
The EuMA website has its Knowledge Centre which presently contains over 20,000 papers published under the EuMA umbrella. Full texts are available to EuMA members only, who can make as many copies as they wish, at no extra-cost.

HOTELS AND TRAVEL
HOTEL RESERVATION
Horizon House has teamed up with Connex Hotels and Events, our official hotel booking supplier, to offer you the ability to book your accommodation for EuMW at the most competitive rates available. It is very easy to make an immediate hotel booking.

Simply visit their booking page http://www.connexhotelsandevenets.com/eumw-2019-paris.html and make your booking, or email sally@connexhotelsandevenets.com. You will find a wide range of accommodation to suit every budget. Alternatively, see the hotel booking pages within this programme.

GETTING TO PARIS EXPO PORTE DE VERSAILLES
The city of Paris and it is well connected to the European motorway, rail and flight networks. Paris Expo Porte de Versailles can be accessed through a variety of transportation means.

Address:
Paris Expo Porte de Versailles - 1 Place de la Porte de Versailles
75015 Paris

BY PUBLIC TRANSPORT
Use the following public transportation to get to Paris Expo Porte de Versailles:

METRO: Line 12, Porte de Versailles station / Line 8, Balard station
TRAMWAY: Lines T2 and T3a, Porte de Versailles–Parc des Expositions stop
BUS: Line 80, Porte de Versailles–Parc des Expositions stop / Line 39, Desnouettes stop

BY AIR
From Roissy-Charles de Gaulle airport:
Take the RoissyBus to Paris–Opéra, then take Metro Line 8 (direction Balard) to Madeleine, and change to Line 12 (direction Mairie d’Issy) to Porte de Versailles–Parc des Expositions station.

Take the RER B (direction Saint-Rémy-lès-Chevreuse) to Cité Universitaire station, then take tramway T3 (direction Pont du Garigliano) to Porte de Versailles–Parc des Expositions stop.

From Orly airport:
Take the Orlyval train to Antony, then the RER B to Cité Universitaire, change to the tramway T3 and get off at the Porte de Versailles–Parc des expositions stop.

Take the Orlybus to Denfert-Rochereau, then the RER B to Cité Universitaire, change to the tramway T3 and get off at the Porte de Versailles–Parc des expositions stop.

OTHER USEFUL INFORMATION
PERSONAL INVITATION
A valid passport will be required for entry into the organising country, in this case France. Since EuMW events are held in the European Union, no visa is usually required for travellers from a number of countries, like for instance: European Union, Australia, Brazil, Canada, Japan, Singapore, South Korea or the United States. If you are registering as speaker, delegate or exhibitor and you need a visa, we recommend that you speak with the French Consulate, in your own country. You should organise this at least 3 to 4 months prior to EuMW.

The organisers will be pleased to send a letter of invitation to any exhibitor, conference delegate or speaker requesting it.

For requesting this letter of invitation, please pre-fill the invitation letter at https://france-visas.gouv.fr/en_US/web/france-visas/welcome-page and send to the visa operational officer: visa-eumw2019@unilim.fr

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 2019.

ELECTRICITY
Electricity is supplied at 230V, 50 Hz.

SOCIAL EVENTS & PARTNER PROGRAMME
Full details of the social events & dinners that are taking place during EuMW 2019 can be found in the 'Social Events & Partner Programme' section of this programme.

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.

WIFI
Wifi is available in the exhibition hall and conference area. Login details can be found within your delegate bag.

SHOPPING & SIGHTSEEING
PARIS, its special dynamism as a business centre goes hand in hand with its vibrant vitality, tourist appeal and fervent cultural and recreational life. Come and discover its sites, iconic museums and spectacular range of hotels and restaurants; and enjoy its endless nightlife and the flood of designs, fashion and trends you will find in the shop windows of one of Europe’s leading capitals.

A great city that boasts a rich treasure of art, culture and natural environments, set in a region packed with history and modernity. Visit https://en.parisinfo.com/ for information on top attractions and tips for your stay.

Alternatively, see the “Social Events & Partner Programme” section of this booklet for tours and excursions before, during and after EuMW 2019.
**SOCIAL EVENTS**

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**EuMIC Get-Together**

**Date:** Monday 30th September 2019  
**Duration:** from 18:30 until 21:00  
**Location:** Paris expo Porte de Versailles, 1 place de la Porte de Versailles 75015 Paris  
**Cost:** Free to EuMIC delegates  

Following the tradition of the European Microwave Integrated Circuits Conference, delegates are invited to enjoy an informal “finger food” buffet. An unrivalled setting to have a good time with colleagues and friends and taste the excellent French cheese and wine.

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**Automotive Forum Networking Dinner**

**Date:** Monday 30th September 2019  
**Duration:** 19:30 until 22:30  
**Location:** Restaurant “Île” 170 Quai de Stalingrad, Parc de l’île St Germain 92130 Issy les Moulineaux  
**Cost:** Free and only available to the Automotive Forum registered delegates.

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**Welcome Reception**

**Date:** Tuesday 1st October 2019  
**Duration:** 18:30 until 21:00  
**Location:** Paris expo Porte de Versailles, 1 place de la Porte de Versailles 75015 Paris  
**Cost:** Free to conference delegates and invited exhibitors.  

All registered conference delegates, as well as invited representatives from companies participating in the exhibition are invited to the EuMW 2019 Welcome Reception, sponsored by Keysight Technologies, Horizon House Publications and EuMA. Delegates will need to bring their badge and exhibitors their invite along with them to gain entrance. The evening will begin with drinks at 18:30 followed by the General Chairs’ handover from EuMW 2019, Paris to EuMW 2020, Utrecht as well as an address from the Platinum Sponsor, Keysight Technologies. The open-buffet dinner will be served from 19:00.

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**EuRAD Lunch**

**Date:** Friday 4th September 2019  
**Duration:** 12:30 until 13:50  
**Location:** Paris expo Porte de Versailles, 1 place de la Porte de Versailles 75015 Paris  
**Cost:** Free to EuRAD delegates and Friday WS/SC delegates  

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**Defence, Security & Space Forum Cocktail Reception**

**Date:** Wednesday 2nd October 2019  
**Duration:** 17:50 until 18:30  
**Location:** Paris expo Porte de Versailles, 1 place de la Porte de Versailles 75015 Paris  
**Cost:** Free to Defence, Security & Space Forum registered delegates.
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
ALL FEES ARE INCLUSIVE OF FRENCH VAT @ 20%

ONLINE registration is open from 28th May 2019 up to and during the event until 4th October 2019.
ONSITE registration is open from 16:00 on 28th September 2019.
ADVANCE DISCOUNTED RATE (up to and including 30th August) STANDARD RATE (from 31st August & Onsite).

CONFERENCE REGISTRATION FEES
There are TWO different rates available for the EuMW conferences:
• ADVANCE DISCOUNTED RATE – for all registrations made online up to and including 30th August (these are approximately 40% cheaper than the Standard Rate).
• STANDARD RATE – for all registrations made online from 31st August and onsite.

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

CONFERENCE REGISTRATION DETAILS
Online Registration
• All registrations should be made online at www.eumweek.com. Those completed up to and including 30th August will be charged at the ‘Advance Discounted Rate’ and those from 31st August will be charged at the ‘Standard Rate’.
• Online registration is open from 28th May 2019 up to and during the event until 4th October 2019. You can also register ONSITE from 16:00 on Saturday 28th September 2019 and then at the times detailed below.

Onsite Registration
Onsite registration is available:
• Saturday 28th September 16:00 - 19:00
• Sunday 29th September 08:00 - 17:00
• Monday 30th September 08:00 - 17:00
• Tuesday 1st October 08:00 - 17:00
• Wednesday 2nd October 08:00 - 17:00
• Thursday 3rd October 08:00 - 17:00
• Friday 4th October 08:00 - 10:00

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

HOW TO REGISTER
Online
• All registrations should be made online at www.eumweek.com.
• Delegates can register for one, two or all three of the conferences, workshops and short courses.
• 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 entrance to the conference and exhibition in Pavilion 7, level 3 as sign posted.
• 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@aventri.com

BAGE 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 the 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, EUMIC GET TOGETHER, WELCOME RECEPTION AND EURAD LUNCH
• Upon presentation of their badge conference delegates will be served free coffee during the coffee breaks.
• There will be two coffee breaks per day. On Friday, there will be only one coffee break in the morning.
• Monday’s EUMIC Get-Together, which will be held on-site in room S01/S02/S03, is free of cost for EUMIC delegates.
• Tuesday’s Welcome Reception, sponsored by Keysight Technologies, will be held on-site in room S01/S02/S03. Badges must be presented at the entrance.
• Friday’s EuRAD LUNCH, which will be held in room S01/S02/S03, is free of cost for EuRAD delegates and Friday’s WS/SC delegates.

DELEGATE LUNCHBOXES
• Subsidised lunchboxes for delegates, WS/SC, doctoral and student school attendees are being offered by EuMW at the reduced cost of €7 per lunchbox (one per day). In order to guarantee availability, it is required to order the lunchboxes at the time of registration. Lunchboxes for the student challenge, the student design competitions and the WiM event should be ordered separately when you register for these activities. Visit www.eumweek.com for more information.

CONFERENCE LOCATION
The conferences will be held in different rooms over the conference dates. Please refer to the Conference Matrix. Registration at one conference does not allow access to the sessions of the other conferences.
Reduced rates are offered if you have society membership to any of the following*: EuMA, GAAS, IET or IEEE.

If you register for membership through the EuMW registration system, you will automatically be entitled to discounted member rates.

ADVANCE REGISTRATION CONFERENCE FEES (UP TO AND INCLUDING 30TH AUG.)

<table>
<thead>
<tr>
<th>CONFERENCE FEES</th>
<th>ADVANCE DISCOUNTED RATE</th>
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<tbody>
<tr>
<td></td>
<td>Society Member</td>
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<tr>
<td></td>
<td>(*any of above)</td>
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<tr>
<td>1 Conference</td>
<td>Standard</td>
</tr>
<tr>
<td>EuMC</td>
<td>€ 470</td>
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<tr>
<td>EuMIC</td>
<td>€ 360</td>
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<tr>
<td>EuRAD</td>
<td>€ 320</td>
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<tr>
<td>2 Conferences</td>
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<tr>
<td>EuMC + EuMIC</td>
<td>€ 670</td>
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<tr>
<td>EuMC + EuRAD</td>
<td>€ 640</td>
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<td>EuMIC + EuRAD</td>
<td>€ 550</td>
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<td>3 Conferences</td>
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<tr>
<td>EuMC + EuMIC + EuRAD</td>
<td>€ 810</td>
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WORKSHOP AND SHORT COURSE FEES (ONE STANDARD RATE THROUGHOUT)

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<tbody>
<tr>
<td></td>
<td>Society Member</td>
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<tr>
<td></td>
<td>(*any of above)</td>
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<tr>
<td>Half day WITH Conference</td>
<td>€ 100</td>
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<tr>
<td>registration</td>
<td>€ 130</td>
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<tr>
<td>Half day WITHOUT Conference</td>
<td>€ 140</td>
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<tr>
<td>Conference registration</td>
<td>€ 180</td>
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SPECIAL FORUM FEES

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<th>ADVANCED RATE (UP TO &amp; INCL 30TH AUG.)</th>
<th>STANDARD RATE (FROM 31ST AUG &amp; ONSITE)</th>
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</thead>
<tbody>
<tr>
<td>Automotive Forum Monday 30th September</td>
<td>€ 260 For Delegates (those registered for EuMC, EuMIC or EuRAD)</td>
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<td></td>
<td>€ 360 For All Others (those not registered for a conference)</td>
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Defence, Security and Space Forum Wednesday 2nd October

<table>
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<tr>
<th>ONE STANDARD RATE THROUGHOUT</th>
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<tr>
<td>€ 20 For Delegates (those registered for EuMC, EuMIC or EuRAD)</td>
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</table>

Reduced Rates for the conferences are also offered if you are a Student/Senior (Full-time students 30 years or younger and Seniors 65 or older as of 4th October 2019). The fees shown below are invoiced in the name and on behalf of the European Microwave Association. EuMA’s supplies of attendance fees in respect of the European Microwave Week 2019 are inclusive of French VAT.

STANDARD REGISTRATION CONFERENCE FEES (FROM 31ST AUG. AND ONSITE)

<table>
<thead>
<tr>
<th>CONFERENCE FEES</th>
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<td>EuMC + EuMIC + EuRAD</td>
<td>€ 1140</td>
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EUROPEAN MICROWAVE WEEK WORKSHOPS & SHORT COURSES

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<tr>
<th>SUNDAY 29th September</th>
<th>MONDAY 30th September</th>
<th>TUESDAY 1st October</th>
<th>WEDNESDAY 2nd October</th>
<th>FRIDAY 4th October</th>
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<td>WS-03</td>
<td>WS-04</td>
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<td>Full Day</td>
<td>Half Day</td>
</tr>
<tr>
<td>WS-08</td>
<td>WS-09</td>
<td>SM-01</td>
<td>WS-01</td>
<td>WS-02</td>
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<td>EuMC</td>
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<tr>
<td>Half Day</td>
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<tr>
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<td>WS-06</td>
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<tr>
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<td>WS-01</td>
<td>WS-02</td>
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<td>EuMC/EuMIC</td>
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<td>EuMC</td>
<td>EuMC/EuMIC</td>
<td>EuMC</td>
</tr>
</tbody>
</table>

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. The cost for an additional USB stick is € 50.

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.

SPECIAL SESSIONS

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Title</th>
<th>Location</th>
<th>No. of Days</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday 1st October</td>
<td>08:30 - 17:50</td>
<td>European Microwave Student School</td>
<td>Room 746 - Tuesday</td>
<td>1 full day</td>
<td>€ 40</td>
</tr>
<tr>
<td>and Wednesday 2nd</td>
<td></td>
<td></td>
<td>Booth by Reg. Desk - Wednesday</td>
<td>2 half-days</td>
<td></td>
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<tr>
<td>October</td>
<td></td>
<td>European Microwave Doctoral School</td>
<td>Room 741BC - Tuesday</td>
<td>1 half-day</td>
<td>€ 80</td>
</tr>
<tr>
<td>and Wednesday 2nd</td>
<td>13:30 - 17:50</td>
<td>Tuesday 1st October</td>
<td>Booth by Reg. Desk - Wednesday</td>
<td>2 half-days</td>
<td></td>
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<tr>
<td>October</td>
<td>09:00 - 17:50</td>
<td>Tuesday 1st October</td>
<td>Booth by Reg. Desk - Wednesday</td>
<td>1 full day</td>
<td></td>
</tr>
</tbody>
</table>
## EUROPEAN MICROWAVE WEEK WORKSHOPS AND SHORT COURSES

### SUNDAY 29th September

<table>
<thead>
<tr>
<th>Time</th>
<th>Type</th>
<th>Code</th>
<th>Organisation</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Day</td>
<td>WS-01</td>
<td>EuMC/EuMIC</td>
<td>EuMC/EuMIC</td>
<td>Recent Advances in SiGe BiCMOS: Technologies, Modelling and Circuits for 5G, radar and imaging</td>
</tr>
<tr>
<td>Full Day</td>
<td>WS-02</td>
<td>EuMC/EuMIC</td>
<td>EuMC/EuMIC</td>
<td>RF Techniques for 5G Applications</td>
</tr>
<tr>
<td>Full Day</td>
<td>WS-03</td>
<td>EuMC</td>
<td>EuMC</td>
<td>Microwave Characterization and Modelling at Nano and Micro-Scale of Advanced Materials to Enhance Emerging Products Manufacturing</td>
</tr>
<tr>
<td>Full Day</td>
<td>WS-04</td>
<td>EuMC</td>
<td>EuMC</td>
<td>Real Amplifier Devices for 5G New Radios</td>
</tr>
<tr>
<td>Full Day</td>
<td>WS-05</td>
<td>EuMC/EuMIC</td>
<td>EuMC/EuMIC</td>
<td>Microwave measurements at systems, components and materials levels: a global approach to improve energy efficiency of the next generation of electronic devices</td>
</tr>
<tr>
<td>Half Day AM</td>
<td>WS-06</td>
<td>EuMC</td>
<td>EuMC</td>
<td>Future Wireless Technologies in the Terahertz and Optical Frequency Bands</td>
</tr>
<tr>
<td>Half Day PM</td>
<td>WS-07</td>
<td>EuMC</td>
<td>EuMC</td>
<td>New materials and technologies for reconfigurable RF components</td>
</tr>
<tr>
<td>Full Day</td>
<td>WS-08</td>
<td>EuMC/EuMIC</td>
<td>EuMC/EuMIC</td>
<td>RF Technologies &amp; Techniques for Multi-Band Power Amplifiers for Radars and Communications</td>
</tr>
<tr>
<td>Full Day</td>
<td>WS-09</td>
<td>EuMC</td>
<td>EuMC</td>
<td>THz Applications: Present and Future</td>
</tr>
<tr>
<td>Full Day</td>
<td>SS-01</td>
<td>EuMC</td>
<td>EuMC</td>
<td>Fundamentals of Microwave PA Design</td>
</tr>
<tr>
<td>Half Day AM</td>
<td>SS-02</td>
<td>EuMC/EuMIC</td>
<td>EuMC/EuMIC</td>
<td>Silicon-Based Integrated Technology Platform for Millimeter Wave (MMW) and Terahertz (THz) Applications</td>
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</table>

### MONDAY 30th September

<table>
<thead>
<tr>
<th>Time</th>
<th>Type</th>
<th>Code</th>
<th>Organisation</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Half Day AM</td>
<td>WM-01</td>
<td>EuMC/EuMIC</td>
<td>EuMC/EuMIC</td>
<td>Advanced CAD Tools and Techniques for the System Co-Design of Smart Antenna and Transmitter Modules</td>
</tr>
<tr>
<td>Half Day PM</td>
<td>WM-02</td>
<td>EuMC</td>
<td>EuMC</td>
<td>Phase Change Material for Microwave Applications</td>
</tr>
<tr>
<td>Full Day</td>
<td>WM-03</td>
<td>EuMC</td>
<td>EuMC</td>
<td>Current and Future Use of Spectrum by PMSE</td>
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<tr>
<td>Full Day</td>
<td>WM-04</td>
<td>EuMC/EuMIC</td>
<td>EuMC/EuMIC</td>
<td>Integration and multi-physics challenges in 5G mm-wave system design</td>
</tr>
<tr>
<td>Full Day</td>
<td>WM-05</td>
<td>EuMC</td>
<td>EuMC</td>
<td>Terahertz Devices, Circuits and Systems: from fundamentals to applications</td>
</tr>
<tr>
<td>Full Day</td>
<td>WM-06</td>
<td>EuMC</td>
<td>EuMC</td>
<td>Recent Advances in Technologies and Practical Realizations of Compact Filters</td>
</tr>
<tr>
<td>Half Day AM</td>
<td>WM-07</td>
<td>EuMC/EuMIC</td>
<td>EuMC/EuMIC</td>
<td>Technologies and modelling for electromagnetically-mediated medical treatments: at the beginning of the “electroceuticals” era</td>
</tr>
<tr>
<td>Half Day PM</td>
<td>WM-08</td>
<td>EuMC</td>
<td>EuMC</td>
<td>Advanced Microwave Systems for Emerging Healthcare Applications</td>
</tr>
<tr>
<td>Half Day AM</td>
<td>WM-09</td>
<td>EuMC/EuMIC</td>
<td>EuMC/EuMIC</td>
<td>New challenges and new trends mixing active and passive devices in silicon technology: from components to tunable RF functions</td>
</tr>
<tr>
<td>Half Day PM</td>
<td>SM-01</td>
<td>EuMC</td>
<td>EuMC</td>
<td>Multibeam Antennas and Beamforming Networks</td>
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### TUESDAY 1st October

<table>
<thead>
<tr>
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<th>Type</th>
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<th>Organisation</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Half Day AM</td>
<td>STu-01</td>
<td>EuMC</td>
<td>EuMC</td>
<td>Antenna Booster Technology for IoT Applications</td>
</tr>
</tbody>
</table>

### WEDNESDAY 2nd October

<table>
<thead>
<tr>
<th>Time</th>
<th>Type</th>
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<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Day</td>
<td>WW-01</td>
<td>EuMC/EuRAD</td>
<td>EuMC/EuRAD</td>
<td>Advanced passive radar techniques and applications</td>
</tr>
<tr>
<td>Full Day</td>
<td>WW-02</td>
<td>EuMC/EuRAD</td>
<td>EuMC/EuRAD</td>
<td>Radar Interference and Coexistence</td>
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</tbody>
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### THURSDAY 3rd October

<table>
<thead>
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<th>Time</th>
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<th>Title</th>
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</thead>
<tbody>
<tr>
<td>Half Day AM</td>
<td>WTh-01</td>
<td>EuRAD</td>
<td>EuRAD</td>
<td>Automotive Radar Systems and Signal Processing</td>
</tr>
<tr>
<td>Full Day</td>
<td>WTh-02</td>
<td>EuMC/EuRAD</td>
<td>EuMC/EuRAD</td>
<td>Test Procedures &amp; Solutions, as well as simulation &amp; Validation of sensor functions and Entire Adas Systems</td>
</tr>
<tr>
<td>Half Day PM</td>
<td>STh-01</td>
<td>EuRAD</td>
<td>EuRAD</td>
<td>Modern Advances in Computational Imaging at Microwave and Millimetre-Wave Frequencies</td>
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</table>

### FRIDAY 4th October

<table>
<thead>
<tr>
<th>Time</th>
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<th>Organisation</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Half Day AM</td>
<td>WF-01</td>
<td>EuRAD</td>
<td>EuRAD</td>
<td>Automotive Radar Frontend Technologies</td>
</tr>
<tr>
<td>Full Day</td>
<td>WF-02</td>
<td>EuMC</td>
<td>EuMC</td>
<td>Measurements and Waveguides for Millimetre-wave and Terahertz Frequencies</td>
</tr>
</tbody>
</table>

www.eumweek.com | 23
The Defence, Security and Space (DSS) Forum is jointly organized by the European Microwave Association (EuMA) and Microwave Journal to complement European Microwave Week’s activity in the Defence, Security and Space sector.

Each year the DSS Forum focuses on a hot topic that is engaging industry, academia and organizations/agencies to develop, test and implement leading edge technology. In 2019 the topic is: New Radio Architectures: The Evolution for Satellite Constellations.

With the development of the commercial space market being driven by companies like SpaceX, Blue Origin and Virgin Galactic, the market has become more competitive and demanding for communications technology to evolve and innovate. New radio architectures are needed that use less power and have lower latency while still being low cost. Small and nano-satellites are also driving the same factors but to an extreme level for miniature systems.

The development of Satellite Constellations is growing due to increase demand in data rates and data traffic for wireless communications. 6G is expected to achieve Tb/s data rates while the traffic will reach ZetaBytes in 2030 time frame. Proposals are based on the deployment of thousands low-cost micro-satellites in Low-Earth-Orbits for instance (LEO). This pushes the performance towards higher frequencies and much more powerful communication systems.

The RF and Microwave community in this forum will discuss how organizations are responding with new radio architectures to achieve these goals.

Keynote speakers will consider the state of the art of leading technologies and systems for satellite constellations, the estimated evolution of technologies and trends and consider expected capabilities and functionalities to address future challenges. The efforts made by the main players in the sector will be analysed and their views on new trends and technological developments will be offered.

The industry session will reflect the effort and investment that is being made to develop and test new radio architectures with improved size, weight and cost. Specific areas of activity include phased arrays, various types of beamforming, different RF partitioning, high efficiency solid state amplifiers, improved heat sinking materials, miniaturized radios and antennas, to name a few. Link and alternatives with respect to optical technologies will also be addressed as a complement to the communication technologies. From an industry perspective, the emphasis will be on development at component and sub-system level, with particular focus on sub-system integration, not forgetting the significant role that test and measurement has to play in moving the sector forward.

The Executive Forum will present the points of view of the different established and regulatory bodies that allow coexistence between the different aerial platforms and describe the activity of the different players already established and emerging in the field.

Programme

08:30 - 10:10 EuRAD Opening Session
10:10 - 10:40 Coffee Break
10:40 - 13:00 ‘Challenges in Satellite Constellations and impact on the communications technologies’
Moderators: Dr. Patrice GAMAND, ALPHA-RLH Cluster, France and Dr. Erwan FOURN, IETR, France
• The revival of Constellations in the 21st century: Roadmaps and Technology requirements. Emiliano RE, RF systems, payloads and technology division, ESA, ESTEC, The Netherlands
• How optical innovation and Radio-Frequency team-up for higher satellite communication throughput? Dr. David ALLOUX, CAILABS, France.
• The “Space Data Highway” from Babacar SECK, CEO, Leads-Aerospace, France
• Conference from Isabelle BURET, Telecom Business Line Technical Authority & Iridium Program Design Authority, Thales Alenia Space, France
13:00 - 14:00 Strategy Analytics Lunch & Learn Session – Global Satellite Market Outlook
Asif Anwar will discuss the global market outlook for both military and commercial satellites underpinned by a discussion on how the emergence of small satellite buses and LEO constellations will change the make-up of satellite communication systems. He will cover specifics such as phased arrays and solid-state technology. Asif Anwar, Strategy Analytics, UK
14:10 - 15:50 Microwave Journal Industry Session
This session offers a perspective on how industry is aiming to design, develop and test radio architectures and the challenges that need to be addressed to implement them. Various trade-offs in radio architectures will be covered along with solid state technologies, phased arrays and packaging concerns.
15:50 - 16:20 Coffee Break
16:20 - 18:00 Round table: Concepts, technologies and systems addressing ultra-high capacity and data traffic for future wireless communications.
Moderator: Dr. Patrice GAMAND, ALPHA-RLH Cluster, France and Dr. Erwan FOURN, IETR, France
Speakers:
• Jan THOEMEL, GomSpace, Luxemburg, Head of Satellite operation
• Babacar SECK, Leads-Aerospace, CEO
• Emiliano RE, ESA, Radio Frequency Systems Division
• Jean-François BOUTILLON, Thales Alenia Space, Constellation Solutions Line Manager
• Guy KOUEMOU, Hensoldt, Technology Manager
• David ALLOUX, CAILABS, Engineering Manager
18:00 - 18:30 Cocktail Reception
The opportunity to network and discuss informally the issues raised throughout the Forum.

Registration and Programme Updates
Registration fee is €20 for those who registered for a conference and €60 for those not registered for a conference. The Conference Special Events section of the EuMW website will give further details and updates.
The 2019 Automotive Forum

When: Monday 30th September, 08:30 to 17:50
Location: Room E04 + dinner
Chair: Thomas Zwick, Karlsruhe Institute of Technology, Germany
Co-Chair: Frank Gruson, Continental AG, Germany
Local Arrangement Chair: Stéphane Méric, INSA de Rennes, IETR, France

Following applications like keyless entry and tyre pressure monitoring systems, mobile communications and recently automotive radar made microwave technologies be a strong pillar inside the automotive world. The first 77 GHz automotive radar sensors entered the European market in 1999. In 2019 – 20 years later – the European Microwave Association (EuMA) for the first time organises the Automotive Forum to provide an open platform for industrial experts to discuss technical aspects and market issues in the area of microwaves in automotive industry. The forum consists of a good mix of technical presentations, plenary and panel discussions as well as networking time. The forum mainly addresses technical experts from automotive industry throughout the whole supply chain. Keynote speakers will present their views on special technical solutions as well as regulatory or strategic issues. The event will close with a networking dinner.

Programme

8:30-8:50 Automated Driving: Market Perspective for Radar
Cédric Malaquin, Yole, France
8:50-9:10 The Role of Automotive Radars in Future Automated Driving Functions
Martin Kunert, Robert Bosch GmbH, Germany
9:10-9:30 Safety First – Critical Performance Requirements for High Frequency Laminates in 76-81 GHz Automotive Radars to Enable Next Generation Advanced Driver Assistance Systems (ADAS)
Ingmar van der Linden, Rogers Corporation, USA
9:30-9:50 A Study of Antenna Performance Influence on mm-Scale Dk Variation in PCB Substrate
Tatsunari Koyama, Nippon Pillar Packing Co., Japan
9:50-10:10 Labelling of Data for Classification with Automotive Radar Sensors
Florian Baumgärtner, Daimler AG, Germany
10:10-10:50 Coffee
10:50-11:10 Radar Data Classification and Generation with Deep Learning
Robert Prophit, Friedrich-Alexander University Erlangen-Nuremberg, Germany
11:10-11:30 Leveraging Artificial Intelligence in Imaging Radars to transform Environment Sensing into Autonomous Decision Making
Noam Arkind, Asbe, Israel
11:30-11:50 Deep Learning Approaches for Radar Based 3D Object Detection
Georg Kuschk, Astyx GmbH, Germany
11:50-12:10 Artificial Intelligence in Automotive Radar
Jürgen Dickmann, Daimler AG, Germany
Jonathan Wache, Continental AG, Germany
12:30-13:50 Lunch
13:50-14:10 Beyond MIMO: 5G Radar = Digital Modulation Radar (DMR)
Ralph Reuter, Uhnder Inc., Germany
14:10-14:30 Performance of Automotive Radar Raw Data Repair Algorithms with Measured Signals
Jonathan Moss, Veoneer, Germany
14:30-14:50 FFT-Peak as Output for High Resolution Radar
Andre Roger, Infineon Technologies AG, Germany
14:50-15:10 A Study of the Accurate Occupancy Grid Mapping Generation by 3D Radar
Hidekuni Yomo, Panasonic, Japan
15:10-15:30 Advanced Methods for Mitigation of Mutual Interference in FMCW Radar Systems
Paul Meissner, Infineon Technologies AG, Austria
15:30-16:10 Coffee
16:10-16:30 IMIKO-Radar: Towards Cooperative Radar-Interference Mitigation
Werner Sörgel, Robert Bosch GmbH, Germany
16:30-16:50 Simulation of Polarimetric Radar Cross-Sections of Pedestrians for Automotive Radar
Anshu Gupta, ADC Automotive Distance Control Systems GmbH, Germany
16:50-17:10 Closed Loop Testing of Radar-Sensors with Synthetic Raw Data derived from Real-Time Raytracing
Sebastian Graf, dSpace, Germany
17:10-17:30 The Coded MIMO Radar System Design and the Consideration of the New Technologies Verification and the Estimation Method for the Coexisting Issue with FMCW Radar
Seung Chul Shin, Keysight Technologies, USA
17:30-17:50 Novel CATR-based Target Generation System for Automotive Radar Testing
Daniel Markert, Rohde & Schwarz GmbH & Co. KG, Germany
19:30 Networking dinner
Location will be provided during the workshop.

Registration and Programme Updates
Advanced Registration fee (up to & incl. 30th August) is €260 for those who registered for a conference and €360 for those not registered for a conference. Standard Registration fee (from 31st August & Onsite) is €320 for those who registered for a conference and €420 for those not registered for a conference. The networking dinner as well as a lunch snack and beverages are included in the fee. The Conference Special Events section of the EuMW website will give further details and updates. Due to limited room size early registration is recommended.

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EuMW 2019 Student Design Competitions

When: Tuesday 1st October and Wednesday 2nd October, 2019
Location: Student Design Room
Dr Benjamin Potelon (Lab-STICC - Université de Bretagne Occidentale, Brest, France) & Prof. Pierre Blondy (XLIM - Université de Limoges, Limoges, France)

The Student Design Competitions involve master and doctoral students designing and measuring a microwave device developed prior to the conference. This competition is open to all students. Measurements will be open to all EuMW participants. A representative of the design team must be present at the competition day.

The Student Design competitions are centred on three topics and please refer to the student’s activities web site for detailed design rules and specifications.

This year, three competitions will be offered:

**Thrust 1: PA Design, organised and sponsored by AMCAD Engineering (Booth 320D)**
When: Tuesday 1st October – 08:30 to 12:30
The aim of the Thrust 1 is to design a power amplifier at the frequency 3.5 GHz, with a video bandwidth target of 100MHz. The amplifier should deliver a minimal output power of 35dBm at 1 dB of Gain compression, with the highest PAE. This thrust is supervised by Tony Gasseling (gasseling@amcad-engineering.fr).

How to participate
1. Request the entry form (gasseling@amcad-engineering.fr)
2. Submit the entry form to Tony Gasseling before 15th of September 2019
3. Submit a brief report including simulations, layout, and measurements before the competition. (The selected projects will receive an acceptance letter to attend the competition.)

**Thrust 2: Wideband Amplifier Biasing Network, organised and sponsored by Ampleon Netherlands BV**
When: Tuesday 1st October – 13:50 to 17:50
Thrust 2 will introduce the students to the RF high power amplifier (HPA) biasing for wideband applications. This thrust is supervised by Osman Ceylan (osman.ceylan@ampleon.com).

Biasing networks has a key role on the video bandwidth (VBW) and RF performance of HPAs. The main target of the contest is design and realization of a biasing network considering low insertion loss at the operation bandwidth and low impedance at the low frequency region. The competitors will design and fabricate a biasing network having the resonance-free low impedance response at the low frequency region. Although students are free to use any topology and material, they need to meet a given set of specifications.

The winner will be the network that demonstrates the widest bandwidth regarding the lowest input impedance at the low frequency region. If there is a tie, wider accepted operation BW will be the winner. Questions can be sent to Dr. Osman Ceylan.

Winners will be awarded € 1000 (1st place) and € 500 (2nd place). Promising designs will be also awarded € 250.

How to participate
1. Request the entry form (osman.ceylan@ampleon.com)
2. Submit the entry form to Osman Ceylan before 15th of September 2019
3. Submit a brief report including simulations, layout, and measurements before the competition. (The selected projects will receive an acceptance letter to attend the competition.)

**Thrust 3: Filter Design (sponsored by Elliptika – booth A050)**
When: Wednesday 2nd October – 08:30 to 12:30
Thrust 3 is meant to develop a dual-band filter design prior to the conference. This thrust is supervised by Dr Benjamin Potelon (benjamin.potelon@univ-brest.fr) & Prof. Pierre Blondy (pierre.blondy@xlim.fr).

The winner team will be awarded € 1000 and will be offered the opportunity to propose an invited paper in the International Journal of Microwave and Wireless Technologies to detail the design of their filter. The second team will be awarded € 500.

Please refer to the student activities section on the website for design rules and specifications. Questions can be sent to Dr. Benjamin Potelon & Prof. Pierre Blondy.

Please refer to the student’s activities web site for design rules and specifications.

How to participate:
1. Request the entry form (benjamin.potelon@univ-brest.fr and pierre.blondy@xlim.fr).
2. Submit the entry form to Benjamin Potelon and Pierre Blondy before 15th of September 2019
3. Submit a brief report including simulations, layout, and measurements before the competition. (The selected projects will receive an acceptance letter to attend the competition.)

For further information please visit: www.eumweek.com.
4th European Microwave Student School ‘Software Defined Radio: Basic blocks and Hands-on Practice’

When: Tuesday 1st October and Wednesday 2nd October 2019
Location: Room 741BC on Tuesday and Specific booth next to Registration Desk on Wednesday
Organisers: Florence Podevin and Estelle Lauga-Larroze (Univ. Grenoble Alpes, Grenoble, France)

About the European Microwave Student School
This year’s European Microwave Week features the 4th European Microwave Student School for bachelor and master students. The program features academic lecturers from all over the world. This year’s topic is dedicated to Software Defined Radio (SDR) with a focus on basic blocks design and the opportunity to practice hands-on activities on SDR. Precisely, the course will be formed by a full day of high level lectures on transmission lines, planar RF components, power amplifiers and mixers on Tuesday. Hands-on design experience will be proposed on Wednesday: in collaboration with PhD students registered at the Doctoral School, students will build a modern digital transceiver.

Earning Credit Points
The European Microwave Student School will offer certificates to all attendees for earning credit points within the European Credit Transfer System (ECTS). If you need to have a written or oral exam, please contact your professor well in advance for arranging the details of the examination process. By request of your professor via email to eumw2019studentevent@unilim.fr we will provide an exam sheet for oral or written examination by the beginning of October 2019.

Registration
The registration fee for this event is €40. For the registration, bachelor and master students will need a valid student ID of an accredited university. Students are prompted to bring their own laptops. For registration, please go to the registration site and select EuMW Student School. For further information please visit: www.eumweek.com.

Registration closes 10th September 2019. Space is limited, so purchase your ticket well in advance.

Programme

**Tuesday 1st October**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>8:30-8:45</td>
<td>Student School presentation</td>
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<tr>
<td>8:45-10:10</td>
<td>General overview on transmission lines</td>
</tr>
<tr>
<td></td>
<td>Philippe Ferrari, Univ. Grenoble Alpes, Grenoble, France</td>
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<tr>
<td>10:10-11:00</td>
<td>Long time break to visit the Exhibition Hall:</td>
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<tr>
<td></td>
<td>Career Platform and Industrial Booth</td>
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<tr>
<td>11:00-12:30</td>
<td>Planar passive devices, hybrid coupler and power dividers</td>
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<td></td>
<td>Roberto Gomez-Garcia, Universidad de Alcala, Madrid, Spain</td>
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<tr>
<td>12:30-13:50</td>
<td>Lunch and break to visit the Exhibition Hall:</td>
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<tr>
<td></td>
<td>Career Platform and Industrial Booth</td>
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<tr>
<td>13:50-15:30</td>
<td>Power amplifiers</td>
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<tr>
<td></td>
<td>Antonio Lisboa Da Souza, Universidade Federal da Paraiba, Joao Pessoa,</td>
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<tr>
<td></td>
<td>Brazil</td>
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<tr>
<td>15:30-16:10</td>
<td>Long time break to visit the Exhibition Hall:</td>
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<td>Career Platform and Industrial Booth</td>
</tr>
<tr>
<td>16:10-17:50</td>
<td>General overview on mixers and applications</td>
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<tr>
<td></td>
<td>Justin King, Trinity College Dublin, Dublin, Ireland</td>
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**Wednesday 2nd October**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>9:00-12:30</td>
<td>Hands on activity - Building a modern digital transceiver in one day</td>
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<tr>
<td></td>
<td>David S. Ricketts, North Carolina State University, Raleigh, USA</td>
</tr>
<tr>
<td>12:30-13:50</td>
<td>Lunch</td>
</tr>
<tr>
<td>13:50-17:50</td>
<td>Hands on activity - Building a modern digital transceiver in one day</td>
</tr>
<tr>
<td></td>
<td>David S. Ricketts, North Carolina State University, Raleigh, USA</td>
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</tbody>
</table>

For updates to the programme, visit www.eumweek.com/students/Studentschool.html
4th European Microwave Doctoral School ‘Emerging Technologies for Reconfigurable Radio and Hands-on Practice’

Programme

Tuesday 1st October
13:50-14:00  Doctoral School presentation
14:00-14:45  RF Circuit Design with the Inversion Coefficient: Application to LNA Implementations
Thierry Taris, Univ. of Bordeaux, Bordeaux, France
14:45-15:30  Innovative switches for reconfigurability with PCM / SOI / MEMS
Bruno Reig, CEA-Léti, Grenoble, France
15:30-16:10  Break
16:10-17:00  Microwave Filtering through Signal Interference
Roberto Gomez-Garcia, Universidad de Alcala, Madrid, Spain
17:00-17:50  Beam-Forming and Antennas
Luigi Boccia, Universita’ della Calabria, Cosenza, Italy

Wednesday 2nd October
9:00-12:30  Hands on activity - Building a modern digital transceiver in one day
David S. Ricketts, North Carolina State University, Raleigh, USA
12:30-13:50  Lunch
13:50-17:50  Hands on activity - Building a modern digital transceiver in one day
David S. Ricketts, North Carolina State University, Raleigh, USA

EuMW 2019 Student Challenge

When: Tuesday 1st October until Thursday 3rd October
Location: Room 746 on Tuesday and Interactive session Area (e-Poster exhibition hall) on Thursday

Eligible students are invited to take part in the Student Challenge during EuMW 2019. The aim of the Doctoral School is to offer to PhD students, beyond the normal conference programme, an overview of various emerging technologies. This year thematic is devoted to reconfigurable radio. The School gathers several speakers that develop their research in different topics linked to this field. The talks of the Doctoral School are longer (50 min) than typical conference presentations. Additionally, the School includes a Hands-on Design Experience on Wednesday: in collaboration with master students registered at the Student School, PhD students will build a modern digital transceiver. Attention has to be paid on the free Tuesday morning enabling preferential access to the Career Platform.

Registration
The registration fee for this event is €80. For the registration, PhD students will need a valid student ID of an accredited university. Students are prompted to bring their own laptops. For registration, please go to the registration site and select EuMW Doctoral School. Registration is open until 10th September 2019. Space is limited, so secure your ticket well in advance.

For updates to the programme, visit www.eumweek.com/students/doctoralschool.html
EuMW 2019 Career Platform

The Career Platform is a two-day event (October 1st and 2nd) within the European Microwave Week 2019 and it is part of the student activities organized by the EuMW 2019 team with the additional support of EuMA and the IEEE MTT-S / Region 8 Young Professionals. The Career Platform is an opportunity for young European graduates to get in touch with those companies making an impact in today's high-frequency business and to know their main activities, application fields, and market indicators, and for the companies to recruit young talent in the areas of microwave / millimetre-wave, radar, wireless and integrated circuits engineering.

The main aim of the EuMW 2019 Career Platform initiative is to foster relationships between the young engineers and the job market. To this end, a special session will be held on "The European Microwave Industry market and Professional Opportunities" on Tuesday, October 1st. The Career Platform will also include a speed-recruiting lounge where companies and institutions will show their current job/internship offers. All this will be complemented by an active presence in the social networks (Facebook, LinkedIn, Xing) during the conference and the maintenance of the European RF and Microwave job portal http://www.rf-and-microwave-jobs-in-europe.eu which is the virtual marketplace for students and companies to meet at and in-between European Microwave Weeks. Further information can be found at: www.eumweek.com/docs/Career_platform.html.

Please feel free to contact the Career Platform Chair at jean-luc.polleux@esiee.fr with any questions you may have or to obtain additional details.

Careers Platform Special Session
The European Microwave Industry Market and Professional Opportunities
Date: Tuesday 1st October 2019
09:00 -10:40
Location: Special space organised at the boundary of the conference spaces and of the exhibition.
No registration – free access (including visitors)

The special session will describe the main market of the European Microwave Industry with a focus on Professional Opportunities in each of the main sectors. Top industry leading speakers will give their vision and insights.

Women-In-Microwaves Get-Together on the Career Platform
Date: Wednesday 2nd October 18:00-18:30
Registration through the WIM event
Location: Career Lounge

Career Platform Recruitment Space
Date: Tuesday 1st October and Wednesday 2nd, October 2019
Time: full day - exhibition hours
Location: Special space organised at the boundary of the conference spaces and of the exhibition.
No registration – free access (including visitors)

The Career Platform will be an excellent opportunity for companies to meet students and young engineers looking for a career in the areas of high frequency, microwave, millimetre-wave engineering and Radar. An additional special Women-in-Engineering gathering will be also organised on the career lounge on Wednesday at 17:50. Come and join us.

Young Professionals Evening Meet-up
Date: Thursday 3rd October, 19:00-23:00
Location: down-town location, to be confirmed / Registration through www.eumweek.com/docs/Career_platform.html
Brought to you by IEEE MTT-S and IEEE Region 8 Young Professionals

Career Platform Special Session
The European Microwave Industry Market and Professional Opportunities
Date: Tuesday 1st October 2019
09:00 -10:40
Location: Special space organised at the boundary of the conference spaces and of the exhibition.
No registration – free access (including visitors)

The special session will describe the main market of the European Microwave Industry with a focus on Professional Opportunities in each of the main sectors. Top industry leading speakers will give their vision and insights.

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No registration – free access (including visitors)

The Career Platform will be an excellent opportunity for companies to meet students and young engineers looking for a career in the areas of high frequency, microwave, millimetre-wave engineering and Radar. An additional special Women-in-Engineering gathering will be also organised on the career lounge on Wednesday at 17:50. Come and join us.

Special Session on “From Instrumentation to Metrology” - Women in Microwave Engineering Event

Date: Tuesday 1st October 2019
Duration: 13:00-17:50
Location: WiM stand, Room E07
Organiser:
WIM Chair: Audrey MARTIN, University of Limoges, France
WIM Co-chair: Anne Laure FRANC, University of Toulouse, France

We continue the tradition of holding the Women in Microwave Engineering (WiM) event, co-sponsored by the IEEE MTT-Society. This year’s event, focusing on Instrumentation and Metrology, will take you on a visit to "Musée des Arts et Métiers — CNAM" (https://www.arts-et-metiers.net). This is your chance to follow in the footsteps of inventors and pioneers of progress and explore a one-of-a-kind repository of scientific and technical knowledge. Both women and men are welcome.

Before visiting the museum, presentations will be done by scientists:

- 'Over-the-Air Test: From AM Radio to mmWaves'
  Dr. Kate A. REMLEY from NIST (USA)
- 'See the World Outside of the Design Lab'
  Dr. Amele SALAH from Keysight (France)
- 'Oscilloscope-Based Setups for the Nonlinear Characterization of Microwave Transistors'
  Dr. Valerie VADALA from Univeristy of Ferrara (Italy).

Attendees will have the opportunity to interact with high school students who are invited to participate in this event, Bus transportation to the museum will be provided.

Please register for the event by sending an e-mail to: audrey.martin@xlim.fr

Note that places are limited and assigned on a first-come first-served basis. For more information and registration details, please visit: https://www.eumweek.com/docs/women_microwave.html
Welcome to Paris!

Paris' monument-lined boulevards, museums, classical bistros and boutiques are enhanced by a new wave of multimedia galleries, creative wine bars, design shops and tech start-ups.

The cloud-piercing Eiffel Tower, broad Arc de Triomphe guarding the glamorous avenue des Champs-Élysées, Gargoyled Notre Dame cathedral, Lamplit bridges spanning the Seine and art nouveau cafes' wicker-chair-lined terraces are enduring Parisian emblems. Paris' cityscape isn’t static: there are some stunning modern and contemporary icons, too, from the industrial-style Centre Pompidou to the Mur Végétal gracing the Musée du Quai Branly, the glass sails of the Fondation Louis Vuitton contemporary-art centre, and the gleaming steel egg-shaped concert venue La Seine Musicale.

France’s reputation for its cuisine precedes it, and whether you seek a cosy neighbourhood bistro or a triple-Michelin-starred temple to gastronomy, you’ll find that every establishment prides itself on exquisite preparation and presentation of quality produce, invariably served with wine. Enticing patisseries, boulangeries, fromageries and colorful street markets are perfect for putting together a picnic to take to the city’s beautiful parks and gardens.

Paris is one of the world’s great art repositories, harbouring treasures from antiquity onwards. In addition to big hitters like the incomparable Louvre, the Musée d’Orsay’s exceptional impressionist collection, and the Centre Pompidou’s cache of modern and contemporary art, scores of smaller museums showcase every imaginable genre, a diverse range of venues mount major exhibitions through to offbeat installations, and there’s also the city’s vibrant street art.

Paris Open Tour: The best view of Paris…

Be guided by commentaries available in 10 languages. Hop on and off as you please and enjoy fantastic views from the open top deck of our buses! One pass, 3 routes and 34 stops to explore Paris at your own pace! Main bus stops are Madeleine, Opéra, Musée du Louvre, Notre-Dame, Saint-Germain-des-Prés, Musée d'Orsay, Concorde, Champs-Elysées, Arc de Triomphe, Tour Eiffel, Trocadéro, Invalides, Montmartre-Anvers, Gare du Nord, Les Grands Boulevards, Gare Saint-Lazare, Saint-germain, Montparnasse, Saint-Paul, Bastille, Gare de Lyon, Bercy…

1 Day pass - £34.00, 2 day pass - £38.00, 3 day pass - £42.00,
Children passes £17.00

Batobus + Open Tour

Combine the 3 circuits and 34 stop-offs of the Open Tour panoramic bus with the 8 Batobus stops along the Seine river and you can be sure to see every nook and cranny of the French capital in two days.

Open Tour: Tickets From £47.00
The 10 best things to do in Paris!

**Musee d’Orsay**
This beautiful museum, once a railroad station, now houses a staggering collection of Impressionist art, as well as other items created between 1848 and 1914.

**Louvre Museum**
Home to Leonardo da Vinci’s Mona Lisa, the Louvre is considered the world’s greatest art museum, with an unparalleled collection of items covering the full spectrum of art through the ages.

**Château de Versailles**
The Château de Versailles is the symbol of the French monarchy. Originally a simple hunting pavilion for King Louis XIII, it was transformed into the marvel it is today under Louis XIV’s orders as a means to establish dominance over the nobles and to leave his trace upon the world.

**Eiffel Tower**
Completed in 1889, this colossal landmark, although initially hated by many Parisians, is now a famous symbol of French civic pride.

**Le Marais**
Located on a land-filled swamp, this revitalized neighbourhood, once a centre of high culture, fell into disrepair following the French Revolution, but has regained prominence.

**Montmartre**
Located in the 18th Arrondissement, this elevated rural neighbourhood on the outskirts of the city has a collection of upscale shops and cafés and still exudes hints of old village charm.

**Seine River**
This famous river flows from east to west through the heart of the city and divides Paris’s Left Bank and Right Bank.

**Palais Garnier - Opera National de Paris**
This performance hall hosts opera, ballet and chamber music performances.

**Arc de Triomphe**
The Arc de Triomphe was begun in 1806, on the orders of Napoleon I to honour the victories of his Grande Armée. Inspired by the great arches of antiquity, the monument combines the commemorative with the symbolic and it has always played a major role in the national republican consciousness. Every evening, the flame is lit on the tomb of the Unknown Soldier from the Great War. An exhibition portrays the history and explains its symbolic importance, nationally as well as internationally. The terrace provides superb views both by day and night across the city and its great sweeping avenues.

**Sainte-Chapelle**
The Sainte-Chapelle is the finest royal chapel to be built in France and features a truly exceptional collection of stained-glass windows. It was built in the mid 13th century by Louis IX, at the heart of the royal residence, the Palais de la Cité. It was built to house the relics of the Passion of Christ.

**Must See!**
**Moulin Rouge - The most famous cabaret in the world!**
Admire a troupe of 60 artists from all over the world who perform twice each evening in the revue ‘Féerie’, a show made up of four breath-taking tableaux: feathers, rhinestones, sequins, sparkling decor, acrobats, original music, international attractions...

If you would like any other information or would like to book any tickets, please contact Sally Garland on sally@connexhotelsandevents.com or visit Paris’ Official Website and Visitors Bureau https://en.parisinfo.com/
**MONDAY**

**EuMIC01**

**Integrated mmWave Circuits on BiCMOS & CMOS**
Chair: Domine Leenaerts¹
Co-Chair: Julien Lintignat²
¹NXP Semiconductors, ²XLIM UMR 7252, University of Limoges/CNRS

**EuMIC02**

**GaN Characterisation and Modelling**
Chair: Alberto Santarelli¹
Co-Chair: Rocco Godhi²
¹University of Bologna, ²University of Rome Tor Vergata

**EuMIC03**

**GaN Technology and Device Characterization for Improved Circuit Demonstrators**
Chair: Didier Fiorini¹
Co-Chair: Eric Bergeaud⁴
¹University of Bologna, ⁴University of Rome Tor Vergata

**EuMIC01-1**

**High Performance 60 GHz Bidirectional Phased Array Front End in SiGe BiCMOS**
Roee Ben-Yishay¹, Oded Katz¹, Benny Sheinman¹, Danny Elad¹
¹ON Semiconductor

**EuMIC02-1**

**Time Domain Drain Lag Measurement and TCAD-based Device Simulations of AlGaN/GaN HEMTs: Investigation of Physical Mechanism**
Nanasa Kumar Subramani¹, Mohamed Boualtama¹, Raphael Sommet¹, Jean-Christophe Nallatamby¹
¹XLIM Research Institute, University of Limoges, Limoges, France

**EuMIC03-1**

**GaN for 5G: A Material Perspective on Challenges and Solutions up to mm-Wave Frequencies**
Marianne Germain¹
¹EPIGAN

**EuMIC01-2**

**Ultralow Power, 3.15mW, 76.7 GHz Digitally Controlled Oscillator in 65 nm CMOS for High Data-Rate Application**
Yanlu Wang¹, Muh-Dey Wei¹, Renato Negra¹
¹RWTH Aachen University

**EuMIC02-2**

**Comparison of Harmonic Balance Simulated and Measured Ultra-short Low Frequency/Microwave Transients in Pulse to Pulse Characterization of GaN transistors**
Manuel Ben Sassa¹, Gaetano Neveus¹, Denis Barcauf²
¹XLIM UMR7252, University of Limoges/CNRS, Limoges, France

**EuMIC03-2**

**Drain Current Recovery Time Analyses of InAlGaN/GaN HEMTs Realized with a Back-Barrier Buffer Layer**
Stéphane Podorzočk, Clément Polet¹, Jean-Claude Jacquet¹, Jean-Christophe Nallatamby¹, Michel Prigent¹, Philippe Moutard¹, Eriq Chartier¹, Christian Dua¹, Piero Gamarra¹, Cédric Lacam¹, Nicolas Michel¹, Mourad Ouali², Olivier Patard¹, Sylvain L. Delage²
¹-IV Lab, ²XLIM, University of Limoges

**EuMIC01-3**

**Feasibility Demonstration of a Ka-Band Linearized Channel Amplifier in Silicon Technology for Space Applications**
Oliver Jarltd⁴, Jérôme Potemarac, Victor Manuel Leal¹, Stéphane Rochect, Jerémie Pades¹, Anthony Ghidò¹, Hervé Letieud¹, Nathalie Delilinoa, Jean-François Villenaud²
¹Techno Rénia Space France, ²University of Bordeaux, IMS laboratory

**EuMIC02-3**

**Characterization of Different Technologies of GaN HEMTs of 0.15 µm Ultra-Short Gate Length: Identification of Traps Using TCAD Based 2D Physics-based Simulation**
Mohamed Boualtama¹, Raphael Sommet¹, Jean-Christophe Nallatamby¹
¹XLIM Research Institute, University of Limoges, Limoges, France

**EuMIC03-3**

**Degradation of Ka band GaN Low-Noise Amplifier under High Input Power Stress**
Xiaodong Tong¹
¹Microsystem & Terahertz Research Center, China Academy of Engineering Physics

**EuMIC01-4**

**A Differential Traveling Wave Active Power Divider in 130 nm SiGe:BiCMOS Technology for Application in Receiver Synchronization**
Eskraı̈tı̈ Damarin², Abdul Rehman Javed³, Karthik KrishneGowda³, Ingmar Kallfass¹
¹Universität Stuttgart, ²University of Paderborn, ³Brandenburg University of Technology

**EuMIC02-4**

**Narrow-Pulse-width Double-Pulsed S-Parameters Measurements of 100-nm GaN-on-Si HEMTs**
Alberto Mario Angeli², Gian Piero Giolo¹, Camillo Floster¹, Alberto Santarelli³
¹University of Bologna

**EuMIC03-4**

**A Segmented Internally-Matched Class J GaN Power Amplifier for High Duty Cycle C-Band Radars**
Gabriele Forniccone¹, James Gunter¹
¹Integra Technologies, Inc.

**EuMIC01-5**

**Broadband Linearization Technique for mmWave Circuits**
Alok Sethi¹, Jere Rusanen¹, Jari P. Akio¹, Aarno Pärssinen¹, Timo Raikkonen¹
¹University of Oulu

**EuMIC02-5**

**GaN HEMT Model with Enhanced Accuracy under Back-off Operation**
Valeria Vadalä¹, Antonio Ratthi¹, Ken Kikuchi¹, Hiroshi Yamamoto¹, Gianni Bedi¹, Kazutaka Inoue², Norihiko Ui², Giorgio Vannini¹
¹University of Ferrara, ²Sumitomo Electric Industries
10:50 - 11:00
**Welcome Address**

*Opening of the European Microwave Integrated Circuits Conference 2019*

Farid Medjdoub, EuMIC 2019 Chair
Jean-Christophe Nallatamby, EuMIC 2019 TPC Chair

11:00 - 11:45
**BiCMOS Integrated Millimeter-Wave Circuits for Short-Range Wireless Communications and Sensing**

Prof. Dr.-Ing. habil. Dietmar Kissinger, Ulm University

High-performance BiCMOS processes based on silicon-germanium heterojunction bipolar transistor modules are the technology of choice for the realization of millimeter-wave integrated circuits with a strong presence of competitive semiconductor fabs in Europe. They offer sufficient yield for circuits of high complexity at moderately low manufacturing cost for medium to high-volume products.

Electromagnetic waves in the millimeter-wave spectrum (30 - 300 GHz) are still capable of sufficient transmission in harsh environments such as fog or dust and can penetrate dry fabrics. At the same time the high carrier frequency results in geometrically small frontends with a large achievable absolute bandwidth, enabling miniaturized broadband circuits for ultra-fast wireless communication systems and high-resolution sensors for point-to-point and near-field applications. However, this frequency range also poses a number of challenges on the circuit design and interconnect/assembly, including novel system architectures and concepts.

This talk presents latest research results in the area of complex integrated electronic millimeter-wave circuit solutions in state-of-the-art SiGe BiCMOS technologies addressing the above-mentioned challenges. The presentation will cover different frontend architectures and integration concepts from 60 to 240 GHz toward highly-integrated transceiver frontends with high degrees of miniaturization and scalable channel solutions for massive arrays with flexible operation. Applications of the presented circuits include mobile or reconfigurable short-range/backhaul communication links and broadband near-field sensors for autonomous transportation, human-machine interfaces and bioanalysis.

11:45 - 12:30
**Trends in Active Antennas and T/R Modules for Radar and Multi-Function Systems**

Yves Mancuso, Thales Defence Mission Systems (TDMS)

The Thales presentation consists of new developments and breakthroughs in Phased Arrays Radars, Electronic Warfare and MultiFunction systems for the new generations of T/R modules, in order to decrease the mass production cost, while increasing the level of performance and reliability. In the ‘brick’ architecture, all elements of active channels (radiating elements, distributions and active components) are disposed perpendicularly to radiating aperture plane, hence resulting in heavy, bulky and complex antenna structures. The ‘tile’ architecture consists in a novel architecture for active arrays where radiating elements, RF and electronic components for transmit and receive channels are organized in layers, parallel to the radiating aperture plane. In terms of physical architecture, the tile concept has been applied in Thales Defence Mission Systems (TDMS) for conformal and/or multifunction phased array antennas: a 3-dimension module will lead to a drastic reduction of size and weight of the antenna. A complete ‘tile’ structure is obtained with a multi-layer structure where the radiating elements are connected to “3D” RF modules through a cooling plate, RF combiners and dividers, via plated-through holes and compressive RF connectors.

Trends for T/R modules are also very linked to the components: MMICs are always the key components, with evolutions towards multifunction chips, new processes like GaN, SiGe, MEMS power switches. The technical innovation is the use of SiGe front-end chips to benefit both frequency performance and integration power offered by such a technology.

All these technologies mastered by Thales are dual for Airborne and Space, Military and Civilian applications.

12:30
**End of Session**
MONDAY

EuMIC05  New GaN Process Development for Improved Thermal and Efficiency properties
Chair: Farid Medjdoub¹
Co-Chair: Gilles Dambrine²
¹IEMN-CNRS, ²IEMN-University of Lille

EuMIC06  Nonlinear CAD
Chair: Simona Donati Guerrieri¹
Co-Chair: Raphael Sommer²
¹Politecnico di Torino, ²ILJIM Research Institute, University of Limoges, Limoges, France

EuMIC07  System-Oriented mm-wave ICs
Chair: Frank C. van Vliet¹
Co-Chair: Ingmar Kallfass²
¹TNO, ²Universitat Stuttgart

EuMIC05-1  Highly Conductive Nitride Based Heterostructures for 5G Communications
Kai Cheng¹
¹ENKRIS

EuMIC06-1  Non-linear Modeling and Harmonic Balance Simulations of Track and Hold Amplifier
Ahmed El-Tantawy¹, Ali Badr², Guillaume Neveux², Denis Barbaud³, Cédric Chambon³
²ILJIM Research Institute - UMR CNRS 7252, ³Callisto Space

EuMIC07-1  100nm GaN on Si Technology for mmW 5G Application and SATCOM
Fabien Robert¹
¹OMMIC SAS

EuMIC05-2  High-speed Linear GaN Technology with a Record Efficiency in Ka-band
Jeong-Moo Moor¹, Joel Wong¹, Bob Grabar¹, Michael Antcliffe², Erdum Akkut³, A Corton³, Peter Chen³, Khalil³
²HRL Laboratories, LLC

EuMIC06-2  Time-Domain Analysis of RF and Microwave Autonomous Circuits by Vector Fitting-Based Approach
Leonardo Pantoli¹, Domenico Spinia², Daniele Romani², Giulo Antonini³, Giorgio Leuzzi³, Tom Charene³
¹University of L'Aquila, ²University of Ferrara

EuMIC07-2  A 35-39 GHz CMOS Linearized Receiver with 2 dBm IIP3 and 16.8 dBm OIP3 for the 5G Systems
Chun-Nien Chen¹, Ying Chen¹, Tai-Yu Kuo¹, Huei Wang¹
¹National Taiwan University

EuMIC05-3  Thermal Performances of Industrial 0.25-µm GaN Technology for Space Applications
Samira Dia³, Charles Tayssaud³, Christophe Cheng¹, Brune Laurent¹, Valeria Brunel¹, Didier Flouri¹, Hermann Siegel³, Herve Bando³, Anne-Marie Coulziet³
¹United Monolithic Semiconductors SAS

EuMIC06-3  GaN FET Load-Pull Data in Circuit Simulators: a Comparative Study
Gustavo Avolio¹, Antonio Rafín², Mauro Marchetti², Gianni Borì¹, Valeria Vadalà², Giorgio Vannini²
¹ANTEVERTA MW|Maury Microwave, ²University of Ferrara

EuMIC07-3  A High-Speed Millimeter-Wave OQPSK Transmitter in 28 nm CMOS FD-SOI for Polymer Microwave Fibers Applications
Fioran Vianese¹, Baudouin Martinez¹, Mathilde Sié², Anthony Goër², Eric Kreher²
¹STMicroelectronics, ²Université Grenoble Alpes, CEA, LETI, ³University of Bordeaux, Bordeaux INP, UMR CNRS 5218, IMS Laboratory

EuMIC05-4  Demonstration of 30 GHz OIP3/PDC > 10 dB by mm-wave N-polar Deep Recess MISHEMTs
Matthew Gudry¹, Shan Romanczyk², Hassen Lz², Elaheh Ahmad³, Steven Wenzluche², Kun Zheng⁴, Stacia Keller³, Umesh Mishra³
¹UCSB

EuMIC06-4  Physically-based Statistical Analysis of Nonlinear Circuits Through X-parameters
Simona Donati Guerrieri¹, Fabrizio Bonani², Giovanni Ghione²
¹Politecnico di Torino

EuMIC07-4  A D-band Fully-Integrated 2-RX, 1-TX FMCW Radar Sensor with 13 dBm Output Power
Muhammad Furqan¹, Faisal Ahmed¹, Andreas Stelzer²
¹Infineon Technologies Austria AG, ²Johannes Kepler University

EuMIC05-5  Study of Thick Copper Metallization with WNx as Diffusion Barrier for AlGaN/GaN HEMTs
Y. C. Lin¹, Ming-Wen Lee¹
¹NCTU

EuMIC06-5  Reduced-Cost Gradient-Based Optimization of Compact Impedance Matching Transformers in Highly-Dimensional Parameters Spaces
Slawomir Koziel¹, Anna Pietrenko-Dabrowska²
¹Reykjavik University, ²Gdansk University of Technology

EuMIC07-5  A Fully Integrated 30- to 160GHz Coherent Detector with a Broadband Frequency Comb in 65nm CMOS
Babak Jamali¹, Aydin Babakhani²
¹University of California, Los Angeles, ²Rice University
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<td>16:10 - 16:30</td>
<td>EuMIC08</td>
<td>Ka to W Band GaN/Si CW Power Amplifiers</td>
<td>Rémy Leblanc¹, OMMIC SAS</td>
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<td>16:10 - 16:30</td>
<td>EuMIC09</td>
<td>Energy-based Capacitance Modeling for Field-effect Transistor Stability Analysis</td>
<td>Manuel Schmidt-Sczesnewski¹, Ampelion</td>
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<td>16:30 - 16:50</td>
<td>EuMIC10</td>
<td>Compact and Performing Transmission Lines for Mm-wave Circuits Design in Advanced CMOS Technology</td>
<td>Giuseppe Ace⁷, Luigi Bozzo², Nicolas Corrado⁷, Florence Podevin¹, Emmanuel Pietro⁷, Telfour Liu⁷, Erik Vanzaert⁷, Philippe Ferrara⁷, INPS, RFIC-Lab, University of Càlábria, Univ. Grenoble Alpes, IMEP-LAHIC Grenoble, Fraunhofer Institute</td>
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<td>16:50 - 17:10</td>
<td>EuMIC08</td>
<td>A 5 to 18GHz, 10 W GaN Power Amplifier Using Non-distributed Approach</td>
<td>Simplice Gong⁴, Yoganand Varamañu, Suman K⁴, Uwaalia GP, Pramod Singh⁴, Judith Chu⁴, Nellus Semiconductors Pte Ltd, Yana Microwave Products Limited</td>
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<td>16:50 - 17:10</td>
<td>EuMIC09</td>
<td>HEMT Small-Signal Modelling for Voltage-Controlled Attenuator Applications</td>
<td>Yimin Tao¹, University of Electronic Science and Technology of China</td>
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<td>17:10 - 17:30</td>
<td>EuMIC10</td>
<td>Full Waveguide E- and W-Band Fundamental VCOs in SiGe:C Technology for Next Generation FMCW Radars Sensors</td>
<td>Christian Bredendiek¹, Klaus Aufinger², Nils Pohl³, Fraunhofer Institute for High Frequency Physics and Radar Techniques FHR, Fraunhofer Institute</td>
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<td>17:30 - 17:50</td>
<td>EuMIC08</td>
<td>A High Gain Ka-Band Asymmetrical GaAs Doherty Power Amplifier MMIC for 5G Applications</td>
<td>Ahmet Degirmenci¹, Ahmet Aktuğ¹, Aselsan Inc.</td>
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<td>17:30 - 17:50</td>
<td>EuMIC09</td>
<td>Intrinsic Capacitance Extraction from Pulsed S-parameters</td>
<td>Clarín Wilson¹, Justin King¹, University College Dublin, Trinity College Dublin</td>
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<td>17:50 - 17:50</td>
<td>EuMIC10</td>
<td>An Inductorless 60 GHz Down-Conversion Mixer in 22 nm FD-SOI CMOS Technology</td>
<td>Paolo Valerio Testa¹, Vincent Red³, Corrado Carta¹, Frank Ellinger¹, TU Dresden</td>
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<tr>
<td>17:50 - 17:50</td>
<td>EuMIC08</td>
<td>An Area Efficient 48 - 62 GHz Stacked Power Amplifier in 22 nm FD-SOI</td>
<td>Mengqi Cui¹, Zoltán Tibenszky¹, David Fritsche¹, Comanda Cavo¹, Frank Ellinger¹, Technische Universität Dresden</td>
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<td>17:50 - 17:50</td>
<td>EuMIC09</td>
<td>Effective Resistivity Extraction of Low-Loss Silicon Substrate at Millimeter-Wave Frequencies</td>
<td>Lucas Myself¹, Martin Ruck¹, Jean-Pierre Raukin¹, Université catholique de Louvain</td>
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<tr>
<td>17:50 - 17:50</td>
<td>EuMIC10</td>
<td>A 2.38 GHz Linear GaAs pHEMT TIA for a Quasi-Coherent Optical Receiver</td>
<td>Guillermo Sita Valdecasa¹, Jesper Berveersen Jensen¹, Martin Didikier⁷, Tom Keitkem Johansen⁷, Department of Electrical Engineering, Technical University of Denmark, Biftos Communications ApS, NIKOBI Engineering</td>
</tr>
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### TUESDAY

#### EuMC/EuMIC01
**Low-Noise amplifiers**
Chair: François Doborges¹  
Co-Chair: Amparo Herrera Guardado²  
¹ESA-ESTEC, ²University of Cantabria

#### EuMIC11
**ICs Beyond 100 GHz**
Chair: Christian Fager¹  
Co-Chair: Vadim Isakov²  
¹Chalmers University of Technology, ²Infineon Technologies AG

#### EuMC/EuMIC02
**Photonic-Electronic Devices**
Chair: Marion K. Matters-Kammerer¹  
Co-Chair: Franco Giannini²  
¹Eindhoven University of Technology - TU/e, ²University of Rome Tor Vergata

### 08:30 - 10:10

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
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</thead>
</table>
| E01 EuMC/EuMIC01-1 | New frontier for RF GaN Technologies applied to SIP product | Didier Floriot¹  
¹United Monolithic Semiconductors SAS |
| E02 EuMIC11-1 | A 18-dBm G-band Power Amplifier using 130-nm SiGe BiCMOS Technology | Abdul Elkader¹  
¹University of Rome Tor Vergata |
| E03 EuMC/EuMIC02-1 | THz Optoelectronic Systems: Trends and Potential | Robert Criado¹  
¹LUZ WAVE LABS |
| E01 EuMC/EuMIC01-2 | Limiting the Output Power of Rugged GaN LNAs | Evelyne Kaule¹, Cristina Andrei¹, Stefan Gerlich¹, Ralf Doerner², Matthias Rudolph¹  
¹Brandenburg University of Technology, ²Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik |
| E02 EuMIC11-2 | A Broadband Antenna-Coupled Terahertz Direct Detector in a 0.13-µm SiGe HBT Technology | Marcel Andree¹, Janusz Goźdz, Ritesh Jain¹, Bernd Heinemann¹, Ulrich R. Pfeifer¹  
¹University of Wuppertal |
| E03 EuMC/EuMIC02-2 | THz Optoelectronic Systems: Trends and Potential | Mohammad Aliha¹  
¹Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik |
| E01 EuMC/EuMIC01-3 | High Robustness S-Band SiGe HBT Based LNA | Jubaid Qayyum¹, John Albrecht¹, John Papapolymerou¹, Ahmet Ulusoy¹ ²  
¹Michigan State University, ²Karlsruhe Institute of Technology (KIT) |
| E02 EuMIC11-3 | A 300 GHz Active Frequency Tripler in Transferred-Substrate InP DHBT Technology | Tom Keinicke Johansen¹, Maruf Hossain², Sebastian Bopp², Ralf Doerner², Viktor Krozer², Wolfgang Heinrich²  
¹Technical University of Denmark, ²Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik |
| E03 EuMC/EuMIC02-3 | Pulsed Photoconductive Connected Slot Array Operating at the Sub-mm Wavelength Band | Christian Fager¹, Vadim Isakov²  
¹Chalmers University of Technology, ²Infineon Technologies AG |
| E01 EuMC/EuMIC01-4 | A 23-31 GHz Robust Low-Noise Amplifier with 1.1 dB Noise Figure and 28 dBm Psat | Penghui Zheng¹, Shijian Zhang¹, Jianxing Xu¹, Peng Wang¹, Xiaodong Tong¹  
¹Microsystem & Terahertz Research Center, China Academy of Engineering Physics |
| E02 EuMIC11-4 | An Integrated mm-Wave Quadrature Up-Conversion Mixer Based on a Six-Port Modulator | Vincent Kies¹, Paul Stähle¹, Conrado Carl¹, Frank Ellinger¹  
¹TU Dresden |
| E03 EuMC/EuMIC02-4 | Pulsed Photoconductive Connected Slot Array Operating at the Sub-mm Wavelength Band | Alessandro Grimaldi¹, Peter Skapar³, George Carluccio⁴, Joshua Freeman⁴, Ioan Lager²  
¹TNO Defense, Safety and Security, ²PHIX Photonics Assembly, ³University of Leeds, ⁴Netherlands Institute for Space Research (SRON) |
| E01 EuMC/EuMIC01-5 | A 28-60 GHz SiGe HBT LNA with 2.4-3.4 dB Noise Figure | Jiaojia Guay¹, John Albrecht¹, John Papapolymerou¹, Ahmed Uusay² ³  
¹Michigan State University, ²Karlsruhe Institute of Technology (KIT) |
| E02 EuMIC11-5 | A 300 GHz Active Frequency Tripler in Transferred-Substrate InP DHBT Technology | Tom Keinicke Johansen¹, Maruf Hossain², Sebastian Bopp², Ralf Doerner², Viktor Krozer², Wolfgang Heinrich²  
¹Technical University of Denmark, ²Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik |
| E03 EuMC/EuMIC02-5 | Pulsed Photoconductive Connected Slot Array Operating at the Sub-mm Wavelength Band | Alessandro Grimaldi¹, Peter Skapar³, George Carluccio⁴, Joshua Freeman⁴, Ioan Lager²  
¹TNO Defense, Safety and Security, ²PHIX Photonics Assembly, ³University of Leeds, ⁴Netherlands Institute for Space Research (SRON) |
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<th>E05</th>
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<tr>
<td><strong>EuMC01</strong>&lt;br&gt;Passive Devices - Theory and Applications&lt;br&gt;Chair: Antonio Lisboa Da Souza¹&lt;br&gt;Co-Chair: Anthony Ghiotto²&lt;br&gt;¹Universidade Federal da Paraíba, Brazil, ²Bordeaux INP, IMS Laboratory</td>
<td><strong>EuMC02</strong>&lt;br&gt;High Directivity Antennas&lt;br&gt;Chair: Diego Masci¹&lt;br&gt;Co-Chair: Martino Aldrigo²&lt;br&gt;¹University of Bologna, ²IMT</td>
</tr>
<tr>
<td><strong>EuMC01-1</strong>&lt;br&gt;Passive Ferrite Devices: Original Designs and New Challenges for the Future’s Applications&lt;br&gt;Hamza Turki¹&lt;br&gt;¹INOVEOS SAS</td>
<td><strong>EuMC02-1</strong>&lt;br&gt;From Antenna Measurement to 5G OTA – a Paradigm Shift&lt;br&gt;Benoit Derat¹&lt;br&gt;¹Rohde &amp; Schwarz GmbH &amp; Co. KG</td>
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<td><strong>EuMC01-2</strong>&lt;br&gt;Self-Heating Study on a First Order Filter with Discrete and Continuous Tuning&lt;br&gt;Miguel Sanchez-Solano¹, Rozeni Allanci¹, Vincent Le Sauf¹, Hassan Bouzazaou², Alexandre Manchete², Cédric Queued²&lt;br&gt;¹University of Aix-Marseille, ²Lab-STICC-Université de Bretagne Occidentale, ³ENSTA-Bretagne, ⁴Éliphiła [STC]</td>
<td><strong>EuMC02-2</strong>&lt;br&gt;Analysis and Design of Arrays with Tilted Directive Dipole Elements&lt;br&gt;Cristina Yepes¹, Elio Gardini¹, Stefania Momo², Frank E. van Vliet¹, Andrea Neto¹, Daniele Cavallo¹&lt;br&gt;¹Delft University of Technology, ²TNO Defense, Safety and Security</td>
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<td><strong>EuMC01-3</strong>&lt;br&gt;Broadband Phase Control in Frequency and Time Domains: Design of True Delay-Lines for Noise-Decorrelation in Sensor-Arrays&lt;br&gt;Sidina Niiawé¹, Damienne Bajou¹&lt;br&gt;¹Ariane Technologies, ²SAE SUPAERO Université de Toulouse</td>
<td><strong>EuMC02-3</strong>&lt;br&gt;Dual-polarized Leaky Wave Antenna with Low Cross-polarization Based on the Mode Composite Ridged Waveguide&lt;br&gt;Yihong Su¹, Jianzi Li¹, Yong Fan¹, Yunlong Lu¹, Guangpeng Xu¹&lt;br&gt;¹University of Electronic Science and Technology of China, ²Ningbo University</td>
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<td><strong>EuMC01-4</strong>&lt;br&gt;Modal Analysis and Same-Bandedge Response Optimization of 3-D Lumped Networks&lt;br&gt;Yelei Yao¹, Mustafa S. Batin², Ian Hunter³&lt;br&gt;¹University of Leeds, Leeds, United Kingdom, ²Novo Nordisk Healthcare, ³University of Electronic Science and Technology of China</td>
<td><strong>EuMC02-4</strong>&lt;br&gt;Substrate-Superstrate Leaky-Wave Antenna with Interleaved Metasurfaces for Directivity Improvement&lt;br&gt;Silvia Tofani¹, Walter Fauzado¹, Paolo Burghignoli¹, Paolo Baccarelli², Alessandro Galli¹&lt;br&gt;¹Sapienza University, ²Roma Tre University</td>
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<td><strong>EuMC01-5</strong>&lt;br&gt;Arbitrary Terminated Negative Group Delay Circuit with Constant Signal Attenuation and Its Application to Absorptive Bandstop Filter&lt;br&gt;Godthai Chauttheuy¹, Wang Qi¹, Jongsik Lim², Yongchae Jeong¹&lt;br&gt;¹Chonbuk National University, ²Soonchunhyang University</td>
<td><strong>EuMC02-5</strong>&lt;br&gt;A High Directivity Beam-Steering Parasitic Antenna Array&lt;br&gt;Husnain Ali Kayani¹, Christophe Craeye¹&lt;br&gt;¹Université catholique de Louvain</td>
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### EuMIC12 Interactive Session 1

**Chair:** Jean-Christophe Nallatamby
**Co-Chair:** Joaquín Portilla

*XLIM Research Institute - UMR CNRS 7252, *UPV/EHU*

#### 08:30 – 10:10

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<tr>
<td><strong>EuMIC12-1</strong></td>
<td><strong>EuMIC12-6</strong></td>
<td><strong>EuMIC12-10</strong></td>
<td><strong>EuMIC12-13</strong></td>
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<tr>
<td>10W Ka Band GaN MMIC amplifier embedded in Metal Ceramic Package</td>
<td>Study of Enhancement-Mode Tri-Gate InAs HEMTs for Low Noise Application</td>
<td>A Digital Adjustable Fully Integrated Bistatic Interferometric Radar Transceiver at 60 GHz in a 130 nm BiCMOS Technology</td>
<td>A GaN MMIC HPA with 50W Output Power and 50% PAE for S-Band Radar Systems</td>
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<td>Laurent Marchal, Alain Orsat, Thiabou Haro, Eodie Richard, Véronique Senu, Marc Camiade, Christophe Chang, Gregory Mouchoff, Bertrand Gerfaud, Guillaume Le Rhuil</td>
<td>Y. C. Lin, Chun Wang</td>
<td>Matthias Völkel, Marco Dütsch, Amelie Hageleuer, Elvis Mohamed Huassain, Dietmar Kasinger, Robert Weigel</td>
<td>Rocco Guicci, Ferdinando Costanzo, Manuela Sulpizzi, Maurizio Cirillo, Ernesto Limli</td>
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<td>United Monolithic Semiconductors, THALES AVS/MS</td>
<td>NCTU</td>
<td>Friedrich-Alexander Universität Erlangen-Nürnberg (FAU)</td>
<td>University of Rome Tor Vergata, Rheinmetall Italy</td>
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| **EuMIC12-2**  | **EuMIC12-7**  | **EuMIC12-11** | **EuMIC12-14** |
| Experimental Analysis of In-package Harmonic Manipulations with a 160 W GaN HEMT Power Bar | Radio Frequency Graphene Transistor, High Yield Process and Good Stability Under Strain | A Low Power Wideband V-band LNA Using Double-Transformer- Coupling Technique and T-type Matching in 90 nm CMOS | 100 W High Power Amplifier MMIC in 0.45 µm GaN Technology |
| Omeran Ceylan, Ali Ilač, Yi-Zhu, Sergei Ples | Wei Wei, Soukaina Ben-Salk, Theo Levert, Oihana Txoperena, Emiliano Palleco, Henri Happy | Yu-Teng Chang, Tai-Yi Lin, Hsin-Chia Lu | Pramod Singh |
| Ampleon Netherlands BV | Institute of Electronics, Microelectronics and Nanotechnology, "graphene" | National Taiwan University | Astra Microwave-Products Limited, Reelus Semiconductors Pte Ltd |

| **EuMIC12-3**  | **EuMIC12-8**  | **EuMIC12-12** | **EuMIC12-15** |
| Comparative Noise Investigation of High-Performance GaAs and GaN Millimeter-wave Monolithic Technologies | A 0.41 mW Band-Tunable 6th-Order IF Filter with 40 ns Settling Time in 45 nm CMOS RFSOI | A GaN MMIC HPA with 50W Output Power and 50% PAE for S-Band Radar Systems | Systematic Experimental ft and fmax Comparison of 40-nm Bulk CMOS versus 45-nm SOI Technology |
| Walter Cicogna, Sergio Colangeli, Antonio Serrano, Lorenzo Pana, Silvio Fenu, Patrick Longhi, Ernesto Limli, Julien Poulain, Rémy Lelièvre | Rui Ma, Zoltán Tibenszky, Martin Kreßig, Frank Ellinger | Friedrich-Alexander Universität Erlangen-Nürnberg (FAU), "HP - Leibniz Institut für innovative Mikroelektronik, Uni University | Johannes Rimmelspacher, Andreas Werhoff, Robert Weigel, Vladimir Isaakov |
| University of Roma Tor Vergata, "UMIC SAS" | Technische Universität Dresden | National Taiwan University | University of Erlangen-Nuremberg, Infineon Technologies AG |

| **EuMIC12-4**  | **EuMIC12-9**  | **EuMIC12-13** | **EuMIC12-16** |
| Increased RF-Losses at the GaN/Si Interface after Eutectic Die Attach | HCI-Proof Ultra-Broadband Millimeter-Wave Amplifier for Automotive Radar | A GaN MMIC HPA with 50W Output Power and 50% PAE for S-Band Radar Systems | A 18-40GHz 10W GaN Power Amplifier MMIC Utilizing Combination of the Distributed and Reactive Matching Topology |
| Korbinian Reiser, John Tawaran, Helmut Brech, Shyam Hardikar, Robert Weigel | Nidumasa Haraegawa, Shuya Kikumoto, Shinji Yamazaki | Rocco Guicci, Ferdinando Costanzo, Manuela Sulpizzi, Maurizio Cirillo, Ernesto Limli | Chenghao Han |
| Infineon Technologies AG, Institute for Electronics Engineering, Friedrich-Alexander-Universität Erlangen-Nürnberg | DENSO CORPORATION | University of Rome Tor Vergata, Rheinmetall Italy | Nanjing Electronic Devices Institute |

| **EuMIC12-5**  | **EuMIC12-10** | **EuMIC12-14** | **EuMIC12-17** |
| Systematic Experimental ft and fmax Comparison of 40-nm Bulk CMOS versus 45-nm SOI Technology | A Digital Adjustable Fully Integrated Bistatic Interferometric Radar Transceiver at 60 GHz in a 130 nm BiCMOS Technology | 100 W High Power Amplifier MMIC in 0.45 µm GaN Technology | A 18-40GHz 10W GaN Power Amplifier MMIC Utilizing Combination of the Distributed and Reactive Matching Topology |
| Johannes Rimmelspacher, Andreas Werhoff, Robert Weigel, Vladimir Isaakov | Matthias Völkel, Marco Dütsch, Amelie Hageleuer, Elvis Mohamed Huassain, Dietmar Kasinger, Robert Weigel | Pramod Singh | Chenghao Han |
| University of Erlangen-Nuremberg, Infineon Technologies AG | Friedrich-Alexander Universität Erlangen-Nürnberg (FAU), "HP - Leibniz Institut für innovative Mikroelektronik, Uni University | Astra Microwave-Products Limited, Reelus Semiconductors Pte Ltd | Nanjing Electronic Devices Institute |

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**EuMIC12**

EuMIC Interactive Session 1

**Chair:** Jean-Christophe Nallatamby
**Co-Chair:** Joaquín Portilla

*XLIM Research Institute - UMR CNRS 7252, *UPV/EHU*
EuMW01
EuMW/EuMC Opening Session
Chair: Denis Barataud, EuMW 2019 General Chair
Co-Chair: Stephane Bila, EuMC 2019 Chair
*XLIM UMR7252, Université of Limoges/CNRS, Limoges, France

10:50 - 11:00
Welcome Address
Opening of the European Microwave Week 2019
Denis Barataud, EuMW 2019 General Chair

11:00 - 11:05
EuMA Welcome Address
Frank Van Den Bogaart, EuMA President

11:05 – 11:10
Greetings from IEEE MTT-S
Dominique Schreurs, IEEE MTT-S President

11:10 – 11:15
Opening of the European Microwave Conference 2019
Stephane Bila, EuMC 2019 Chair

11:15 – 11:25
Greetings from EuMW 2019 Platinum Sponsor
Benoit Neel, Vice President and General Manager for Keysight EMEA

11:25 – 11:55
1969 – 2019: Souvenir of 50 years of Microwave Conferences
The first EuMC conference took place in London in 1969. We wanted, through a first presentation, to go back over these 50 years of European microwave conferences thanks to retrospectives on microwave circuits and radar. Pr. André Vander Vorst will tell the story of the inaugural organization of the first edition of this European Microwave Conference in London. Then, Pr. Roberto Sorrentino will offer a selective retrospective on microwave circuits since 1969. Finally, because EuRAD did not exist but radar was already an important topic for the microwave research community, Pr. Leo Ligthart will present a selective retrospective on radar.

11:55 – 12:25
Beyond 100GHz transport technology and applications
Paolo Di Prisco, Wireless Transport Product Strategy leader from NOKIA

The shift towards higher spectrum bands for mobile backhaul to provide large and unused spectrum is well aligned to future 5G capacity requirements and densification targets, in order to satisfy the ultra-dense network scenario. RF and antenna technology evolution are demonstrating breakthrough results, both in terms of performance and form factor which are key for the wireless transport success in this area to achieve fiber-like capacity. Such evolution will offer unique opportunity to enlarge the applicability of spectrum beyond 100GHz not only to x-Haul but also to enterprise, smart cities and industrial applications.

12:25 – 12:45
Awards Ceremony
Andy Gibson, Chair EuMA Awards Committee

EuMA Distinguished Service Award
EuMA Outstanding Career Award
Certificate of Recognition of Distinguished Service as General Chair of EuMW 2018
Certificate of Recognition of Distinguished Service as General Chair of EuMCE 2019

12:45
End of Session
**EuMC/EuMIC03-1**  
Challenges & Solutions of High Frequency and High Output Power GaN-based SSPAs  
Jose Maria Aguiar\(^1\)  
\(^1\)TI Norte

**EuMC/EuMIC03-2**  
10W Ka Band MMIC Power Amplifiers based on InAlGaN/GaN HEMT Technology  
Clément Pérès\(^1\), Stéphane Potocki\(^1\), Christophe Chang\(^2\), Olivier Patard\(^2\), Linh Tinh Vu\(^3\), Jan Goossens\(^4\), Pietro Garzani\(^5\), Philippe Allurant\(^5\), Eric Chartier\(^6\), Jean-Claude Jacquet\(^6\), Cédric Lacan\(^6\), Nicolas Michel\(^6\), Christian Dui\(^6\), Mouded Ouaffi\(^6\), Sylvain L. Delage\(^6\)  
\(^1\)IV Labs, \(^2\)Nokia Bell Labs, \(^3\)Thales, \(^4\)UMS SAS

**EuMC/EuMIC03-3**  
3.6 GHz Integrated Inverse Class-E Amplifier with Polar Modulation Capability  
Andrés Sedeñ\(^1\), Albrecht Gündel\(^2\), Martin Kretag\(^2\), Paul Stahl\(^1\), Jens Wagner\(^2\), Frank Ellinger\(^2\)  
\(^1\)Technische Universität Dresden, \(^2\)Airrays GmbH

**EuMC/EuMIC03-4**  
Quasi Inverse Class-F X-Band Highly Efficient Power Amplifier with 51.8% Peak PAE in SiGe  
Samuel Redois\(^1\), Eric Kerhervé\(^2\), Anthony Ghiotto\(^2\), Bruno Louis\(^3\), Yves Marcoux\(^3\), Vincent Phélip\(^3\)  
\(^1\)University of Bordeaux, IMS laboratory, \(^2\)Bordeaux INP, \(^3\)Thales Defence Mission Systems (TDMIS)

**EuMC/EuMIC03-5**  
Low Phase Noise Digital Division by 2 and by 3 of a 30 GHz Coupled Optoelectronic Oscillator  
Amrioul Cibert\(^1\), Olivier Loyau\(^2\), Gilles Cibert\(^2\), Eric Tournier\(^2\)  
\(^1\)LAAS-CNRS, \(^2\)INSA

**EuMC/EuMIC03-6**  
A Novel Wide-Band Finger-Shaped Phase Shifter on Silicon-On-Glass (SOG) Technology for Sub-Millimeter Wave and Terahertz Applications  
Aldin Tešić\(^1\), Suren Gignyan\(^1\), Mohamed Bamba\(^2\), Sujet Chauhan\(^2\), Safiiddin Sattari-Nasiri\(^2\)  
\(^1\)University of Waterloo

**EuMC/EuMIC04-1**  
A Compact and Broadband Phase Shifter with Bridged-T Circuit Topology  
Ryota Hongo\(^1\), Naotaka Hanga\(^2\), Tawas Mokhtari\(^2\), Shintaro Shinjo\(^3\)  
\(^1\)Mitsubishi Electric Corporation

**EuMC/EuMIC04-2**  
2-12 GHz High-Power GaN MMIC Switch Utilizing Stacked-FET Circuit  
Naotaka Hanga\(^4\), Ryota Hongo\(^5\), Shintaro Shinjo\(^6\), Yoshitaka Kanno\(^6\), Shintaro Shinjo\(^6\)  
\(^4\)Mitsubishi Electric Corporation

**EuMC/EuMIC04-3**  
A Novel Injection-Locked Frequency Tripler for V-band Applications  
Yu-Hsin Chang\(^1\), Yen-Chung Chiang\(^2\)  
\(^1\)National Formosa University, \(^2\)National Chung Hsing University

**EuMC/EuMIC04-4**  
A GaAs Frequency Doubler with 38 dB Fundamental Rejection From 22 to 40 GHz Using a Transformer Balun  
Sudipta Chakraborty\(^1\), Leigh E. Miller\(^1\), Simon Makson\(^1\), Anthony Parker\(^1\), Michael Heinrich\(^1\)  
\(^1\)Macquarie University

**EuMC/EuMIC04-5**  
A 0.5 THz Signal Source with -11 dBm Peak Output Power Based on InP DHBT  
Olivier J. S. Ostinelli\(^1\), Colombo Bolognesi\(^2\), Wolfgang Heinrich\(^3\), Viktor Krozer\(^3\)  
\(^1\)Ferdinand-Braun-Institut (FBH) Leibniz-Institut für Höchstfrequenztechnik, \(^2\)University of Duisburg-Essen, Duisburg, Germany, \(^3\)ETH Zürich

**EuMC/EuMIC05-1**  
A 115-185 GHz 75-115 mW High-Gain PA MMIC in 250-nm InP HBT  
Zach Griffith\(^1\), Miguel Urteaga\(^1\), Petra Rowell\(^1\)  
\(^1\)Teledyne Scientific and Imaging

**EuMC/EuMIC05-2**  
High Data Rate W-Band Balanced Schottky Diode Envelope Detector for Broadband Communications  
Angel Blanco Granja\(^1\), Dimitrios Konstantinou\(^2\), Simon Rommel\(^2\), Bruno Chiesa\(^2\), Sebastian Rodriguez\(^3\), Simon Maben\(^3\), Sebastian Rodriguez\(^3\), Ulf Johannsen\(^2\), Rolf Jakoby\(^1\), Tom Keinicke Johansen\(^3\), Idelfonso Tafur Monroy\(^2\), Andreas Penirschke\(^4\)  
\(^1\)Technische Universität Darmstadt, \(^2\)Eindhoven University of Technology - TUE, \(^3\)Technical University of Denmark, \(^4\)Mittelhessen University of Applied Sciences

**EuMC/EuMIC05-3**  
A D-band 4-ways Power Splitter/combiner Implemented on a 28nm Bulk CMOS Process  
Fernando Barrera\(^1\), Alexandre Siligaris\(^1\), Benjamin Blampey\(^1\), Jose Luis Gonzalez-Jimenez\(^1\)  
\(^1\)Université Grenoble-Alpes/CEA-Leti

**EuMC/EuMIC05-4**  
A Novel Wide-Band Finger-Shaped Phase Shifter on Silicon-On-Glass (SOG) Technology for Sub-Millimeter Wave and Terahertz Applications  
Aidin Taeb\(^1\), Suren Gignyan\(^1\), Mohamed Bamba\(^2\), Sujet Chauhan\(^2\), Safiiddin Sattari-Nasiri\(^2\)  
\(^1\)University of Waterloo
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<td>13:50-14:10</td>
<td>E04</td>
<td>EuMC03 Battery-Less Circuits for Emerging Technologies</td>
<td>Chair: Nuno Borges Carvalho¹</td>
<td>Co-Chair: Diego Masotti²</td>
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<td>¹Instituto de Telecomunicaciones, DETI, Universidade de Aveiro, ²University of Bologna</td>
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<td>14:10-14:30</td>
<td>E05</td>
<td>EuMC04 Non-Planar Filters I</td>
<td>Chair: Giuseppe Macchiarella¹</td>
<td>Co-Chair: Simone Bastioli²</td>
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<td>¹Politecnico di Milano, ²RS Microwave</td>
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<td>14:30-14:50</td>
<td>E08</td>
<td>EuMC05 Novel Antenna Materials</td>
<td>Chair: Ioan Lage¹</td>
<td>Co-Chair: Józef Modestski²</td>
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<td>¹Delft University of Technology, ²Warsaw University of Technology</td>
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<td>14:45-14:50</td>
<td>E04-1</td>
<td>EuMC03-1 Wireless Power Opportunities in Aerospace</td>
<td>Rhyi Philip¹</td>
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<td>¹Airbus Defence &amp; Space by Airbus</td>
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<td>14:50-15:10</td>
<td>E04-2</td>
<td>EuMC04-2 Vertical Feeding Section with a Band-Rejection Filtering Function for a Low-Profile Antenna</td>
<td>Motomi Abe¹, Tomohiro Takahashi¹, Masataka Otsuka¹, Toru Takahashi¹, Nissan Yoneda¹</td>
<td>¹Mitsubishi Electric Corporation</td>
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<td>15:10-15:30</td>
<td>E04-3</td>
<td>EuMC04-3 Easy-to-Fabricate Embedded Negative Coupling Structure for Post-Loaded Dielectric Resonator Filter</td>
<td>Sang-gi Lee¹, Seung-yoo Nam¹, Boyoung Lee¹, Juneop Lee¹</td>
<td>¹Korea University</td>
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<td>15:45-15:50</td>
<td>E04-4</td>
<td>EuMC04-4 Ku-Band Waveguide Filter with Multiple Transmission Zeros by Resonant Source to Load and Bypass Cross-Coupling</td>
<td>Daniel Mate¹, Alex Motean López¹, Jorge A. Ruiz-Cruz¹, Michael Hof¹</td>
<td>¹Christian-Albrechts-Universität zu Kiel, ²Universidad Autónoma de Madrid</td>
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<td>16:05-16:10</td>
<td>E04-5</td>
<td>EuMC04-5 Compact On-board L-band Dielectric-loaded Diplexer for High-power Applications</td>
<td>Lisa Pellicci¹, Fabrizio Cacciamani¹, Alessandro Cazzola¹, Davide Tirodoni¹, Paolo Vallerontona¹, Roberto Sorrentino¹, Walter Staffa¹, Francesco Vital¹, Elia Picchione¹, Jaione Gallardo¹, Pelinrito Martin-Iglesias¹</td>
<td>¹RF Microtech Srl, ²Istituto Aeronautica Spazio Italia, ³ESA ESTEC</td>
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<td>16:15-16:30</td>
<td>E04-6</td>
<td>EuMC04-6 Determination of Effective Dielectric Constant and Resonant Frequency of Microstrip Patch Antenna with Multilayered Superstructure Structures</td>
<td>Dinesh Rani¹, Mohammad Hashmi¹</td>
<td>¹IT Delhi</td>
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<td><strong>EuMC/EuMIC06-1</strong></td>
<td><strong>EuMC/EuMIC06-4</strong></td>
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<td><strong>Tune-All Substrate-Integrated-Waveguide (SIW) Bandpass Filters</strong></td>
<td><strong>A Miniatured 28-GHz FEM using a 0.15-µm InGaAs/GaAs E-mode pHEMT Process</strong></td>
<td><strong>High-Reliability Active Integrated Power Limiter with Sharp Compression Profile in Ka-Band in 130 nm SiGe Technology</strong></td>
<td><strong>Sub-THz On-chip Dielectric Resonator Antenna with Wideband Performance</strong></td>
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<td>Martin Deng¹, Dimitra Psychogiou¹</td>
<td>Hui Dong Lee¹</td>
<td>Manuel Potereau¹, Nathalie Deltempo¹, Anthony Ghizzol¹, Oliver Jardel¹, Stéphane Rochette¹, Hervé Leblond¹, Jean-François Vilmannaze¹</td>
<td>Abdul Ali¹</td>
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<td>University of Colorado Boulder</td>
<td><em>Electronics and Telecommunications Research Institute</em></td>
<td>*University of Bordeaux, IMS laboratory, <em>Thales Alenia Space en France</em></td>
<td><em>University of Rome Tor Vergata</em></td>
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<td><strong>A Reconfigurable Array for Media Based Spatial Modulation</strong></td>
<td><strong>A Planar Single-ended Kilowatt-level VHF Class E Power Amplifier</strong></td>
<td><strong>Unified Feedback Beamforming Digital Predistorter</strong></td>
<td><strong>Simple Microwave Measurement System Using Bi-Directional Configuration of VCSEL and PD-TIA from 6 to 16 GHz</strong></td>
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<td>Anita Roy¹, Vinny A.J.</td>
<td>Renbin Tong¹, Stefan Book¹, Long Hoang¹, Dragos Dancila¹</td>
<td>Suguru Habu¹, Yasushi Yamao¹, Hiroshi Suzuki¹</td>
<td>Satoko Kurokawa¹</td>
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<td><em>Uppsala University</em></td>
<td><em>Advanced Wireless &amp; Communication Research Center, the University of Electro-Communications</em></td>
<td><em>National Institute of Advanced Industrial Science and Technology</em></td>
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<td><strong>20-44 GHz Mismatch Tolerant Programmable Dynamic Range with Inherent CMRR Square Law Detector for AGC Applications</strong></td>
<td><strong>4096-QAM Microwave Transmitter Providing Efficiency Exceeding 50% and EVM Below 1%</strong></td>
<td><strong>Screening of Integrated GaAs Stacked-FET Power Amplifiers</strong></td>
<td><strong>A Miniatured 28-GHz FEM using a 0.15-µm InGaAs/GaAs E-mode pHEMT Process</strong></td>
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<td>Ahmed Amer¹, Mohamed Abdalla², Islam Eshrah¹</td>
<td>Earl McCune¹, Quentin Diduck¹</td>
<td>Gij van der Heij¹, Peter de Heij¹, Frank E. van Vliet¹</td>
<td><em>Electronics and Telecommunications Research Institute</em></td>
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<td><em>Eridan Communications</em></td>
<td><em>Thales Alenia Space en France</em></td>
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16:10 – 16:50
Trends in Microwave Technologies for Space Application
Natanael Ayllon, European Space Agency, ESTEC

Microwave technologies are fundamental part in space missions of all kind spanning from telecommunication, earth observation, science, navigation to human spaceflight and robotic exploration. Among all, telecommunication is the domain using microwave technologies the most. The microwave equipment ranges from solid-state power amplifiers, travelling-wave tube amplifiers, frequency converters and signal generation subsystems and complex RF passive networks such as switch matrices, multiplexers and complex input/output sections. Over the last decades, most of the efforts have been put on improving the performance (electrical, mechanical, thermal) to satisfy the ever increasing demand for data throughput, the issue being that both the non-recurring engineering costs as well as the recurring engineering cost of the equipment increased considerably for marginal improvement of performance. The same problem applies when going to higher frequencies i.e. beyond Ka-band. Nowadays, space-borne systems using Q/V-Bands are being developed; however, telecommunication operators are still reluctant to deploy such systems due to the inherent costs of the space segment and limited legacy. Moreover, the rapid evolution of the telecommunication market might not guarantee operators the recovery of the considerable initial investment. The talk will present the challenge ahead and will describe what are the current trends in telecommunication payloads and its associated RF equipment and technologies that are being considered to reduce the cost of the space segment while at the same time satisfy the demand from the user needs. Finally, the presentation will also highlight the ongoing development activities within the European Space Agency concerning MMC developments for various applications domains.

16:50 – 17:40
Foundry Session
Chair: Eric Leclerc, United Monolithic Semiconductors S.A.S.

Several key representatives of RF and microwave semiconductor foundries will give short presentations of their foundry capabilities with respect to the impact of advanced GaN, GaAs and silicon technologies for military and Space, as well as civilian applications in sensing and communication. This includes details of current fully-released and commercially available processes and processes in development. There will also be an opportunity for questions and answers during this interactive forum.

17:40 – 17:50
Awards Ceremony
Eric Bergeault, EuMW2019 Awards Coordination Chair.
Florence Podevin, EuMW2019 Student Activities Coordination Chair
Nathalie Deltimple, EuMW2019 General TPC Chair

EuMIC Microwave Prize
EuMIC Young Engineer Prizes
GaAS Association Address
GaAS Association Student Fellowships

17:50 – 18:10
Closing Remarks
Farid Medjdoub, EuMIC 2019 Chair

Invitation to EuMIC 2020 in Utrecht
François Deborgies, EuMIC 2020 Chair

18:10
End of Session
TUESDAY

**EuMC06**
Applied Computational Electromagnetics
Chair: Hervé Aubert¹
Co-Chair: Maurizio Bozzi²
¹LAAS-CNRS, ²University of Pavia

**EuMC07**
UHF, UWB and mmWave Techniques for Autonomous Sensors
Chair: Alessandra Costanzo¹
Co-Chair: Giuseppina Monti²
¹University of Bologna, ²University of Salento

**EuMC06-1**
Filter and Multiplexer Design Under SIMULIA's CST Studio Suite Environment
Carlos Vicente¹
¹Aurora Software and Testing S. L. U. (CST/3DS)

**EuMC07-1**
Battery-less UWB Indoor Location Is The Way Forward For Industry 4.0
Jan Mennekens¹
¹UWINLOC

**EuMC06-2**
Identification of Vulnerability within Front-Ends Chips using 60 GHz Near-Field Injection
Jeremy Raoult¹, Pierre Payet¹, Laurent Chusseau¹
YES - University of Montpellier

**EuMC07-2**
Robust Wireless Power Receiver for Multi-Tone Waveforms
Mahmoud Ouda¹, Paul Mitcheson¹, Bruno Clerckx¹
¹Imperial College London

**EuMC06-3**
Modeling and Analysis for Ultra-wideband Single-Cell Sensing by a Coplanar Waveguide
Alessandra Paffi¹, Micaela Liber², Francesca Apollonio¹, Xiao Ma¹, Xiaolin Ou¹, James C. Huang¹
¹Sapienza University of Rome, ²Lehigh University

**EuMC07-3**
Miniaturized Millimeter Wave RFID Tag for Spatial Identification and Localization in Internet of Things Applications
Ajibayo Adeyeye¹
¹Georgia Institute of Technology

**EuMC06-4**
Analysis of Combined Plasmon-Resonance and Photonic-Jet Effects in the THz Wave Scattering by Dielectric Rod with Graphene Strip
Sergii Dukhopelykov¹⋅²
¹Institute of Radio-Physics and Electronics NASU, ²V.N. Karazin Kharkiv National University

**EuMC07-4**
Modular and Reconfigurable Rectenna Unitcells with Beam-Forming Properties
Erik Vandelle¹, Tan-Phu Vuong¹, Gustavo Ardila¹, Ke Wu¹, Simon Hennou²
¹EPFL, ²HES-SO Grenoble, École polytechnique de Montréal, ³IMS Bordeaux

**EuMC06-5**
Optical Range Diffraction Radiation of Electron Beam in the Presence of Twin Circular Dielectric Nanowires
Daria Yevtushenko¹
¹Institute of Radio-Physics and Electronics NASU

**EuMC07-5**
An Attempt to Evaluate Potential Hydrogen in Soil Using AM Radio Waves for Agricultural Applications
Yuto Uchida¹, Kousei Kumahara¹, Tomoki Sakagawa¹, Toshiro Kuroki¹, Masanori Eguchi¹
¹National Institute of Technology, Kure College
EuMC08 Dividers and Couplers
Chair: Richard Snyder¹
Co-Chair: Rozenn Allanic²
¹RS Microwave, ²LABSTICC-UBO

EuMC09 Emerging Antenna Concepts
Chair: Wile Vikari¹
Co-Chair: Stefan Lindenmeier²
¹Aalto University, ²Institut für Hoch- und Höchstfrequenztechnik der Universität der Bundeswehr München

EuMC08-1 Analytical Design of the Radial Power Divider With Wide Isolation Bandwidths
Ching-Wen Fang¹, Zhi-Hao Huang¹
¹National Chung Cheng University

EuMC09-1 System for Multiplexed OAM Modes at 24 GHz
Christian Jimenez¹, Jerzy Kowalewski¹, Thomas Zwick¹
¹Karlsruhe Institute of Technology (KIT)

EuMC08-2 A Fully Differential Ultra-Broadband Power Divider with Integrated Resistors
Bjoern Deutschmann¹, Kevin Ekelend¹, Arne F. Jacob¹
¹Hamburg University of Technology

EuMC09-2 Reflectarray with Mechanically Steerable Beam for DTH Application
Pasha Pirvola¹, Thomas Linrey², Mario Orefice³, Michele Becari¹, Gianluca Dassano¹
¹DST-LACE, Politecnico di Torino, ²Eutelsat S.A., Paris, ³CNR-IEIIT

EuMC08-3 A PI-type Isolation Network for Improvement of Matching and Isolation in Reconfigurable Multifunctional Bandpass Filter
Xu Zhu¹
¹University of Electronic Science and Technology of China

EuMC09-3 Experimental Demonstration of a Dielectric Dome Antenna with Reduced Profile and Wide Scanning Capability
Erio Gandini¹, Fabrizio Silvestri¹, Ales Bereš¹, Giampiero Genni¹, Enrica Martin¹, Stefano Maci², Maria Carolina Viganò¹, Giovanni Toso¹
¹TNO, ²University of Siena, ³Viasat, ⁴ESA ESTEC

EuMC08-4 Wideband and Compact 3-D Quadrature Coupler for 5G Applications
Audrey Cayron¹, Christophe Villillon¹, Ayad Ghannem¹, Alessandro Magnani¹, Thierry Pans¹
¹LAAS-CNRS, ²INSA Toulouse, ³Université de Toulouse Paul Sabatier, ⁴ODS Technologies

EuMC09-4 Using UCA Techniques to Study OAM Modes Designed with Dipole Antennas at E-band
Le Fang¹, Rashauda Henderson¹
¹The University of Texas at Dallas

EuMC08-5 A Compact Wideband Wilkinson Power Divider using Periodic Synthesized Transmission Line in Silicon IPD Process
Zhong Li¹, Liming Li¹, Rong Zeng¹, Juncai Lu¹
¹China Academy of Engineering Physics

EuMC09-5 X-Band Slot Antenna Array In Air-Filled Substrate Integrated Waveguide
Homayoun Oraizi¹, Parinaz Hosseini¹, Armin Amin²
¹Iran University of Science and Technology, ²University of Twente
EuRAD01
EuRAD Opening Session

08:30 – 08:40
Welcome Addresses
Opening of the European Radar Conference 2019
Philippe Eudeline, EuRAD 2019 Chair
Jean-Yves Davyguiez, EuRAD 2019 TPC Chair

08:40 – 09:20
Electromagnetic Detection and Electronic Warfare Challenges
Florent Jangal, Radar Architect, Direction Générale de l'Armement

In order to face with the diversity of intervention areas as well as the multiplicity of modern threats, the Defense Innovation Agency supports various research and development activities. Among others, in the electromagnetic domain, we can mention high power GaN amplifier, low power SiGe transmitter/receiver, massive MIMO systems, high resolution SAR, HF radars, ultra-HiN absorber or drone swarms. The high level of digitizing and the improvement of simulation models allow to early take into account the crowding of the spectrum while more and more detection and electronic warfare sensors shall be deployed on same platforms. After brief introduction of the abovementioned challenges, some ongoing research topics will be detailed and illustrated.

09:20 – 10:00
Naval and Landbased Multi-Function Radar
Thomas Carpenter
Ground MFR Product Manager
THALES – Land Air System – Surface Radar

Thales is integrating a new generation of Multi-Function Radars (MFR), both for naval (Sea Fire) and ground (Ground Fire) based upon a common architecture, new AESA technology and a new digital processing technology using an open architecture. This paper presents progress of those technologies’ integration and highlights their advantages to improve operational radar capabilities. First part will present the improved operational capabilities offered by multifunction full element digital beam forming (FEDBF) Radars. Second part will present the development phase of MFR FEDBF radars, based on Thales Common Open Radar Architecture (CORA) and SR3D platform. Third part will present the new integration capabilities and concepts which have been developed, in order to support integration of these extensive software-defined MFR FEDBF Radars solutions, based on state-of-the-art integration tools (continuous integration, digital radar, agile, etc…). Final part will present first integration results of Sea Fire radar.

10:10
End of Session
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<tr>
<th>EuMC/EuRAD01</th>
<th>EuMC/EuRAD02</th>
<th>EuMC16</th>
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<tr>
<td>Diverse Radar Applications</td>
<td>Antennas for Radar Application</td>
<td>Transmitter/Receiver Circuits</td>
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<tr>
<td>Chair: Mehmet Karaaslan¹</td>
<td>Chair: Matthias Geissler¹</td>
<td>Chair: Matteo van Vliet¹</td>
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<td>Co-Chair: Korkut Yegin²</td>
<td>Co-Chair: Józef Modelski²</td>
<td>Co-Chair: Angel Medavilla¹</td>
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<td>¹Teledyne e2v, ²Yeditepe University</td>
<td>¹IMST GmbH, ²Warsaw University of Technology</td>
<td>¹INO, Universidad de Cantabria</td>
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### Wednesday Program

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<tr>
<th>Session</th>
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<td>Transient Waveforms Shaping for Frequency Diversity Radar Applications</td>
<td>Oussama Hamdi¹, Maxime Schutz¹, Said Farah², Sebastien Reynaud¹, Arnaud Dellier¹, Bertrand Lenor¹, Guillaume Noux¹, Cyril Diencz¹, Denis Barada¹</td>
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<td>10:50 - 11:10</td>
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<td>XUM Research Institute, University of Limoges, Limoges, France, CITIEME, MACAD Engineering, <em>novos SAR</em></td>
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<td>EuMC/EuRAD01-2</td>
<td>An Original UWB Radar Platform Based on Coherent Interleaving Sampling Technique</td>
<td>Cihan Yavuz¹, Wen-Ting Wang¹, Yang-Hui Li¹, Xingqian Chai¹, Wenguo Chen¹</td>
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<td>11:10 - 11:30</td>
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<td>EuMC/EuRAD01-3</td>
<td>Clutter-Resistant Vital Sign Detection Using Amplitude-Based Demodulation by EEMD-PCA-Correlation Algorithm for FMCW Radar Systems</td>
<td>Shaoqiang Li¹, Guowei Shen¹, Jiahe Wang¹, Shuang Li¹, Weiyuan Zhang¹</td>
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<td>EuMC/EuRAD01-4</td>
<td>Time Domain Analysis of Microwave Signal Propagating along FRPM Pipe Walls and Application to Non-destructive Inspection</td>
<td>Myoong Lee¹, Jinhyuk Kim¹, Youngtae Kim¹, Seokhyun Cho¹, Jinho Park¹</td>
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<td>11:50 - 12:10</td>
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<td>EuMC/EuRAD01-5</td>
<td>Guided Wave Tank Level Sensor</td>
<td>Alexander Kaiser¹, Christof Michelsen¹, Dirk Hammerschmidt¹, Andreas Stelzer¹</td>
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<td>JKU University Linz, <em>Kurimoto Technologies</em> Austria AG</td>
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<td>EuMC/EuRAD02-1</td>
<td>Investigation of Bent PCB Laminates for Conformal Antennas at 80 GHz</td>
<td>Jonathan Mayer¹, Manuela Nieder¹, Jörg Kowalewski¹, Thomas Zwick¹</td>
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<td>EuMC/EuRAD02-2</td>
<td>Evaluation of Antenna Calibration and DOA Estimation Algorithms for FMCW Radars</td>
<td>Michael Stepha¹, Kuang indifference Wang¹, Torsten Riesen², Robert Weig², Fabian Luz²</td>
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<tr>
<td>EuMC/EuRAD02-3</td>
<td>A 3D-Printed Coaxial-fed Waveguide 2-Slot Array for an AESA Radar Application in the Ku-band</td>
<td>Samia Abderrahim¹, Rizvan Alaric¹, Norbert Guilloud¹, Julien Hauman¹, Cedric Quendo¹, Thomas Merlet¹</td>
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<td>EuMC/EuRAD02-4</td>
<td>Design of a Horizontally Polarized Slotted Waveguide Antenna Element for Airborne Ka-PolInSAR System</td>
<td>Alicja Kosc¹</td>
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<td>EuMC/EuRAD02-5</td>
<td>Millimeter-wave Stepped Series Array with LTCC</td>
<td>Sabin Karki¹, Juha Aala-Laurinaho¹, Jianfang Zheng¹, Markku Lahit¹, Ville Villan¹</td>
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<td>EuMC/EuRAD02-6</td>
<td>Evaluation of Antenna Calibration and DOA Estimation Algorithms for FMCW Radars</td>
<td>Michael Stephan¹, Kuangda Wang², Torsten Reissland¹, Robert Weigel¹, Ke Wu², Fabian Luz²</td>
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<td>EuMC16-1</td>
<td>Analysis of High-Order Sub-Harmonically Injection-Locked Oscillators</td>
<td>Daniel Hernández¹, Mabel Pontón¹, Sabat Khesbakh¹</td>
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<td>11:10 - 11:30</td>
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<td><em>Skyworks Solutions, Skyworks Solutions Inc.</em></td>
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<td>EuMC16-2</td>
<td>HTS Quad-band High-Sensitivity Receiver for 4.5m Radio Telescope</td>
<td>Tamio Kawaguchi¹, Hiroyuki Kayano¹, Kazuhiro Tsubosaki², Hirotaka Kamide², Taro Asakura²</td>
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<td>11:30 - 11:50</td>
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<td>Toshiba Corporation, <em>Toshiba Hokuto Electronics Corporation</em></td>
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<td>EuMC16-3</td>
<td>5G RF Front End Module Architectures for Mobile Applications</td>
<td>Florinel Balteanu¹, Hardik Modi², Yunyoung Choi², Junhyung Lee², Serge Drogi², Sabat Khesbakh¹</td>
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<td>11:50 - 12:10</td>
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<td><em>Skyworks Solutions, Skyworks Solutions Inc.</em></td>
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<td>EuMC16-4</td>
<td>Reconfigurable Series Feed Network for Squint-free Antenna Beamforming Using Distributed Amplifier-Based Negative Group Delay Circuit</td>
<td>Minho Yu¹, Chung-Tse Michael Wu¹</td>
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<td>Rutgers University</td>
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<td>EuMC16-5</td>
<td>A Wideband Beamformer using 3.25 GS/sec Discrete-time Analog FIR Filter ICs</td>
<td>Shinnosuke Park¹</td>
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<td>Qualcomm</td>
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1. EUROMICRO Conference on Electromagnetics Applications (EuMC)
2. Conference on Radar Applications (EuRAD)
3. EUROMICRO Conference on Microelectronics (EuMC16)
EuMC17
Special Session LAMC
Chair: Jose E. Rayas-Sánchez²
Co-Chair: Guillermo Rafael-Valdivia², Almudena Suárez²
¹ITESO - The Jesuit University of Guadalajara, ²Universidad Tecnológica de Panamá, Instituto de Investigaciones Científicas y Servicios de Alta Tecnología

EuMC18
Emerging Components and Integration Techniques
Chair: Ke Wu¹
Co-Chair: Kamal Samanta²
¹Ecole Polytechnique de Montreal, ²Sony Europe

EuMC19
Non-Planar Filters II
Chair: Vicente E. Boria¹
Co-Chair: Stéphane Bila²
¹Universitat Politècnica de València, ²Université de Limoges, CNRS, XLIM UMR 7252

EuMC17-1
RF Exposure due to Mobile Devices Operated Close to the Human Body
Claude Emeriau, Fernandibe-Rodriguez¹, Géza Bulat¹, A.A. de Salles²
¹IFRS, Federal Institute for Education, ²UFRGS - Federal University of Rio Grande do Sul

EuMC18-1
Towards More Effective Electrical Thermal Co-design with Carbon Aluminum Composite EMI Shield
Baratunde Cola¹
¹CARBICE

EuMC19-1
Widely-Reconfigurable 2.5:1 Coaxial-Cavity Resonators Using Actuated Liquid-Metal Posts
Kahilh Sadakian¹, Dimitra Psychogiou¹
¹University of Colorado Boulder

EuMC18-2
Concurrent Dual-Mode Circulator
Amir Afshani¹, Ke Wu¹
¹Ecole Polytechnique de Montreal

EuMC19-2
3D Compact High-Q Filter Made of High-Permittivity Ceramic
Yaakoub Dia¹⋅², Laure Huitema¹, Stéphane Bila¹, Marc Thévenot¹, Nicolas Dehoîle¹, Christophe Delaveau²
¹Université de Limoges, CNRS, XLIM UMR 7252, ²CEA LETI

EuMC18-3
WR12 to Planar Transmission Line Transition on Organic Substrate
Johannes Jakobs¹, Roman Sammer², Franz Xaver Röhrl², Stefan Zott³, Werner Bugnar³
¹DT Dresden Technical Institute of Technology, ²Rohde & Schwarz GmbH & Co. KG

EuMC19-3
Synthesis Method for Manifold-Coupled Multiplexers
David Martinez¹⋅²
¹XLIM Research Institute - UMR CNRS 7252, ²INRIA

EuMC18-4
Hermetically Sealed Glass Package for Highly Integrated MMICs
Thomas Safer¹, Tobias Chakou³, Max Schulz-Rüdiger², Kevin Köhler², Christian Waldschmidt²
¹University Ulm, ²IKF, ³ZIM Fraunhofer

EuMC19-4
A Novel De-embedding Technique for Frequency Identification of Manifold Coupled Multiplexers
Sayyed Reza Mirnaziry¹, Maysam Haghparast¹, Ali Akbar Ahmadi², Ali Kheirdoost¹
¹Iran Telecommunication Research Center (ITRC), ²Kharazmi University

EuMC18-5
90 GHz Micro Laser Sintered Filter: Reproducibility and Quality Assessment
Mílim Şahin¹, Koosang Shang², Michael Lancaster³, Robert Roberts³, Thomas Starke³, Falko Boettcher³, Daniel Weber⁵
¹The University of Birmingham, ²National Physical Laboratory, ³University of Hong Kong, ⁴3D Micro Print, ⁵Freeman Technology

EuMC19-5
Low-Cost Hybrid Manufactured Waveguide Bandpass Filters with 3D Printed Insert Dielectric
Uroš Janković¹, Nandun Mohottige², Ananjan Basu³, Juraj Budimir¹
¹University of Westminster, ²Global Invacom Ltd, ³Indian Institute of Technology, Delhi
## WEDNESDAY

**EuMC20**  
**EuMC Interactive Session 3**  
Chair: Mohammed Zaknoune¹  
Co-Chair: Stéphane Bila²  
¹IEMN - CNRS, ²Université de Limoges, CNRS UMR 7252

### 10:50 – 12:30

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| **EuMC20-1** | Waveguide Coupler Design Method for Permittivity Measurement at millimeter-wave applications  
Karrar Al Khanjar¹, Tarek Djerafi¹  
¹Institut National de la Recherche Scientifique (INRS) | **EuMC20-6** | Electrolyte Concentration Measurements in DI Water with 0.125 g/L Resolution by means of CSRR-Based Structures  
Paris Vélez¹, Jonathan Muñoz-Eraso¹, Ferran Martín¹  
²Universitat Autònoma de Barcelona | **EuMC20-11** | C-Band Microstrip Lossy Filter using Resistive-loaded Closed-Loop Resonators  
Jia Yu¹, Hongfang Guo¹, Jian N.¹, Xiaoheng Hong¹, Petronio Martín Iglesias¹  
²National Taiwan University, “European Space Agency, ESTRACK” |
| **EuMC20-2** | A 2X3 Hybrid Substrate Integrated Waveguide Coupler Applied to Beamforming Network  
Tongfeng Guo¹, Bin You¹, Ke Wu¹  
¹ École Polytechnique de Montréal | **EuMC20-7** | Conductor-Backed Coplanar Waveguide on BCB with Thin Metal Layers and Via Holes  
Anne-Sophie Grimaud-Jaccquin¹, Jean-Pierre Zemouel¹, Imene Kaid Omar¹, Paul Crozet¹, Fanah Abou¹, Cédric Villebasse¹, David Bouillé¹, Frédéric Hamouda¹, Frédéric Arel¹  
²C2N, Univ Paris-Sud Paris-Saclay, CNRS UMR9001 | **EuMC20-12** | Dual-Band Bandpass SIW Resonator Filter with Flexible Frequency Ratio  
Wenjiao Li¹, Tae-Hak Lee¹, Ke Wu¹  
²École Polytechnique de Montréal |
| **EuMC20-3** | Design of an X-Band Suspended Stripline Unequal Split Power Distribution Network  
Guillaume Plassat-Julian², Jeancatique Lampante Vara¹, Carlos Zarzuco Torres¹  
¹INDRA Sistemas | **EuMC20-8** | Design and Validation of V-Band Microwave Coaxial Switch  
Qurqiang Chang¹  
²Beijing Institute of Aerospace Micro-Electro-Mechanical Technology | **EuMC20-13** | Planar Diplexer Design Using Hairpin Resonators Loaded with External Capacitors for Improvement of Isolation and Stopband Rejection Levels  
Yi-Fan Tsao¹, Ting-Jui Huang¹, Heng-Tung Hsu¹, Chia-Wei Wu²  
¹National Chiao Tung University, ²Yuan Ze University |
| **EuMC20-4** | 60 GHz Double Edge Coupled Marchand Balun for PCB Implementation  
Muhammad Omar¹, Martin Laabs¹, Niels Neumann¹, Dirk Piettenemer⁵  
¹Technische Universität Dresden | **EuMC20-9** | A W-Band Stepped Impedance Transformer Transition from SIW to RWG for Thin Single Layer Substrates with Thick Metal Cladding  
Steffen Hersel¹, Nils Pol¹  
²Fraunhofer Institute for High Frequency Physics and Radar Techniques FHR, ³Ruhr-University Bochum | **EuMC20-14** | Strip-Loaded Coplanar Waveguide Bandpass Filter with Wideband Spur-Free Response  
Mohamed El Menkh¹, Amr Safwat¹  
³Faculty of Engineering, Ain Shams University |
| **EuMC20-5** | Power Summation in Ultra-Thin Planar Dielectric Resonator with Gunn-Diodes  
Romain Culi¹, Alexandre Kogut¹, Zoya Eremenko¹, Igor Kuzmichev¹, Mohammad Islam³  
²Ya. Ilyichov Institute for Radiophysics and Electronics National Academy of Sciences of Ukraine, ³University of Kebangsaan | **EuMC20-10** | Planar Millimetre-Wave Waveguide Transition for Material Characterization at 79 GHz  
Wael A. Ahmed¹, Tomohiro Inoue¹, Delmar Keesinger¹, Herman J. Ny¹  
³Harry Diamond Laboratory, ⁴Indian Institute of Technology, ⁵Indian Institute of Technology Kharagpur | **EuMC20-15** | Design and Implementation of High Frequency and Large Group Delay Bridged-T All Pass Network  
Rajesh Kumar¹, Voxy K.J.  
³Indian Institute of Technology, Bangalore |
| **EuMC20-6** | Electrolyte Concentration Measurements in DI Water with 0.125 g/L Resolution by means of CSRR-Based Structures  
Paris Vélez¹, Jonathan Muñoz-Eraso¹, Ferran Martín¹  
²Universitat Autònoma de Barcelona | **EuMC20-11** | C-Band Microstrip Lossy Filter using Resistive-loaded Closed-Loop Resonators  
Jia Yu¹, Hongfang Guo¹, Jian N.¹, Xiaoheng Hong¹, Petronio Martín Iglesias¹  
²National Taiwan University, “European Space Agency, ESTRACK” |
| **EuMC20-7** | Conductor-Backed Coplanar Waveguide on BCB with Thin Metal Layers and Via Holes  
Anne-Sophie Grimaud-Jaccquin¹, Jean-Pierre Zemouel¹, Imene Kaid Omar¹, Paul Crozet¹, Fanah Abou¹, Cédric Villebasse¹, David Bouillé¹, Frédéric Hamouda¹, Frédéric Arel¹  
²C2N, Univ Paris-Sud Paris-Saclay, CNRS UMR9001 | **EuMC20-8** | Design and Validation of V-Band Microwave Coaxial Switch  
Qurqiang Chang¹  
²Beijing Institute of Aerospace Micro-Electro-Mechanical Technology | **EuMC20-13** | Planar Diplexer Design Using Hairpin Resonators Loaded with External Capacitors for Improvement of Isolation and Stopband Rejection Levels  
Yi-Fan Tsao¹, Ting-Jui Huang¹, Heng-Tung Hsu¹, Chia-Wei Wu²  
¹National Chiao Tung University, ²Yuan Ze University |
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²École Polytechnique de Montréal | **EuMC20-14** | Strip-Loaded Coplanar Waveguide Bandpass Filter with Wideband Spur-Free Response  
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³Faculty of Engineering, Ain Shams University |
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Yi-Fan Tsao¹, Ting-Jui Huang¹, Heng-Tung Hsu¹, Chia-Wei Wu²  
¹National Chiao Tung University, ²Yuan Ze University | **EuMC20-15** | Design and Implementation of High Frequency and Large Group Delay Bridged-T All Pass Network  
Rajesh Kumar¹, Voxy K.J.  
³Indian Institute of Technology, Bangalore |
| **EuMC20-14** | Strip-Loaded Coplanar Waveguide Bandpass Filter with Wideband Spur-Free Response  
Mohamed El Menkh¹, Amr Safwat¹  
³Faculty of Engineering, Ain Shams University | **EuMC20-15** | Design and Implementation of High Frequency and Large Group Delay Bridged-T All Pass Network  
Rajesh Kumar¹, Voxy K.J.  
³Indian Institute of Technology, Bangalore | **EuMC20-16** | Narrow Bandpass Filters Using Microstrip Lines Loaded with Asymmetric Bandstop Resonator Pairs  
Amir Ebrahimi¹, James Scott¹, Kamran Ghoreian¹  
²RMIT University |
| **EuMC20-15** | Design and Implementation of High Frequency and Large Group Delay Bridged-T All Pass Network  
Rajesh Kumar¹, Voxy K.J.  
³Indian Institute of Technology, Bangalore | **EuMC20-16** | Narrow Bandpass Filters Using Microstrip Lines Loaded with Asymmetric Bandstop Resonator Pairs  
Amir Ebrahimi¹, James Scott¹, Kamran Ghoreian¹  
²RMIT University |
| **EuMC20-16** | Narrow Bandpass Filters Using Microstrip Lines Loaded with Asymmetric Bandstop Resonator Pairs  
Amir Ebrahimi¹, James Scott¹, Kamran Ghoreian¹  
²RMIT University | **EuMC20-17** | Equivalent Calculation Method for Low-Pressure Discharge Threshold of Ridge Waveguide Filter  
Rui Wang¹  
²National Key Laboratory of Science and Technology on Space Microwave, CAST, Xian, China | **EuMC20-17** | Equivalent Calculation Method for Low-Pressure Discharge Threshold of Ridge Waveguide Filter  
Rui Wang¹  
²National Key Laboratory of Science and Technology on Space Microwave, CAST, Xian, China |
| **EuMC20-17** | Equivalent Calculation Method for Low-Pressure Discharge Threshold of Ridge Waveguide Filter  
Rui Wang¹  
²National Key Laboratory of Science and Technology on Space Microwave, CAST, Xian, China | **EuMC20-18** | Investigation of Stored Energy Distribution in Filters Using K-Means Clustering Algorithm  
Rona Pangwe², Ting Yi⁵, Richard Parry⁵  
¹University of Leeds, Leeds, United Kingdom, ²Radio Design Ltd |
| **EuMC20-18** | Investigation of Stored Energy Distribution in Filters Using K-Means Clustering Algorithm  
Rona Pangwe², Ting Yi⁵, Richard Parry⁵  
¹University of Leeds, Leeds, United Kingdom, ²Radio Design Ltd | **EuMC20-19** | A Post-fabrication Tuning Method using Space Mapping and Surrogate Modeling Techniques  
Xiaolin Fan¹, Song Li¹  
¹University of Regina |
| **EuMC20-19** | A Post-fabrication Tuning Method using Space Mapping and Surrogate Modeling Techniques  
Xiaolin Fan¹, Song Li¹  
¹University of Regina | **EuMC20-20** | Investigation of Stored Energy Distribution in Filters Using K-Means Clustering Algorithm  
Rona Pangwe², Ting Yi⁵, Richard Parry⁵  
¹University of Leeds, Leeds, United Kingdom, ²Radio Design Ltd | **EuMC20-20** | Investigation of Stored Energy Distribution in Filters Using K-Means Clustering Algorithm  
Rona Pangwe², Ting Yi⁵, Richard Parry⁵  
¹University of Leeds, Leeds, United Kingdom, ²Radio Design Ltd |

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**EuMC20-1**  
Waveguide Coupler Design Method for Permittivity Measurement at millimeter-wave applications  
Karrar Al Khanjar¹, Tarek Djerafi¹  
¹Institut National de la Recherche Scientifique (INRS)
**WEDNESDAY**

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<td>13:50-14:10</td>
<td>E01</td>
<td>EuMC/EuRAD03-1 New Trends on Telecom Satellites and their Consequences on Microwave</td>
<td>Thales Alenia Space in France</td>
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<td>EuMC21-1 Broadband GaN Power Amplifier Design and Integration: Industrial Challenges and Advanced Techniques</td>
<td>Kanal K. Samanta¹›</td>
<td>Vittorio Camarzani²›</td>
<td>INM, University of Cantabria</td>
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<td>EuMC22-1 Radio Frequency Weapons: Sources, Effects, Test and Protection</td>
<td>Jean-Christophe Joly¹›</td>
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<td>E02</td>
<td>EuMC/EuRAD03-2 Science Instruments for CubeSats and SmallSats</td>
<td>NASA-JPL/Caltech</td>
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<td>EuMC21-2 Over 20 W 2.5 to 10.5 GHz Wideband Two-Stage GaN MMIC Power Amplifier with Distributed and Reactively-Matched Amplifier Stages</td>
<td>Jun Kamioz, Masakazu Hongo, Ryuta Komaru, Takuo Mochida, Yohshika Kano, Shintaro Shinjo</td>
<td>Mitsubishi Electric Corporation</td>
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<td>14:30-14:50</td>
<td>E03</td>
<td>EuMC/EuRAD03-3 A New Radiospectrometer to Study the CMB Deviations between 10-20 GHz</td>
<td>Paz Alonso-Arias¹››, Roger Hoyland¹›, Javier de Miguel-Hernandez¹›, Jose Alberto-Rubio-Martin¹››, Instituto de Astrofisica de Canarias (IAC), Universidad de La Laguna</td>
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<td>EuMC22-2 Probing Millimeter-Wave Antennas and Arrays in their Reactive Near-Field</td>
<td>Jan Hesselbarth¹›, Georg Stadl, Jean Moreau¹››</td>
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<td>University of Stuttgart, Advantest Europe GmbH</td>
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<td>14:50-15:10</td>
<td>E01</td>
<td>EuMC/EuRAD03-4 Comparison between Mixer and Track and Hold UWB Receivers for SATCOM Applications</td>
<td>Arq Baldo¹›, Alkjerg Egelund¹›, Gualuine Neves¹›, Denis Bastiaux¹›, Cedric Chamberlin¹›</td>
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<td>EuMC21-3 A 40 W Ka-Band RF Amplification Chain for Space Telecommunication SSPA Applications</td>
<td>James Bello¹›, Gualuine Le Rhun¹›, Philippe Auguy¹›, Gregory Mouchon¹›, Amel MAATI¹›, Allen Katz¹›</td>
<td>THALES AVS / MIS, Linearizer Technology, Inc. / TONJ</td>
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<td>EuMC22-3 Characterization of 5G Phased Arrays at 28 GHz by Time-Domain Near-Field Scanning</td>
<td>Michael Haider¹›, Pablo Corrales¹›, Nicolas Grio¹›, Chee-Jen Lee¹›, Su-Wen Chang¹›, Wen-Tsoi Tsai¹›, Siddik Wane¹›, Damienne Bagrani¹›, Johannes Ruess¹››, Technical University of Munich, 4hl-Technologies, IMV, TIMTEK, VSA-SUPAERO, Université de Toulouse</td>
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<td>15:10-15:30</td>
<td>E03</td>
<td>EuMC/EuRAD03-5 Design Study for UAV-Mounted GPR</td>
<td>Maxime Schultz¹›, Cyril Decize¹›, Michèle Lalande¹›, Bertrand Lenox¹›</td>
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<td>Université de Lorraine</td>
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<td>EuMC22-4 Measurement Method for Characterizing Nonlinearity Under Near-Field and Far-Field Interferers in 5G mmW Phased Arrays</td>
<td>Nuqui Tieno¹›, Marko E. Larosen¹›, Markku Jokinen¹›, Jyri Palkkonen¹›, Timo Rahkonen¹›, Aarno Pärssinen¹›, University of Oulu</td>
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<td>EuMC22-5 5G Millimeter-Wave Beam Adaptation for Indoor Moving Users</td>
<td>Robert Schulpen¹›, Bart Smolders¹›, UIH Johansen¹›, Eindhoven University of Technology</td>
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¹INDRA Sistemas, ²Universidad de Cantabria

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13:50 - 14:10

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14:10 - 14:30

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14:30 - 14:50

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14:50 - 15:10

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15:10 - 15:30

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**WEDNESDAY**

### E04

**EuMC23**

**Millimeter-wave Transition Structures and Packaging Techniques**
Chair: Mehmet Kaynak¹
Co-Chair: Claire Dalmay²
¹IHP, 15236, Frankfurt (Oder), Germany,
²XLIM Research Institute, University of Limoges, Limoges, France

**EuMC24**

**Planar Filters II**
Chair: Roberto Gómez-García³
Co-Chair: Dimitra Psychogiou²
¹University of Alcala, ²University of Colorado Boulder

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### E05

**EuMC23-1**

**Compact Square/Triangle Mixed-Shape Quarter-Mode Substrate Integrated Waveguide Bandpass Filter with Wide Stopband**
Phirun Kim¹, Wang Qi¹, Phanam Pech¹, Junhyung Jeong¹, Yongchae Jeong¹
¹Chonbuk National University

**EuMC24-1**

**Multilayered Wideband Balun Bandpass Filters Designed with Input-Reflectionless Response**
Li Yang¹, Roberto Gómez-García¹, José-María Muñoz-Ferreras¹, Wenjie Feng²
¹University of Alcala, ²Nanjing University of Science and Technology

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### Session Schedule

13:50 - 14:10

**EuMC23-1**

**D-band Silica-Based Package Substrate with EBG Structure for Flip-Chip Modules**
Masaharu Ito¹, Tsunehisa Masumoto¹
¹NEC Corporation

**EuMC24-2**

**F-band Low-loss Tapered Slot Transition for Millimeter-wave System Packaging**
Ahmed Hassona¹, Zhongxia Simon He¹, Vessen Vassilev¹, Herbert Zirath¹
¹Chalmers University of Technology

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14:10 - 14:30

**EuMC23-2**

**A Compact 28 GHz RF Front-end Module using IPDs and Wafer-level Metal Fan-out Packaging**
Jongmin Yook¹
¹KETI (Korea Electronics Technology Institute)

**EuMC24-3**

**Topology and Rigorous Design Method for Reflectionless Bandstop Filter**
Jongheun Lee¹, Boyoung Lee¹, Seunggoo Nam¹, Juseop Lee¹
¹Korea University

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14:30 - 14:50

**EuMC23-3**

**Broadband Stacked-Patch Transition from Microstrip Line to Circular Dielectric Waveguide for Dual-Polarized Applications at W-Band Frequencies**
Andre Meyer¹, Martin Schneider¹, Simon Karau¹
¹Universität Bremen

**EuMC24-4**

**Magnet-less Non-Reciprocal Bandpass Filters With Tunable Center Frequency**
Dakshath Simpson¹, Dimitra Psychogiou²
¹University of Colorado at Boulder

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14:50 - 15:10

**EuMC23-4**

**A Novel Miniaturized High Performance BGA RF Transition for Ka Band Applications**
Ferid Altmis¹
¹Aseaean Inc.

**EuMC24-5**

**Design of Wideband Bandpass Filters Using Parallel-Coupled Asymmetric Three Line Structures with Adjustment Elements**
Elif Gürkankin Sahin¹, Ali Kursad Gürso², Ceyhun Karpu³, Adnan Gürso²
¹Niğde Omer Halisdemir University, ²Nesib Cam Hatun Onder University, ³Pamukkale University
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Email: ______________________________________________________________________________________

Date of Arrival: __________________________  Date of Departure: _______________________________
Number of rooms required: _______ Single Room(s)    _______ Twin Room(s)    _______ Double Room(s)
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Second choice Hotel: __________________________________________________________________________
Guest Names: ________________________________________________________________________________

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<td>★★★★★</td>
<td>17 Boulevard Saint Jacques, 75014 Paris, France</td>
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<td>Flexible €360.00</td>
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<td>★★★★</td>
<td>69 Boulevard Victor 75015 Paris, France</td>
<td>Rooms from</td>
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<tr>
<td>Oceana Porte de Versailles</td>
<td>★★★★</td>
<td>52, Rue d’Oradour Sur Glane 75015 Paris, France</td>
<td>Rooms from</td>
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<td>OKKO Hotels Paris Porte de Versailles</td>
<td>★★★★</td>
<td>2 rue du Colonel Pierre Avia 75015 Paris, France</td>
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Notes: Prepay = Room rate will be charged at the time of booking, to the credit card used to guarantee the reservation, after this the room is non-refundable. Flexible = Room can be cancelled or amended up until a few days before arrival, individual policy will be stated on the booking confirmation. RO = Room rate does not include breakfast; however, breakfast is available at the hotel at an extra cost. B&B = Room rate includes breakfast. All rates quoted include VAT at the current rate.
**EuMC Interactive Session 4**
Chair: Tan-Phu Vuong¹
Co-Chair: Laure Huitema²
¹IMEP-LAHC Grenoble, ²Université de Limoges, CNRS, XLIM UMR 7252

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<td>Additively Manufactured Interdigitated Capacitors Using Barium Titanate Nanocomposite Inks</td>
<td><strong>EuMC26-5</strong></td>
<td>Wearable RFID Tag on Denim Substrate for Indoor Localization Applications</td>
<td><strong>EuMC26-9</strong></td>
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<td>Michael Crabbe¹, Ying He², Aljoscha Rock³, Premjeet Chahal¹, John Pappapolymenou¹</td>
<td>Giacomo Paolo²</td>
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<td><em>Communication Research Center</em></td>
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<td><strong>EuMC26-2</strong></td>
<td>Passive Intermodulation and Power Handling for High Power RF MEMS Switches</td>
<td><strong>EuMC26-6</strong></td>
<td>Ultrasensitive Planar Metamaterials for Material Characterization Using Tapered CSRR with Application to NDT of 3D Printed Structures</td>
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<td>Chris Giovannetti⁴, Michel Micromems, Inc.</td>
<td>Salem Azibou¹, Yoss Gu¹, Manos H. Tentzolas¹</td>
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<td>Wearable 868 MHz LoRa Wireless Sensor Node on a Substrate-Integrated-Waveguide Antenna Platform</td>
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<td>Low Cost 3D Printed Fabry-Perot Antenna for Automotive Radar Applications</td>
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<td>Patrick Van Tom²</td>
<td>Umair Naem¹, Vincent Fusco¹, Mike Keaveney¹, Mike O'Shea¹, James Breslin¹</td>
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<td><strong>EuMC26-8</strong></td>
<td>A High Transmission Efficiency Metasurface-based Spiral Phase Plate for Generating Vortex Waves</td>
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<td>Laura Cosshala</td>
<td>Li Yu¹, Zhang Qi¹, Hua Zhu¹, Xuping Li²</td>
<td><em>School of Electric Engineering, Beijing University of Posts and Communications</em></td>
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<td><strong>EuMC26-5</strong></td>
<td>WearableRFID Tag on Denim Substrate for Indoor Localization Applications</td>
<td><strong>EuMC26-9</strong></td>
<td>Screen-Printed Flexible 5G Dual Band Flexible Frequency Selective Surface</td>
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<td>Giacomo Paolo²</td>
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<td><em>Communication Research Center</em></td>
<td>Iwata Sakagami¹, Xiaodong Wang¹, Takaishi Ohsita²</td>
<td>*University of Toyama, *Ulm University, <em>Toyoohashi University of Technology</em></td>
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<td><strong>EuMC26-14</strong></td>
<td>In-Situ-Linearization for Instantaneous Frequency Measurement Systems</td>
<td><strong>EuMC26-16</strong></td>
<td>UHF Near-Field Wireless RFID Power Transfer Through Two Distant Rectangular Waveguides</td>
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**E06**

EuRAD02
Innovative Radar Classification Techniques
Chair: Pierfrancesco Lombardo¹
Co-Chair: Laura Anton²
¹Sapienza University of Rome, ²TNO Defense, Safety and Security

EuRAD02-1
Radar System Modelling and Simulation with MATLAB : from RF Modelling to Target Classification.
Gérald Albertini¹
¹Mathworks

EuRAD02-2
Surface Classification with Millimeter-Wave Radar Using Temporal Features and Machine Learning
David Montgomery¹, Gaston Holmé², Andreas Jakobsson³, Peter Almers¹
¹Acconeer, ²Sigma, ³Centre for Mathematical Sciences, Lund University

EuRAD02-3
Projection Metric Learning of Updated-Subspaces for Radar Target Classification
Ryoma Yataka¹, Kazaaki Hirashima¹, Takatumi Matsuda¹, Tai Tanaka¹, Masato Goch¹, Masashi Shinohaki¹
¹Mitsubishi Electric Corporation

EuRAD02-4
Clutter-compensating Adaptive Waveforms with Cognitive Radar for Target Classification using EM-Simulated Ground-Based RCS Responses
Munfe Ben Bay¹, Ric Romeri²
¹Naval Postgraduate School

EuRAD02-5
Learning Dynamic Processes from a Range-Doppler Map Time Series with LSTM Networks
Manojo Almeida¹, Peter Olf¹, Nicolas C. Stolze¹, Christian Waldschmidt²
¹Hochschule Heilbronn, ²University of Ulm

**E07**

EuMC25
Active Antenna Arrays
Chair: Peter Gardner¹
Co-Chair: Michal Mrozowski²
¹University of Birmingham, ²Gdansk University of Technology

EuMC25-1
Antenna Array Driven by Non-Isolated Power Amplifiers for MIMO Applications
Hejia Fan¹, Yuan Ding³, George Goussels¹, Maria Jesus Canavate Sanchez³
¹Henri-Holt University, Edinburgh

EuMC25-2
A Compact Micro-Diversity Module with Integrated Antenna Set for Automotive Satellite Radio Reception
Simon Seregé¹, Sebastian Matthei², Stefan Lindermeier³
¹Universität der Bundeswehr München

EuMC25-3
A 28 GHz 8-channel Fully Differential Beamforming IC in 65nm CMOS Process
Jeongsoo Park¹, Donghyun Baek¹, Jeong-Geun Kim¹
¹Kwangwoon University, ²Chung-Ang University

EuMC25-4
A 25-40 GHz 180° Reflective-Type Phase Shifter using 65 nm CMOS Technology
Jeong Taek Lim¹, Sunju Cho¹, Eun-Gyu Lee¹, Han-Yoong Cho¹, Je-Won Song¹, Sang-Hyo Kim¹, Choul-Young Kim¹
¹Chungnam National University

EuMC25-5
V-band Vector-sum Phase Shifter with Frequency Mixing
Shinya Yokomizo¹, Aihito Hirai¹, Takando Fujimori¹, Masakuni Tsu¹
¹Mitsubishi Electric Corporation
WEDNESDAY

EuMC27
Outphasing and Doherty Power Amplifiers
Chair: Christian Fager¹
Co-Chair: Andreas Wentzel²
¹Chalmers University of Technology, ²Ferdinand-Braun-Institut (FBH)

EuMC28
Calibration and Characterization Techniques
Chair: Nick Rider¹
Co-Chair: Paweł Barmuta¹,²
¹The National Physical Laboratory, Teddington, ²KU Leuven, ³Warsaw University of Technology

16:10 - 16:30
EuMC27-1
Evaluation of DPD Algorithm Thanks to System-Level Behavioral Modelling
Wissam Saabe¹
¹AMCAD Engineering

16:30 - 16:50
EuMC28-1
Measurement and Modeling Techniques
David E. Root¹
¹Keysight Technologies, Inc.

16:50 - 17:10
EuMC27-2
GaN Digital Outphasing PA
Thomas Hoffmann¹, Wolfgang Heinrich¹, Andreas Wentzel², Florian Hühn²
¹Ferdinand-Braun-Institut (FBH)

17:10 - 17:30
EuMC28-2
Linearity and Efficiency Characterization of AlGaN/GaN and InAlGaN/GaN HEMTs devices using Multi-tone Large Signal Measurements
Vincent Giral¹, Ahmed Bouzid¹, Stéphane Pietrowicz², Clément Pilet³, Olivier Papiss³, Michal Pogreb¹, Jean-Christophe Nub方向², Christophe Chang³, Raymond Quéré¹
¹ULM Research Institute - UMR CNRS 7252, ²UV-Lab, ³United Monolithics Semiconductors

17:30 - 17:50
EuMC27-3
An Experimental Study for the Design of Dual Input Load Modulated Wideband GaN Amplifier
Alexis Court¹, Tissaut Reverand¹, Pierre Medra¹, Philippe Bouyss¹, Jean-Michel Nebus¹, Geoffrey Stubbersz-Perr¹, Luc Lapierre²
¹XLIM Research Institute - UMR CNRS 7252, ²Centre National d’Études Spatiales (CNES)

17:50 - 18:10
EuMC28-3
Wide-band Large VSWR On-Wafer Standards for Harmonic Load-Pull System Calibration
Yuzhe Yin¹
¹China Electronics Standardization Institute

18:10 - 18:30
EuMC27-4
A 60-GHz Symmetric Doherty Power Amplifier with 20.4% 6-dB Back-off Efficiency
Masahiro Tanii¹, James Buckwalter¹, Kang Ning²
¹NEC Corporation, ²University of California, Santa Barbara

18:30 - 18:50
EuMC28-4
Improving Wafer-Level S-parameters Measurement Accuracy and Stability with Probe-Tip Power Calibration up to 110 GHz for 5G Applications
Chon Beng Sa¹
¹FormFactor Inc.

18:50 - 19:10
EuMC27-5
400 Watt Sequential Power Amplifier Using Inverted Doherty-Type Active Load Modulation with 50% Efficiency at 10dB Back-off over 23% Fractional Bandwidth
Florian Dietrich¹, Muin-Dey Wan¹, Renato Negra³
¹RWTH Aachen University

19:10 - 19:30
EuMC28-5
Robust One-Tier Calibration for Microwave Microfluidics using Unknown Liquids
Pawel Barbiut¹, Jiongheng Ban², Tomislav Markovic¹, Arhadzak Lewandowski¹, Meng Zhang¹, Bart Nauwelaers², Dominique Schnears², Ija Cickel³
¹KU Leuven, ²Warsaw University of Technology, ³IMEC
WEDNESDAY

**EuMC29**
Techniques and Technologies for the Enhancement of WPT Systems
Chair: Luciano Tarricone¹
Co-Chair: Martino Aldrigo²
¹University of Salento, ²IMT

**EuMC30**
Planar Filters III
Chair: Marco Politi¹
Co-Chair: Cédric Quendo²
¹Politecnico di Milano, ²LABSTICC-UBO

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**EuMC29-1**
Efficient Assessment of the Impact of Metallic Obstacles on the Wireless Power Transfer in Loosely Coupled Links
Benjamin Deutschmann¹, Lukas Görtschacher¹, Peter Pfister¹, Jasmin Grosinger¹
¹Graz University of Technology, ²AVL List GmbH

**EuMC30-1**
A Flexible Design Technique for Band-pass Coupled-line Planar Filters Overcoming Manufacturing Limitations
Santiago Copolaso³, Viorela E. Bona³, Jorge Daniel Martinez³, Stefano Siro³
³Universidad Politecnica de Valéncia

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**EuMC29-2**
Gains Maximization for Two-port WPT Links with Three Coils
Franco Masi¹, Mauro Mangiaro², Giuseppina Masi², Luciano Tarricone³
¹University of Bologna, ²University of Perugia, ³University of Salento

**EuMC30-2**
Non-Reciprocal RF-Bandpass Filters Using Transistor-Based Microwave Resonators
Andrea Ashley¹, Dimitra Psychogiou¹
¹University of Colorado Boulder

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**EuMC29-3**
Wireless Composite Right/Left-Handed Transmission Line Sensor for Permittivity Measurements
Amrit Zoad¹
¹THM

**EuMC30-3**
Stacked Substrate Integrated Waveguide Filter with Air-Holed Cavities
Cristiano Tomassoni¹, Lorenzo Silvestri², Maurizio Bozzo², Luca Perregrini²
¹University of Pavia, ²University of Pavia

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**EuMC29-4**
A 2.4 GHz-Band Enhancement-Mode GaAs HEMT Rectifier with 19% RF-to-DC Efficiency for 1 μW Input Power
Ryo Ishikawa¹, Tatsuya Yoshida¹, Kazuhiko Horii¹
¹The University of Electro-Communications, Chofu, Tokyo, Japan

**EuMC30-4**
Wide-Stopband Bandpass Filter based on Signal Interference Feedback
Abdullah Aburakan¹
¹Public Authority for Applied Education and Training

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**EuMC29-5**
A 2.45-GHz Self-Synchronous GaN FET Rectifier Using CRLH-TL-Based Gate Control Circuit
Shinsuke Tanaka¹, Takanori Naguchi¹
¹Shibaura Institute of Technology

**EuMC30-5**
Coupling Matrix Extraction by Entries Deviation and with Use of Sherman-Morrison Formula
Jędrzej Michalczuk¹, Jerzy Michalczuk¹
¹SpaceForest Ltd.
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<td>EuMC31</td>
<td>Antenna Arrays for 5G</td>
<td>Fredrik Tillman¹</td>
<td>Marina Gashinova²</td>
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<td>EuMC32</td>
<td>Numerical Methods in Microwave Technology</td>
<td>Peter Zwanbooom³</td>
<td>Alessandro Gali¹</td>
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<td>16:50-17:10</td>
<td>EuRAD03</td>
<td>Radar Applications and Target Classification</td>
<td>Carlos Castillo²</td>
<td>Thales Nederland B.V., 'Ndra</td>
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<td>17:10-17:30</td>
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<td>5G Radios – Commercial Challenges and Opportunities</td>
<td>Fredrik Tillman¹</td>
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<td>Advanced FEM Simulators bring Fullwave Microwave Circuit Design up to Speed</td>
<td>Michal Mrozowski¹</td>
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<td>EuRAD03</td>
<td>Flexible Front End Platform for Multiple RADAR Sensor Applications</td>
<td>Charles Nicholas³</td>
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<td>A 28-GHz Phased-array Receiver with an On-chip BIST Function by using a Shielded Symmetrical Signal Distributor</td>
<td>Toshihiro Shimura, Takenori Chotani, Yoji Chohara²</td>
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<td>Analysis of Inhomogeneous Rectangular Cavities Using the Variational Meshless Method</td>
<td>Vincenzo Lombardi, Maurizio Buza, Luca Peregalli³</td>
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<td>Solid State Advantages for UHF Long Range Radar Application</td>
<td>Pascal Massot¹</td>
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<td>A Low-cost and Low-power Single Bit Phased Array at Ka-Band for 5G Applications</td>
<td>Mohammad Mazzaheri, Mohammad Sadegh Valannezh, Masoud Alizadeh, Mohammad Fakhrazadeh</td>
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<td>Real-Time Passive Millimeter-wave Imager for Security Applications</td>
<td>Etien Kpré¹</td>
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<td>Co-Channel Radiation Pattern Distortion in Transmitting 5G Antenna Arrays due to 3rd Order Intermodulation Products</td>
<td>Ricardo Figuerido, Nuno Borges Carvalho</td>
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<td>Validation of MoM-based Solution of Waveguide Port Problem for Composite Structures Applied to Microwave Antenna and PCB Geometries</td>
<td>Falk Bogdanov¹, Irina Chochia², Lily Svarzlet³, Roman Jotava¹</td>
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<td>20:50-21:10</td>
<td>EuRAD03</td>
<td>A Radar Target Simulator for Generating Micro-Doppler-Signatures of Vulnerable Road Users</td>
<td>Johannes Berle, Philipp A. Schaff, Marc A. Mutschler, Thomas Walder³</td>
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<td>A Beam-Steering Transmitarray Antenna for 5G MIMO Channel Sounding in V-band</td>
<td>Tuyen Pham, François Galler, Ronan Saudeau²</td>
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<td>Improvements in Broadband Modeling of Microwave Circuits using Rational Models</td>
<td>Santiago Cogollas, Vicente B. Boria, Héctor Estévez¹</td>
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<td>Universitat Politècnica de València</td>
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<td>EuRAD03</td>
<td>Radar Classifier For Small Manned Air Target</td>
<td>Gilles Premel-Cabic, Jacco J.M. de Wy, Miguel Caro-Carca</td>
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<td>Thales Nederland B.V., TNO</td>
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<td>Ericsson AB</td>
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<td>TNO Defense, Safety and Security, University of Rome</td>
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<td>22:50-23:10</td>
<td>EuRAD03</td>
<td>EuRAD03-1 SBS Evidence: Million Dollar Power Loss of Existing 5G Networks and Next-Generation 6G Networks</td>
<td>Carlos Castillo</td>
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<td>Thales Nederland B.V., 'Ndra</td>
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<td>EUMC/EuRAD04-1</td>
<td>EM Analysis of a Propagation Channel in the Sub-THz Band for Many-Core Architectures</td>
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<td>EUMC/EuRAD04-2</td>
<td>A 60GHz Wideband Antenna Array Based On Metasurface With Gap Waveguide (GWG) Devider</td>
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<td>EUMC/EuRAD04-3</td>
<td>60 GHz Low Phase Noise Radar Front-End Design For The Detection Of Micro Drones</td>
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<td>EUMC/EuRAD04-4</td>
<td>Wideband Spectrum Estimation in Frequency Dense Environments</td>
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<td>EUMC/EuRAD04-5</td>
<td>Design of a mm-wave MIMO Radar Demonstrator with an Array of FMCW Radar Chips on-On-Chip Antennas</td>
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<td>EUMC/EuRAD04-6</td>
<td>A Novel Approach for a MIMO FMCW Radar System with Frequency Steered Antennas for 3D Target Localization</td>
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<td>EUMC/EuRAD04-7</td>
<td>Scalable High-Gainpolarity Split-Block Diagonal Horn Antenna for Integration with Sub-THz Devices</td>
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<td>EUMC/EuRAD04-8</td>
<td>Wideband Metal-Dielectric Multilayer Absorber based on a Single Step FDM Process</td>
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<td>EUMC/EuRAD04-9</td>
<td>A New Concept for the Design of MIMO FMCW Radar Antennas</td>
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<td>EUMC/EuRAD04-10</td>
<td>High Quality-factor Lossy Ring-resonator Type of Electrode for Circulating Tumor Cell Detection</td>
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<td>EUMC/EuRAD04-11</td>
<td>Experimental Evaluation of a 60 GHz Beamforming Solution with 32-Dipole Printed Array</td>
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<td>EUMC/EuRAD04-12</td>
<td>Non-periodic Metasurface Beam Splitter for Dual Polarizations</td>
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<td>EUMC/EuRAD04-13</td>
<td>On the Calibration of mm-wave MIMO Radars Using Sparse Antenna Arrays for DoA Estimation</td>
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<td>EUMC/EuRAD04-14</td>
<td>An Ultrathin Quad-band Microwave Absorber with Small Frequency Ratio</td>
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<td>Metasurface Based Antennas and Absorbers</td>
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<td>Radar Technology</td>
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<td>EUMC/EuRAD04-17</td>
<td>High-Sensitive Glucose Concentration Sensor Exploiting Inter-resonators Couplings</td>
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<td>EUMC/EuRAD04-18</td>
<td>Experimental Study of a Novel Metamaterial for Millimeter-Wave Applications</td>
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<td>EUMC/EuRAD04-20</td>
<td>Printed Array Solution with 32-Dipole Elements for a 60 GHz Beamforming System</td>
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<td>EUMC/EuRAD04-21</td>
<td>Experimental Evaluation of a 60 GHz Beamforming Solution with 32-Dipole Printed Array</td>
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<td>EUMC/EuRAD04-22</td>
<td>Non-periodic Metasurface Beam Splitter for Dual Polarizations</td>
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<td>EUMC/EuRAD04-23</td>
<td>On the Calibration of mm-wave MIMO Radars Using Sparse Antenna Arrays for DoA Estimation</td>
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<td>EUMC/EuRAD04-24</td>
<td>An Ultrathin Quad-band Microwave Absorber with Small Frequency Ratio</td>
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<td>EUMC/EuRAD04-25</td>
<td>Metasurface Based Antennas and Absorbers</td>
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<td>EUMC/EuRAD04-26</td>
<td>Radar Technology</td>
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<td>EUMC/EuRAD04-27</td>
<td>High-Sensitive Glucose Concentration Sensor Exploiting Inter-resonators Couplings</td>
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<td>EUMC/EuRAD04-28</td>
<td>Experimental Study of a Novel Metamaterial for Millimeter-Wave Applications</td>
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<td>EUMC/EuRAD04-29</td>
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<td>EUMC/EuRAD04-30</td>
<td>Printed Array Solution with 32-Dipole Elements for a 60 GHz Beamforming System</td>
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<td>EUMC/EuRAD04-31</td>
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<td>EUMC/EuRAD04-34</td>
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<td>EUMC/EuRAD04-35</td>
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<td>EUMC/EuRAD04-36</td>
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<tr>
<td>EUMC/EuRAD04-37</td>
<td>High-Sensitive Glucose Concentration Sensor Exploiting Inter-resonators Couplings</td>
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<td>EUMC/EuRAD04-38</td>
<td>Experimental Study of a Novel Metamaterial for Millimeter-Wave Applications</td>
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<td>EUMC/EuRAD04-39</td>
<td>Microwave Absorber with Sub-THz Devices</td>
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<td>EUMC/EuRAD04-40</td>
<td>Printed Array Solution with 32-Dipole Elements for a 60 GHz Beamforming System</td>
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### EUMC/EuRAD05

**Measurement and Modeling of Electromagnetic Field Scattering**

**Chair:** Alexander Yarovoy¹  
**Co-Chair:** Marina Gashinova²  
¹Delft University of Technology, ²University of Birmingham

**EuMC/EuRAD05-1**  
Understanding Stealth: RCS Fundamentals – from Design to Measurements  
*Sylvain Morvan¹*  
¹CEA

**EuMC/EuRAD05-2**  
Co-polarized bi-Static RCS Measurements of Vulnerable Road Users Between 1 and 10 GHz  
*Andreas Schwind¹, Sreehari Buddappagari Jayapal Gowdu¹, Willi Hoffmann¹, Ralf Stephan¹, Reiner Thomä¹, Matthias Hein¹*  
¹Technische Universität Ilmenau

**EuMC/EuRAD05-3**  
Monostatic RCS Measurements of a Passenger Car Mock-up at 77 GHz Frequency in Virtual Environment  
*Sreehari Buddappagari Jayapal Gowdu¹, Andreas Schwind¹, Ralf Stephan¹, Matthias Hein¹*  
¹Technische Universität Ilmenau

**EuMC/EuRAD05-4**  
Low Terahertz Signal Backscattering from Rough Surfaces  
*Aleksandr Bystrov¹, Edward Hoare¹, Marina Gashinova¹, Thuy-Yung Tran², Mikhail Cherniakov¹*  
¹University of Birmingham, ²Jaguar Land Rover

**EuMC/EuRAD05-5**  
Permittivity Estimation of Rough Dielectric Surfaces by means of Polarimetric Bistatic Measurements at Millimeter Wave Frequencies  
*Kais Ben Khadhra¹*  
¹IETR, INSA Rennes

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### EuMC38

**Communication Systems**

**Chair:** Alexander Koelpin¹  
**Co-Chair:** Fabian Lurz²  
¹Brandenburg University of Technology, ²Friedrich-Alexander University Erlangen-Nürnberg (FAU)

**EuMC38-1**  
A Superheterodyne 300 GHz Wireless Link for Ultra-Fast Terahertz Communication Systems  
*Iulia Dan¹, Guillaume Ducournau², Shintaro Hisatake³, Pascal Szriftgiser³, Ralf-Peter Braun⁴, Ingmar Kalla⁵*  
¹Universität Stuttgart, ²Université de Lille, ³Gifu University, ⁴DEUTSCHE TELEKOM AG

**EuMC38-2**  
A Study on 10Gb/s+ Data Transmission Rate with Utmost Frequency Efficiency in MIMO System  
*Tong Yang¹*  
¹China Academy of Space Technology

**EuMC38-3**  
Implementation of RF Communication Subsets on Common Low Frequency Clocked FPGA  
*Nasabab Mohab Ahmed⁶, Elieenn Perret⁷, Romain Giraud⁷, David Holy⁷, Nicolas Barth⁷, Maxime Genest⁷, Frédéric Gare⁷*  
⁶LOIS Grenoble University, ⁷IMEP-LAHC University Savoie

**EuMC38-4**  
*Salman Salmi⁸, Yarka Aslan⁸, Jan Puskely⁸, Antoine Roedner⁸, Alexandre Yarovcy⁸*  
⁸Delft University of Technology

**EuMC38-5**  
Latency Performance Evaluation of RF Front-End Transceiver Architecture  
*Michal Bozic⁹, Wael Dyab⁹, Ahmed A. Sakr⁹, Ke Wu⁹*  
⁹Ecole Polytechnique de Montreal

---

### EuMC39

**Metamaterial Based Devices**

**Chair:** Ferenc Mariné¹  
**Co-Chair:** Jan Machac²  
¹University Autònoma de Barcelona, ²Czech Technical University in Prague

**EuMC39-1**  
Microstrip Lines Loaded with Metamaterial-Inspired Resonators for Microwave Sensors/Comparators with Optimized Sensitivity  
*Jonathan Múzico-Eraso⁶, Paris Vélez⁷, Marta GI⁸, Javier Mata-Contreras⁸, Kala Greiner⁹, David Dubuc⁹, Ferenc Mariné¹*  
⁶Universitat Autonoma de Barcelona, ⁷Universidad Politécnica de Madrid, ⁸Universidad de Málaga, ⁹LAAS-CNRS

**EuMC39-2**  
Simple Laminated PCB Artificial Dielectrics for mm-Wave Quasioptical Lenses  
*David S. Roberts¹, Michael Adven¹*  
¹North Carolina State University

**EuMC39-3**  
Reflectionless Microwave Quarter-Wave Plate Using Hyperbolic Metamaterials  
*Ryo Mochizuki¹, Nakki Shinohara¹, Atsunori Sarada²*  
¹Kyoto University, ²Osaka University

**EuMC39-4**  
Modelling of a 3D Periodic Surface Based on a Folded Resonator Embedded into a Waveguide  
*Paul Le Bilhet¹, Maria Garcia Vigueras¹, Erwan Foun¹, Raphael Gillier¹, Isabelle Le Roy Naneix², Stefan Varafa³, Christian Renard²*  
¹Institut d'Électronique et de Télécommunications de Rennes, ²INSA Rennes, ³THALES Defense Missions Systems

**EuMC39-5**  
Circuit Modelling of Metallic Dual-Band Dual-Polarized FSS  
*Carlos Mido Jimez⁸, Esteban Menargues⁸, Tomislav Dobrovoljčič⁸, María García Vigueras¹*  
⁸ETR, INSA Rennes, ⁹SwissSp12
EuMC/EuRAD07-1
Scattering by Infinite Graphene Strip Grating with Brake of Periodicity
Mstyslav Kaliberda¹, Leonid Lytvynenko², Sergey Pogarsky¹
¹V.N. Karazin-Kharkiv National University, ²Institute of Radio Astronomy of the National Academy of Sciences of Ukraine

EuMC/EuRAD07-2
EMC Conducted Emission Analysis of a 3D Multilayer Printed Circuit Board with Kron’s Method
Zhifei Xu¹, yang liu¹, blaise ravelo¹, Olivier Maurice¹, Jonathan Gander¹, Nicolas Marie¹, Benoît Agnès¹, stephane carnell¹
¹ESIGELEC, ²Ariane Group, ³valeo geed, ⁴SCIENTEAMA, ⁵FILIX SAS

EuMC/EuRAD07-3
Analysis of Microwave Backscattering from Nonlinear Sea Surface with Currents
Xiang Su¹, Xiaoxiao Zhang², Xiaomin Tan¹, Hongxing Dang¹
¹China Academy of Space Technology, Xi'an Branch, ²Xi'an University of Post & Telecommunications

EuMC/EuRAD07-4
Impact of Non-idealities on the Performance of Delta-Sigma/Manchester-modulated Microwave signals
Seunghyun Jang¹
¹ETRI

EuMC/EuRAD07-5
Implementation of a Four-Way Amplitude Modulated Mixerless Transmitter
Perci Spajewski¹, Mi-Hoon Yeo¹, Renato Negra¹
¹RWTH Aachen University

EuMC/EuRAD07-6
An Open-Source Speech Codec at 450 bit/s with Pseudo-Wideband Mode
Stefan Erhardt¹, Thomas Kunz¹, Fabian Lust¹, Robert Wegf¹, Alexander Kast¹
¹Friedrich-Alexander-University Erlangen, ²Brandenburg University of Technology

EuMC/EuRAD07-7
Azimuth Pattern Reconfigurable Magnetic Dipole Antenna with Wide-Angle Coverage
Hyun-Jin Cho¹, Soo-Chang Chae¹, Jong-Sang Yoo¹, Kwang-Doo Kimm¹, Jong-Won Yu¹
¹Korea Advanced Institute of Science and Technology

EuMC/EuRAD07-8
A Compact Magnetic Multiple Antenna for Wide 2-Dimensional Beamwidth
Ye-Bin Kim¹, Hyun-Jun Dong¹, Cheol-Ung Lee¹, Han Lim Lee¹
¹Chung-Ang University

EuMC/EuRAD07-9
Influence of Mesh Geometries on the Design of Transparent Antennas at 2.45 Ghz
Maxime WAVRZYK¹, Julien Brat¹, Aurele Demenil¹, Tien-Phu Vuang¹
¹MEP-LANC Grenoble, Laboratory of Pulp & Paper Science

EuMC/EuRAD07-10
High Gain and Broadband Quasi Horn Antenna Array for Ku Band Mobile TV Antenna Systems and Monopulse Radiation
Mehmet Altı TULLU²
¹N电子产品 A.Ş.

EuMC/EuRAD07-11
Dual-Band Open Metal Waveguide Slot Antennas
Vladimir Veremei¹
¹Duisdom

EuMC/EuRAD07-12
High Self-Interference Mitigation Achieved thanks to Significant Antenna Isolation and Advanced RF Front-End for In-Band Full-Duplex Communications
Camille Jouvard¹, Patrick Rossor¹, David Dassonville¹
¹CEA - LETI

EuMC/EuRAD07-13
Effect of Nonlinear Distortion and Null Stability on Spatial-Multiplexing Performance using 4.65-GHz-Band Active Antenna System with DPD
Nakao Hayakawa¹, Takui Ichizuka¹, Masaaki Hisabe¹, Tomohiro Kikuma¹, Daisuke Nose¹
¹NEC Corporation

EuMC/EuRAD07-14
Design of Aperture Coupled Feeding Ku-Band Phased Array Antenna on Multi-Layer PCB for Satellite Communications
Soo-Chang Chae¹, Jong-Wook Kim¹, Jong-Sang Yoo¹, Hyun-Jin Cho¹, Jong-Won Yu¹
¹KAIST

EuMC/EuRAD07-15
An Antenna Diversity and Combining System for Improved Mobile GNSS Reception
Sebastian Mutlihre¹, Simon Senega¹, Stefan Lindenmeier¹
¹Institut für Hoch- und Höchstfrequenztechnik der Universität der Bundeswehr München

EuMC/EuRAD07-16
Cognitive Beamformer Chips with Smart-Antennas for 5G and Beyond: Holistic RF SoI Technology Solutions including ASIC-Correlators
Sidina Wane¹, Pablo Cornelles¹, Tanh Vinh Dinh¹, Johannes Rassler¹, Michael Hader¹, Francois Clement¹, Breuc Turculesu¹, Su-Wi Chang¹, Chueh-Jen Lin¹, Wen-Tsu Tsai¹, ricardo Giacometti¹, Nicolas Groth¹
¹W-Technologies, ²TIM/TEK, ³Keysight Technologies, ⁴MVG

EuMC/EuRAD07-17
A Tiled C-Band Dual-Polarized 1-Bit Transmitarray
Inna Munro¹, Paolo Trindade¹, Alexey Shilov¹, Denis Zelenchuk¹, Alexander Verevkin¹, Vitaly Kolobov¹
²Saint Petersburg Electrotechnical University “LETI’, ³Cardiff University, ⁴Queen’s University Belfast

EuMC/EuRAD07-18
Phased Array Antenna Calibration Technique Based on Center-Null-Tracking (CNT) Method
Cheol-Ung Lee¹, Hyun-Jun Dong¹, Ye-Bon Kim¹, Han Lim Lee¹
¹Chung-Ang University
EuMW/EuMC Closing Session

Chair: Denis Barataud
Co-Chair: Stéphane Bila, EuMC 2019 Chair
*XLIM UMR7252, Université de Limoges-CNRS, Limoges, FRANCE

13:50 – 15:30

13:50 – 14:00

Session Remarks
Denis Barataud, EuMW 2019 General Chair
Stéphane Bila, EuMC 2019 Chair

14:00 – 14:45

SMOS: A Microwave Instrument in Space
François Deborgies, RF Technology Advisor, TEC-EF, ESA-ESTEC, 2200-AG Noordwijk, The Netherlands

2019 is a landmark for the Soil Moisture and Ocean Salinity (SMOS) mission which was launched on November the 2nd 2009 and was designed for 3 years of operation. SMOS is one of ESA’s Earth Explorer missions, which form the science and research element of the Living Planet Programme. This family of satellite missions addresses key scientific challenges identified by the science community and demonstrate breakthrough technology in observing techniques. The satellite carries a novel instrument: an aperture synthesis radiometer that operates in L-band to capture brightness temperature images.

14:45 – 15:15

Awards Ceremony
Eric Bergeault, EuMW2019 Awards Coordination Chair.
Florence Podevin, EuMW2019 Student Activities Coordination Chair
Nathalie Dellimpyle, EuMW2019 General TPC Chair

EuMC Microwave Prize
EuMC Young Engineer Prizes
Student Challenge Prize
Student Design Competition Prize

15:15 – 15:30

Closing Remarks
Denis Barataud, EuMW 2019 General Chair
Frank van Vliet, EuMW 2020 General Chair

15:30

End of Session
| EuRAD06-1 | A Novel Detection Method of Unmodulated Radar Pulses in Scenarios with Interference for Digital Wideband ESM Receivers |
| EuRAD06-2 | A Radar with 3D Imaging Capability that uses Synthetic Aperture in Azimuth and Compressive Sensing MIMO in Elevation |
| EuRAD06-3 | Isolines in 3D Radar Images for Remote Sensing Applications |
| EuRAD06-4 | Stepped Frequency IRCI-Free Sliding Spotlight MIMO SAR |
| EuRAD06-5 | Inter-System Interference Reduction in RadCom Systems - Filter Bank Multicarrier Radar |
| EuRAD06-6 | Wide Swath SAR System Design and Quality Analysis Based on Orthogonal Noise Waveforms |
| EuRAD06-7 | Iterative Minimum Entropy Based Algorithm for Phase Noise Removal in FMCW Radars. |
| EuRAD06-8 | A High Range-Accuracy Interferometry Radar for Very Small Transponder Positioning |
| EuRAD06-9 | Extracting Vertical Distribution of the Aerial Migratory Animals Using Weather Radar |
| EuRAD06-10 | Spectroscopic Estimation of Surface Roughness Depth for mm-wave Radar Sensors |
| EuRAD06-11 | A 3D-Printed Saddle Reflector for Upwards-looking Bi-static SAR Snow Radar |
| EuRAD06-12 | SAR-Like Multi-Input Multi-Output Radar for Naval Applications |
| EuRAD06-13 | Feature Extraction for Classification of Water Surfaces using a 24 GHz CW Radar |
| EuRAD06-14 | Compact Intermodulation Radar for Finding RF Receivers |
| EuRAD06-15 | 3D Millimetre Wave Screening for Metallic Surface Defect Detection |
| EuRAD06-16 | Statistical Approach for Automotive Radar Self-Diagnostics |
| EuRAD06-17 | Passive Cooling of mm-Wave Active Integrated 5G Base Station Antennas Using CPU Heatsinks |
### Thursday

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<td><strong>EuRAD07</strong></td>
<td>Automotive Radar Models and Systems</td>
<td>Chair: Mario Pauliⁱ&lt;br&gt;Co-Chair: Christian Sturm⁰&lt;br&gt;¹Karlsruhe Institute of Technology, ² Valeo Schalter und Sensoren GmbH</td>
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<tr>
<td><strong>EuRAD08</strong></td>
<td>Advanced Detection for Distributed Radar Systems</td>
<td>Chair: Kevin Cinglantⁱ&lt;br&gt;Co-Chair: Stéphane Méric⁹&lt;br&gt;²FRAU Thor, Institut d'électronique et de télécommunications de Rennes, IETR</td>
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<td><strong>EuRAD09</strong></td>
<td>FMCW and Radar Communications</td>
<td>Chair: Matteo Burgos-García⁴&lt;br&gt;Co-Chair: Reinhard Feger⁵&lt;br&gt;¹Universidad Politécnica de Madrid, ² Johannes Kepler University Linz</td>
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<td><strong>EuRAD07-1</strong></td>
<td>Compact 76 GHz Automotive Long-Range Radar with High Linearity Chirp Generator Based on Low Phase Noise Open-Loop VCO</td>
<td>Tatsuya Kaminura⁹&lt;br&gt;¹Mitsubishi Electric Corporation</td>
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<td><strong>EuRAD08-1</strong></td>
<td>Joint High-Resolution Delay-Doppler Estimation for Bi-static Radar Measurements</td>
<td>Michael Gibson⁶, Martin Klade⁷, Andreas Schwein⁸, Christian Andrich⁸, Matthias Heier⁸, Reiner Thomas⁸, Giovanni Del Genio⁸&lt;br&gt;¹Fraunhofer Institute for Integrated Circuits, ²Technische Universität Ilmenau</td>
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<td><strong>EuRAD09-1</strong></td>
<td>An Interference Suppression Method by Transmission Chirp Waveform with Random Repetition Interval in Fast-Chirp FMCW Radar</td>
<td>Yusuke Kikukawa⁹, Masashi Maitomo¹⁰, Hiroyuki Mitobu¹⁰, Kenjiro Fukui¹⁰, Chiharu Miyazaki¹⁰&lt;br&gt;¹Mitsubishi Electric Corporation</td>
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<td><strong>EuRAD07-2</strong></td>
<td>Automotive Radar Dataset for Deep Learning Based 3D Object Detection</td>
<td>Michael Meyer⁸, Georg Kuschk⁸&lt;br&gt;¹Astyx</td>
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<td><strong>EuRAD08-2</strong></td>
<td>Statistical Characterization of DVB-S Bistatic Clutter for Ground Target Detection</td>
<td>Nerea del Rey-Maestre¹, David Mata-Moya¹, María-Pilar Jarabo-Amores¹, Pedro José Gómez-del-Hoyo¹, Javier Rosado-Sanz¹&lt;br&gt;¹University of Alcalá</td>
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<td><strong>EuRAD09-2</strong></td>
<td>A Performance Enhancement Technique for a Joint FMCW RadCom System</td>
<td>Franz Lampel¹&lt;br&gt;¹Eindhoven University of Technology - TU/e</td>
</tr>
<tr>
<td><strong>EuRAD07-3</strong></td>
<td>Deep Learning Based 3D Object Detection for Automotive Radar and Camera</td>
<td>Michael Meyer⁸, Georg Kuschk⁸&lt;br&gt;¹Astyx</td>
</tr>
<tr>
<td><strong>EuRAD08-3</strong></td>
<td>Passive Radar based on 802.11ac Signals for Indoor Object Detection</td>
<td>Hassan Can Yildirim⁹, Laurent Storrer⁹, Mathieu Van Eeckhaute⁹, Claude Dessep⁹, Jérôme Louveaux⁹, François Hori⁹&lt;br&gt;¹Université Libre de Bruxelles, ²Interuniversity Micro-Electronics Center, ³Université Catholique de Louvain</td>
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<td><strong>EuRAD09-3</strong></td>
<td>Partial Chirp Modulation Technique for Chirp Sequence based Radar Communications</td>
<td>Mohammad Basim Alabd¹, Benjamin Nuss¹, Christoph Wilkening¹&lt;br&gt;¹Karlsruhe Institute of Technology (KIT)</td>
</tr>
<tr>
<td><strong>EuRAD07-4</strong></td>
<td>A 77 GHz Simulation Study of Roadway Infrastructure Radar Signatures for Smart Roads</td>
<td>Udi Choevrego¹⁰, Matthew Commens¹⁰&lt;br&gt;¹ANSYS, Inc.</td>
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<td><strong>EuRAD08-4</strong></td>
<td>CFAR Detection applied to MIMO Radar in a Simulated Maritime Surveillance Scenario</td>
<td>Salvatore Maresca¹, Antonella Bogoni¹,², Paolo Ghetti¹&lt;br&gt;¹TeCIP Institute, Scuola Superiore Sant’Anna, ²PNTLab, Consorzio Nazionale Interuniversitario per le Telecomunicazioni (CNR)</td>
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<td><strong>EuRAD09-4</strong></td>
<td>Radar to Radar Interference in Common Traffic Scenarios</td>
<td>Dîge Terbas¹, Francesco Ligezulla¹, Felke Jansen¹, Alessio Filipp², Jens Overdevest¹&lt;br&gt;¹NXP Semiconductors</td>
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<td><strong>EuRAD07-5</strong></td>
<td>Millimeter-Wave FMCW Radar Development using SIW Butler Matrix for Time Domain Beam Steering</td>
<td>Pascual David Hilario Re¹, Cristian-Alexandru Alistarh¹, Symon Podlacha¹, George Goussev⁵, John Thompson⁴, Jaesup Lee⁷&lt;br&gt;¹Heriot-Watt University, ²Samsung Advanced Institute of Technology</td>
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<td><strong>EuRAD08-5</strong></td>
<td>Smart-CFAR, a Machine Learning Approach to Floating Level Detection in Radar</td>
<td>Marco Vicario¹, Camerino¹, Ronny Hammarso³, Roslan Tronnem³&lt;br&gt;¹Delft University of Technology, ²Thales Nederland B.V.</td>
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<td><strong>EuRAD09-5</strong></td>
<td>Impact of Phase Noise on Mutual Interference of FMCW and PMCW Automotive Radars</td>
<td>Hassan Can Yildirim⁹, Marc Bauwens⁹, André Bouard⁵, François Hori⁹&lt;br&gt;¹Université Libre de Bruxelles, ²Interuniversity Micro-Electronics Center</td>
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## FRIDAY

### EuRAD10

**EuRAD10-1**
Radar Recognition of Multi-Propeller Drones using Micro-Doppler Linear Spectra  
Yefeng Cai¹, Oleg Krasnov¹, Alexander Yarovoy¹  
¹Delft University of Technology

**EuRAD10-2**
Micro-Doppler Based Mini-UAV Detection with Low-Cost Distributed Radar in Dense Urban Environment  
Xin Guo¹, Chea Siang Ng¹, Erwin de Jong¹, Adrian Smit¹  
¹Thales Solutions Asia Pte Ltd, ²Thales Nederland B.V.

**EuRAD10-3**
A Realtime Micro-Doppler Detection, Tracking and Classification System for the 94 GHz FMCW Radar System DUSIM  
Rene Petervari¹  
¹Fraunhofer Institute for High Frequency Physics and Radar Techniques FHR

**EuRAD10-4**
Unsupervised Learning using Generative Adversarial Networks on Micro-Doppler Spectrograms  
Hannah Garcia-Galley¹, Lorenzo Clóte², Ronny Hammann³, Francesco Fornelli⁴  
¹University of Glasgow, ²Thales Nederland

**EuRAD10-5**
Target/Clutter Disentanglement using Deep Adversarial Training on Micro-Doppler Signatures  
Lorenzo Clóte¹, Ronny Hammann³  
¹Thales Nederland

### EuRAD11

**EuRAD11-1**
Experimental Validation of Algorithms Used by Radar Remote-Sensing Systems for Oil-Spill Detection and Thickness Estimation  
Bilal Hammoud²  
¹UGA Grenoble France

**EuRAD11-2**
Layer Determination of Building Structures with SAR in Near Field Environment  
Alexander Haas¹, Markus Peichl¹, Stephan Dill⁷  
¹Microwaves and Radar Institute, German Aerospace Center (DLR)

**EuRAD11-3**
SAR Based Non-Destructive Evaluation of Irregularly Shaped Objects with Simultaneous Estimation of Geometry and Permittivity  
Ingrid Ulmann¹  
¹Institute of Microwaves and Photonics, Friedrich-Alexander-Universität Erlangen-Nürnberg

**EuRAD11-4**
Delamination Thickness Estimation Using Time Domain Microwave Non-destructive Testing  
Muhammad Firdaus Akbar¹, Ghassan Nihad Jawad², Mohd Shahri A. Mohamed Fuad³, Laili Rashid Dance⁴, Robin Sian⁵  
¹Universiti Sains Malaysia, ²University of Baghdad, ³SIRIM Industrial Research, ⁴University of Manchester

**EuRAD11-5**
Noninvasive Binary Gas Mixture Measurements with a Millimeter-Wave Low-Cost FMCW Radar System  
Andreas Och¹, Jochen O. Schrattenacker, Stefan Schulte¹, Patrick A. Hülz², Philipp F. Freid³, Robert Weigel⁴  
¹FAU Erlangen-Nürnberg, ²Infineon Technologies Austria AG, ³voestalpine Stahl GmbH
EuRAD12 Waveforms and Radar Networks
Chair: Stéphane Méria¹
Co-Chair: Krzysztof Kulpa²
¹Institut d’électronique et de télécommunications de Rennes, IETR, "Warsaw University of Technology"

EuRAD12-1 OFDM Waveform for Distributed Radar Sensing in Automotive Scenarios
Steffen Schieler¹, Christian Schneider¹, Carsten Andrich², Michael Dibereiner³, Julian Luo³, Andreas Schwie³, Philipp Wendland³, Reiner Thoma³, Giovanni Del Gado⁴
¹Technische Universität Ilmenau, ²Fraunhofer Institute of Integrated Circuits, ³Huawei Technologies Düsseldorf GmbH

EuRAD12-2 Synchronization of Radar Sensors in a Network Based on Inter-Sensor Interference
Maximilian Steiner¹, Manuel Keller¹, Johanna Geti², Martin Vossiek², Christian Waldschmidt²
¹ Ulm University, ²Friedrich-Alexander University Erlangen-Nürnberg (FAU)

EuRAD12-3 CDMA-based MIMO FMCW Radar System Performance using Intra-Pulse Phase Modulation
Marie Mbeutcha¹, Viktor Krozer¹
¹Goethe University Frankfurt am Main

EuRAD12-4 A Fast Algorithm for Target Adaptive Waveform Design for Imaging with Experimental Validation
Marcel Warnke¹
¹Fraunhofer Institute for High Frequency Physics and Radar Techniques FHR

EuRAD12-5 Instantaneous Target Velocity Estimation Using a Network of a Radar and Repeater Elements
Benedikt Meinke¹, Maximilian Steiner¹, Johannes Schlichenmaier¹, Christian Waldschmidt¹
¹ Ulm University
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<th>Time</th>
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<th>Co-Chair(s)</th>
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<td>10:50 - 11:10</td>
<td>EuRAD13 Automotive MIMO and Back-Projection</td>
<td>Christian Sturm¹</td>
<td>Willem A. Hol²</td>
<td>Feike Jansen¹</td>
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<td></td>
<td>EuRAD14 Focus Session Modern Advances in Imaging at Microwave, Millimeterwave and Terahertz Frequencies</td>
<td>Thomas Fromenteze¹</td>
<td>Okan Yurduseven²</td>
<td>Chi Hou Chan¹, Shao-Xin Huang¹, Yvan Song, Zeng¹, Gong-Bu Wu¹, Ka Fa Chan¹, Bao-Jie Chen¹, Ming-Yao Xie¹, Shi-Hie Qu¹</td>
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<td>11:10 - 11:30</td>
<td>EuRAD13-1 Automotive Radar Doppler Division MIMO With Velocity Ambiguity Resolving Capabilities</td>
<td>Claire Migliaccio, Laurent Bouchet, Jerome Lantier</td>
<td>Paul Laugré, Julien Maré, Bruno Cosson</td>
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<td>EuRAD14-1 MMW Imaging using Polarmetric Measurements</td>
<td>Thomas Fromenteze¹</td>
<td>Okan Yurduseven²</td>
<td>Claire Migliaccio, Laurent Bouchet, Jerome Lantier, Paul Laugré, Julien Maré, Bruno Cosson</td>
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<td>11:30 - 11:50</td>
<td>EuRAD13-2 Sparse array design for Automotive MIMO Radar</td>
<td>Renato Simon¹, Farhan Bin Khalif, Maximilian Eschaubauer, Andre Roger¹</td>
<td>Kristian Simons¹</td>
<td>Renato Simon¹, Farhan Bin Khalif, Maximilian Eschaubauer, Andre Roger¹, Kristian Simons¹</td>
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<td>EuRAD14-2 Millimeter-Wave and THz Polarmetric Imaging</td>
<td>Vincent Catoën¹, Shao-Xin Huang¹, Yvan Song</td>
<td>John Papapolymeros, Jeffrey Nazer¹</td>
<td>Vincent Catoën¹, Shao-Xin Huang¹, Yvan Song, John Papapolymeros, Jeffrey Nazer¹</td>
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<td>11:50 - 12:10</td>
<td>EuRAD13-3 Comparison of 2D and 3D Compressed Sensing for High-Resolution TDM-MIMO Radars</td>
<td>Fabian Roco², Philipp Hügel, Christina Knoll, Lizette Lorraine Tovar Torres, Nils Appenzell, Jürgen Dörmann, Christian Waldschmidt</td>
<td>*Ulm University, *Daimler AG</td>
<td>Fabian Roco², Philipp Hügel, Christina Knoll, Lizette Lorraine Tovar Torres, Nils Appenzell, Jürgen Dörmann, Christian Waldschmidt</td>
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<td>EuRAD14-3 40-GHz Active Interferometric Imaging with Noise Transmitters</td>
<td>Stephan Vekas*, Liang Song, John Papapolymeros, Jeffrey Nazer¹</td>
<td>Michigan State University</td>
<td>Stephan Vekas*, Liang Song, John Papapolymeros, Jeffrey Nazer¹, Michigan State University</td>
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<tr>
<td>12:10 - 12:30</td>
<td>EuRAD13-4 Radar-based Environment Perception using Back Projection Algorithm</td>
<td>Patrick Zaeumer², Alexander Kamann², Patrick Heid², Dagmar Steinhauser², Thomas Brandmeier²</td>
<td>Fabien Befrande², Hamza Halak El-Esraï², Yann Marie-Joseph², Damien Boudesque², Cyril Berente², Philippe Del Bono, Thomas Fromenteze², Christelle Aupetit-Berthelot², Fabien Berland², Hamza Halak El-Esraï², Yann Marie-Joseph², Damien Boudesque², Cyril Berente², Philippe Del Bono, Thomas Fromenteze², Christelle Aupetit-Berthelot²</td>
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<td>EuRAD14-4 C-band Microwave Photonic MIMO Imaging System</td>
<td>Fabien Befrand², Hamza Halak El-Esraï², Yann Marie-Joseph², Damien Boudesque², Cyril Berente², Philippe Del Bono, Thomas Fromenteze², Christelle Aupetit-Berthelot²</td>
<td>XLIM Research Institute - UMR CNRS 7252</td>
<td>Fabien Befrande², Hamza Halak El-Esraï², Yann Marie-Joseph², Damien Boudesque², Cyril Berente², Philippe Del Bono, Thomas Fromenteze², Christelle Aupetit-Berthelot²</td>
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<tr>
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<td>EuRAD13-5 Adaption of Fast Factorized Back-Projection to Automotive SAR Applications</td>
<td>Markus Fauth², Reinhard Feger², Johannes Fivel², Markus Gosele², Jürgen Hasch², Andreas Steber²</td>
<td>Johannes Kepler University Linz, *Robert Bosch GmbH</td>
<td>Markus Fauth², Reinhard Feger², Johannes Fivel², Markus Gosele², Jürgen Hasch², Andreas Steber², Johannes Kepler University Linz, *Robert Bosch GmbH</td>
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<td>EuRAD14-5 Improving Quantitative Microwave Holography Through Simultaneous Use of the Born and Rytov Approximations</td>
<td>Daniel Tajk², Natalia K. Nikolas², Michael Noseworthy²</td>
<td>McGill University</td>
<td>Daniel Tajk², Natalia K. Nikolas², Michael Noseworthy²</td>
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12:20 – 13:50
EuRAD Buffet Lunch

13:50 – 14:30
Applications for Staring Holographic Radar
Dominic Walker, Chief Executive Officer
Aveillant Ltd, 19-21 Evolution Business Park, Milton Road, Impington, Cambridge

Aveillant has developed a staring radar technology referred to as Holographic radar. The approach taken to the platform design allows a very high degree of scalability and configurability, depending on the application. Two specific applications work on very different scales: one being the detection of small UAVs (drones) for protection of airports and other critical infrastructure; the other being tracking of aircraft over very large offshore windfarms at ranges up to 60 nm. However, both applications depend on the staring nature of the radar, and the ability this gives to characterise targets based on a high resolution Doppler signature. This presentation will outline some of the techniques used in each application, and the similarities between the approaches taken to what are superficially two very different problems.

14:30 – 14:50
Awards Ceremony
Eric Bergeault, EuMW2019 Awards Coordination Chair.
Philippe Eudeline, EuRAD 2019 Chair
Claire Migliaccio, EuRAD 2019 Co-Chair

EuRAD Conference Prize
EuRAD Young Engineer Prize

14:50 – 15:10
Closing Remarks
Philippe Eudeline, EuRAD 2019 Chair
Stéphane Méric, EuRAD 2019 TPC Co-Chair

Invitation to EuRAD 2020 in Utrecht
Mayazzurra Ruggiano, EuRAD 2020 Chair

15:10
End of Session
Welcome from the Workshops and Short Courses Chairs

This year, we are pleased to offer the EuMW 2019 delegates a wide range of workshops and short courses that cover the topics of all three conferences throughout the week.

To guarantee this wide coverage of topics, the accepted 24 workshops and five short courses were selected through a pre-established review process.

The topics covered comprise theoretical and applicative aspects of circuits and systems for RF and microwave applications (sensors, high-data-rate communications, automotive, 5G, IoT). Specific themes are really wide: mm-waves and THz applications, technologies and design techniques for power devices, filters (reconfigurability, synthesis and applications), nanoscale devices characterization, phase change material, energy efficiency, multiphysics, nonlinear circuits design, advanced circuits design, bio-electromagnetism and medical applications, PMSE, RADAR, and beamforming networks.

We are very grateful to all the organisers, presenters and authors of workshop and short course materials for sharing their knowledge with the EuMW 2019 delegates, and for their hard work and dedication before and during the conference. These events could only happen because of their willingness to serve the microwave community.

All workshops and short courses are individually endorsed by one or two of the conferences that make up EuMW. However, they are available and accessible to any scientist or engineer wishing to gain a broader perspective on microwave and RF systems and devices, or to learn about a new specialism within our broad field.

Due to the wide range of covered topics, the workshops and short courses’ programme fills the entire week. Workshops or short courses that focus on topics relevant for EuMIC mainly take place from Sunday to Tuesday. On Thursday and Friday, we present most of the workshops endorsed by EuRAD. Similarly, EuMC devoted workshops are distributed throughout the whole week.

Slides for the workshops and short courses will be provided electronically at the conference. No hard copies of the slides will be provided.
In this workshop, the recent advances in SiGe BiCMOS technology for mm-wave applications will be illustrated by many examples of technology development, designs, from components to circuits and systems.

The SiGe BiCMOS most advanced technologies in Europe will first be presented, from STMicroelectronics, Infineon and IHP. In particular, the last advances concerning $f_{\text{max}}/f_{\text{t}}$ frequencies will be highlighted. SiGe technology will be compared to standard advanced CMOS technologies to highlight the advantages/drawbacks of each technology family.

Next, specific characterization techniques for frequencies in mm-wave range will be presented, from small- (linear) to large signal (nonlinear) conditions. Some examples of components compact modelling will be illustrated. High-frequency and low-frequency noise issues, along with ageing issues, will also be addressed.

Then, circuit and system level presentations will highlight design techniques in SiGe BiCMOS technologies. Circuits and systems addressing many different frequencies will be presented, for 5G applications (28 GHz and 60 GHz), back-hauling and automotive radars in E-band, and future applications like imaging above 100 GHz, with several designs at 120-140 GHz and 300 GHz, respectively.

In particular, beam-forming applications, which is a hot topic today for future point to point communications systems, will be developed.

As for the technologies, circuit- and system-level comparison will also be carried out between SiGe BiCMOS and standard CMOS (including FDSOI), to highlight pro & cons of each technology.

### Programme

#### Towards 600 to 700 GHz $f_{\text{max}}$ SiGe BiCMOS platforms in Europe
Pascal Chevalier¹
¹STMicroelectronics

#### Silicon Technologies for mm-Wave Applications
Ned Cahoon¹
¹Global Foundries

#### On-wafer small signal characterization beyond 100GHz for compact model assessment
Sebastien Fregonese¹
¹University of Bordeaux

#### Noise and power characterization in mm-wave and sub mm-wave frequencies
Christophe Gaquiere¹
¹University of Lille

#### Design Techniques and Technologies for Next Generation Fiberoptics Systems and High Temperature (> 10 K) Quantum Processors
Sorin P. Voinigescu¹
¹University of Toronto

#### Advances in Aging Compact Model for Hot Carrier Degradation in SiGe HBTs under Dynamic Operating conditions for reliability-aware circuit design
Cristel Maneux¹
¹University of Bordeaux

#### Low Frequency Noise modelling of BiCMOS SiGe HBTs
Fabien Pascal¹
¹University of Montpellier

#### Mm-Wave Distribution and Wireless Fiber for 5G and IoT Backbone
Mahmoud Sawaby¹
¹University of Stanford

#### Can the RF radio foster the 140GHz spectrum?
Bjorn Debaillie¹
¹IMEC

#### A mm-Wave Repeater for mm-Wave Fixed Wireless Access
Wolfgang Templ¹
¹Nokia Bell-Labs

#### Advanced Circuits and Systems for radar sensors in modern SiGe
Nils Pohl¹
¹Ruhr-Universitat Bochum

#### Mm-wave SiGe SoC: E & D band TRX front-end for P2P radio links
Alessandro Fonte¹
²SIAE Microelettronica

#### D/I and A/D Conversion Key ICs for Broadband Communications
Markus Grözing¹
¹University of Stuttgart
The research area of improving the performance, cost and size of RF solutions for incoming 5G LTE is very active with many developments. Mobile cellular subscribers are expected to reach more than 6 billion by 2020 and 5G LTE will bring high data capacity as low latency using sub-6GHz and mm-Wave spectrum. The workshop presents the current status of 4G/5G LTE RF Front End and techniques to deliver an over gigabit-per-second data rate such as Carrier Aggregation and MIMO as well Wider Modulation Bandwidth for LTE and mm-Wave spectrum. The high speed wireless ecosystem which includes 5G LTE and WiFi 6 (802.11ax) will be deployed in the near future and will use two frequency domains: sub 6GHz frequency domain and mm-Wave spectrum. Mm-Wave will be used initially to increase the capacity for backhaul network and allow low latency. Also the next mobile devices will add new wireless functionality in 6GHz-8.5GHz spectrum such as Ultra-wideband (UWB) for proximity indoor location as other smart applications. From this prospective and the concurrently deployment for 5G LTE New Radio (NR) with the actual 4G LTE will increase the complexity for RF Front End Modules (RF FEMs) and will be covered in this workshop.

Programme

Millimeter-wave CMOS Phased-Array Transceiver for 5G New Radio
Kenichi Okada¹
¹Tokyo Institute of technology

Sub-6GHz 5G Front End Modules for Cellular Applications
Florinel Balteanu¹
¹Skyworks Solutions Inc.

Efficient transmitter design using advanced Doherty techniques
Koen Buisman¹, Christian Fager¹
¹Chalmers University of Technology

Recent advancement in RFSOI PA design for LTE-A and 5G
Alexandre Giry¹
¹CEA-LETI

28GHz Front-End Module in CMOS PDSOI 65nm for 5G Phased-Array
Martineau Baudouin¹
¹Commissariat a l’energie atomique et aux energies alternatives

Fully integrated Doherty GaN HEMT power amplifiers for 5G sub-6-GHz massive-MIMO base-station applications
Andrei Grebennikov¹
¹Sumitomo Electric Europe

High Efficiency and Wide-band GaN/GaAs PA Techniques for 5G and beyond
Shuichi Sakata¹, Shintaro Shinjo¹
¹Mitsubishi Electric Corporation

Massive MIMO for 5G: what is (not) different for the RF front-ends?
Lisbet Van der Perre¹
¹KU Leuven

Accurate location through UWB time-of-flight techniques
Luc Darmon¹
¹Decawave Dublin

Developing and testing 5G PAs; from the cable to OTA
Sergio Pires¹
¹Ampleon Nijmegen

Piezoelectric thin film advanced substrates for high performance, highly integrated 5G acoustic filter devices solutions
Eric Butaud¹
¹SOITEC Grenoble
WORKSHOPS AND SHORT COURSES - SUNDAY

WS-03 (EuMC)
Microwave Characterization and Modelling at Nano and Micro-Scale of Advanced Materials to Enhance Emerging Products Manufacturing

Chair: Kamel Haddadi¹, Johannes Hoffmann²
¹University of Lille, CNRS / IEMN, ²METAS

On one hand, Manufacturing industry offers a large range of organic and inorganic based materials addressing numerous applications. The quality and performance of the final manufactured products depend strongly on their chemical/electrical/optical/mechanical properties at nanoscale as well as their arrangements at macroscale (amorphous, partially isomorph, hybrid/composite, multi-layered). On the other hand, microwave to mm-wave nondestructive testing and evaluation methods are well established for determining electrical properties of materials. A variety of methods including far to near field free-space, guided, resonant and scanning probe microscopy offers numerous solutions for Macro down to Nano scale characterization. In this context, the objective of this workshop is oriented towards RF to mm-wave techniques and related instruments dedicated to nondestructive evaluation applicable to wide range of emerging materials. This workshop is proposed in the frame of the H2020-NMBP-07-2017 MMAMA "Microwave Microscopy for Advanced and Efficient Materials Analysis and production" (www.mmama.eu).

Programme

MMAMA project objectives: Study of electrical properties of organic semiconductors and photovoltaic nanostructures using microwave characterization methods
David Moerman¹, Olivier Douheret¹, Pascal Viville¹
¹Materia Nova

Dielectric resonator scanning of wafer - size surfaces at finer - than - head resolution
Malgorzata Celuch¹
¹QWED

Quasi free-space TEM Material Measurements
Ali Reza Kazemipour¹
¹METAS

Synthesis, Verification and Reproducibility of Microwave Design Materials
Christoph Baer¹
¹Ruhr University Bochum

Wideband Electrostatic Force Microscopy (EFM): Broad Frequency Range with High Sensitivity
Georg Gramse¹, Ferry Kienberger¹
¹Keysight Labs

Tips and Calibration of Nearfield Scanning Microwave Microscopes
Johannes Hoffmann¹
¹METAS

Microwave Microscopy based on GHz Surface Acoustic Waves on thin Film Materials
Luca Pierantoni¹, Davide Mencarelli¹, Andrea Di Donato¹, Marco Farina¹
¹Università Politecnica delle Marche

FEM Solver for Drift-Diffusion Semiconductor Equations coupled with full Maxwell Electromagnetics
Arif Guengoer¹
¹ETHZ

Combined Atomic, Microwave and Electron Microscope: A tool for Hybrid Characterization of Nanomaterials
Petr Polobodov¹, Didier Theron¹, Gilles Dambrine¹, Kamel Haddadi¹
¹University of Lille, CNRS / IEMN, ²CNRS / IEMN

Integrated Fluorescence and Scanning Microwave Microscopy: Nano-Imaging with GHz on System With "Proof of Life
Zahra Nemati¹, Jinfeng Li¹, Peter Burke¹
¹UC Irvine
WS-04 (EuMC)
Real amplifier Devices for 5G New Radios

Chair: Kazuya Yamamoto¹, Kazutaka Inoue²
¹Mitsubishi Electric Corporation, ²Sumitomo Electric Industries, Ltd.

Various RF front-end technologies based on GaN, Si-CMOS etc. for 5G new radios (NRs) base stations have been discussed in major conferences up to now. Now, the 3GPP has announced that 5G standards have been completed for services. This workshop introduces not fantastic but “real” 5G devices and systems accordingly while focusing on sub-6 GHz power amplifiers and 28 GHz transmitters. In addition, the workshop covers recent progress in RF devices, circuits, assembly, and phased array systems not only for 5G base stations but also for 5G handsets. These above hottest 5G NR topics will be provided by real 5G base-station manufacturers and real device suppliers.

The workshop attendees, therefore, will be able to learn and understand a variety of technical issues, their countermeasures, and the latest results related to base station transmitters and handset amplifiers of 5G NRs at a time. Thus, it is expected that this workshop will be very useful for 5G amplifier designers; beginners or less-experienced circuit/device designers as well as experienced designers engaged in circuit- and device-suppliers for use in 5G NRs.

Programme
Overview of 5G and expectations for RF front-end
Hiroshi Okazaki¹
¹NTT DOCOMO, INC

GaN HEMT Power Amplifiers for 5G Base Stations
James Wong¹
¹Sumitomo Electric Europe Ltd.

GaN Technology Challenges with 5G Infrastructure Applications
Monte Miller¹
¹NXP Semiconductors, USA

Advances in 5G handset RF front-ends: PAs and filters
Florinel Balteanu¹
¹Skyworks Solutions Inc.

Envelope tracking power amplifiers for 4G/5G mobile handset applications
Kenji Mukai¹
¹Murata Manufacturing Co., Ltd.

100nm and sub 100nm GaN/Si MMIC processes : The perfect complement to mmW 5G applications
Marc Rocchi¹
¹OMMIC

GaN HEMT Technologies for 5G Base Station Amplifiers
Kazutaka Inoue¹
¹Sumitomo Electric Industries, Ltd.
Microwave measurements at systems, components and materials levels: a global approach to improve energy efficiency of the next generation of electronic devices

Chair: Francois Ziade¹, Djamel Allal¹
¹Laboratoire National de Metrologie et d’Essais (LNE)

New materials, more efficient components and systems that are less power consuming must be developed by the semiconductor, electronic and telecommunications industries to meet ultralow power requirements needed in wireless systems and electronic devices involved in 5G and IoT applications. This workshop aims to present a global approach, acting at different levels (system, component and material), to improve energy efficiency of the next generation of electronic. The basis of this approach is the following:

- Wireless communication systems and wireless sensors needed for 5G and IoT applications require better accuracy, reliability and traceability of the measurement of power as well as a better understanding of the mapping distribution of the power consumption.
- The efficiency of RF and microwave components depends on the operating conditions (linear or nonlinear regime, frequency of signal excitation, impedance seen at its inputs and outputs, DC bias conditions). In time-domain, oscilloscopes can be used to provide a measurement of the switching losses by integrating over the product of the synchronous and simultaneous measurements of the current and voltage waveforms.
- Material candidates for low power / high efficiency electronic components, such as the existing InP and GaN III/V semiconductor materials and also the emerging strain engineered piezoelectric materials require the determination of electrical permittivity and dielectric loss at nanoscale.

In introduction, key figures of ICT energy issues and main aspect of this approach will be presented to the auditory. Then the first part of the workshop will be dedicated to on-chip power sensors and contactless techniques based on Near Field electromagnetic techniques which are complementary approaches to provide reliable power measurement data at system level.

Secondly experts will provide main aspects of VNA and NVNA uncertainty evaluation, thermal, electromagnetic, and electrical performance of a gallium nitride (GaN) power transistor for different load conditions and finally an overview of measurement method for characterizing switching waveforms by means of time-domain instrumentation.

Finally the workshop will be focused on calibration aspects and features of Scanning of Microwave Microscopy (SMM) which is a novel and highly versatile scanning probe technique used to investigate materials and devices at the nanoscale.
WS-06 (EuMC)
Future Wireless Technologies in the Terahertz and Optical Frequency Bands

Chair: Dominic O'Brien¹, Olivier Bouchet²
¹University of Oxford, ²Orange

The session comprises four presentations focusing on the challenges and possible solutions in the design of THz and Optical wireless components, systems and networks for beyond 5G access technologies. The presentations will be followed by a panel session for open questions. The key aim is to discuss and provide the audience a vision of the system and network designs, which will enable joint use of the RF and optical spectrum.

Nanometric band, the new wireless Eldorado.
Olivier Bouchet¹
¹Orange

Facing the Challenges in Aggregation of Terabit Wireless Links
Marcin Brzozowski¹
¹IHP

Photonically enabled THz wireless communication
Cyril Renaud¹
¹University College London

Next generation terabit wireless communications in the 200 GHz band
Vladica Sark¹
¹IHP

WS-07 (EuMC)
New materials and technologies for reconfigurable RF components

Chair: Hjalti H. Sigmarsson¹, Nicolas Delhote²
¹Oklahoma University, ²Univ. Limoges, Xlim, CNRS, UMR 7252

Reconfigurability is one of the most exciting paradigms that can make regular fixed frequency RF components capable to reconfigure their behaviour, such as the operating frequency and bandwidth for a given filter or the frequency and polarization of an antenna. Modern materials and manufacturing technologies can provide exciting new ways to bring such capabilities to components that are meant to be integrated into RF front-ends.

The purpose of this half-day workshop, that is specifically focused on practical realizations of reconfigurable filters and antennas, is to give a recent overview on new materials and technologies providing such reconfigurability. The workshop will highlight for example materials like phase change transition materials operating at the millimeter-wave and liquid metals. Such materials, thanks to their superior properties can bring new means of reconfigurability by providing very integrated switching capability and high-power handling respectively. Partially magnetized ferrite substrates based on LTCC technology as well as RF switches based on memristor technology will also be overviewed in this workshop as innovative reconfigurable methods. A last part of this workshop will cover varied methods to turn fixed frequency planar, SIW and SIW-like filters into tunable ones by different means. PCB based and self-packaged 3D printed ceramic filters will be covered.

Exploration of easily manufacturable memristor technology for RF switch applications
William Chappell¹, Qiangfei Xia²
¹DARPA, ²University of Massachusetts

Continuously Reconfigurable Filters using Liquid-Metal Actuation
Hjalti H. Sigmarsson¹
¹Oklahoma University

Reconfigurable antennas based on functional materials
Aurelian Crunteanu¹, Laure Huitema¹
¹Univ. Limoges, Xlim, CNRS, UMR 7252

Tunable and Reconfigurable Passive Microwave Component Designs Based on Partially Magnetized Ferrite Substrates
Fathar Abdul Ghaffar¹, Langis Roy¹
¹University of Ontario Institute of Technology

Planar and SIW tunable devices
Cédric Quendo¹, Benjamin Potelon¹, Jean François Favernac¹, Eric Rius¹, Rozenn Allanic¹, Denis Le Berre¹
¹Univ. Brest, Lab-STICC, CNRS, UMR 6285

Compact surface mountable and tunable 3D ceramic filters
Aurelien Fergaud¹, Nicolas Delhote¹, Remi Segalen¹, Yves Marcuso²
¹Univ. Limoges, Xlim, CNRS, UMR 7252, ²Thales DMS France, ³Thales DMS
WORKSHOPS AND SHORT COURSES - SUNDAY

Time: 08:30 – 17:50  Room: 723+724

WS-08 (EuMC/EuMIC)
RF Technologies & Techniques for Multi-Band Power Amplifiers for Radars and Communications

Chair: Gabriele Formicone¹, Guillaume Callet²
¹Integra Technologies, Inc., ²Unnited Monolithic Semiconductors

Latest or emerging trends in radar and communications take advantage of operation over multiple frequency bands to achieve system capabilities unobtainable through operation over a standard frequency band. One example of such trend is clearly manifested in wireless communications with carrier aggregation, which enables a single device to operate over multiple bands. Wireless communications over multiple bands also enable higher data rates, and these low power systems can take advantage of the latest developments in tunable and reconfigurable components. Also, dual-band transponders and transceivers for satcom or telemetry, tracking and command (TT&C) utilize multi-band RF techniques. Similarly, although operating at much higher power levels compared to multi-band communication systems, radars operating over multiple bands have the capability of providing greater functionality. For example, radars operating at C and X band (such as KRONOS, from Leonardo), or S and C band, or X and Ka band (such as GEMINI-DB, from GEM Elettronica) can provide an unprecedented level of performance and capability to detect and track hostile targets or higher resolution and more information in remote sensing applications. Multi-band system architecture may rely on different power amplifiers for different bands, or whenever feasible, a single power amplifier for multiple bands.

This workshop focuses on RF technologies and techniques available for power amplifiers (PA) operating over multiple bands, covered either by a single PA module or multiple PAs for each frequency band. Being a relatively new field, power amplifier design techniques for "multi-band single PAs" are still evolving without a fully established methodology. Although multiband communication systems operate over relatively close multiple bands, where traditional broadband / wideband power amplifier techniques can be quite successful, multiband radar frequency bands tend to be very far apart where traditional broadband / wideband techniques may not yield an acceptable performance. For instance, broadband / wideband power amplifier techniques require very expensive trade-offs in terms of efficiency, gain and power level. Therefore, it is not uncommon having multiple transmitters for multiband radars. At the same time innovative ideas suitable for multiband single PA systems are strongly desired with the potential to achieve higher RF performance metrics in terms of efficiency, gain and power level. This workshop reviews the RF and MW technologies and techniques available to the designers today, with the hope of opening a debate and stimulating new ideas and maybe identifying new directions of research and development which could lead to future multiband single high power amplifiers with superior performance than achievable today.

Programme

X-band Compact Dual-Polarimetric Doppler Radar using GaN Power Amplifier Module
Takuo Kashiwa¹
¹Furuno Electric Co.

High-power solid-state amplifier modules for Multi-Band coherent radar systems
Giorgio Pizzoi³
³GEM Elettronica

Microwave developments for new Airborne Antennas
Yves Marçuso¹
¹Thales DMS

Advanced AESA architectures based on new GaN Solutions
Claudio Lanzieri¹
¹Leonardo Company

Technologies and architectures for space-borne high-efficiency RF power amplifiers
Václav Valenta¹
¹European Space Agency (ESA)

GaN Technologies for Multi-band/Broadband Power Amplifiers
Rüdiger Quay¹
¹IFF-Fraunhofer: Fraunhofer Institute for Applied Solid-State Physics

High Power RF Pallet Solutions for Radar Systems from UHF to S-band
Gabriele Formicone¹
¹Integra Technologies, Inc.

High efficiency Wideband Power amplifier using Envelop tracking technology for high data rate communication application
Wilfried Demenitroux¹, Stéphane Dellier²
¹Thales Group, ²Wupatec

Multi-band High-Efficiency Power Amplifiers for Concurrent Signal Transmission
Zoya Popovic³
³University of Colorado, Boulder, Colorado

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WS-09 (EuMC)
THz Applications: Present and Future

Chair: Israel Arnedo¹, Albert Redo-Sanchez²
¹UPNA, ²das-Nano S.L.

The terahertz frequency range can be defined as the band of the electromagnetic spectrum centered at 1THz. Thus, the rule of factor 10 expands the frequency range from 0.1 THz to 10 THz. The so-called THz range lies in the gap between the microwave and the infrared bands. The combination of the technologies used in these two frequency ranges has been applied during the last decade to develop successful application oriented THz systems. This workshop covers two fundamental aspects of the THz field. On one hand, the differences between THz generators/receivers consist of radiation sources, detectors, passive/active components, and transmission technologies will characterize their pros and cons. Indeed, the availability of commercial THz generators/receivers (with all the components needed to perform its correct operation) is quite modern. Hence, in the first part of the workshop our top-recognized speakers will present an overview of the commercial THz generators/receivers along with its fundamental physical insight. On the other hand, due to the fact that the THz band is the last region of the electromagnetic spectrum technologically conquered (from RF to optics should be understood) many unsolved industrial problems have tried to be figured out with THz waves. Thus, in the second part of the workshop multitude of thriving applications in many fields will be presented: communication, biology, medicine, astrophysics, security, material detection, non-destructive evaluation, ... The historical perspective, the current state-of-the-art and the future perspective of both THz generators/receivers and THz applications are cover in this workshop being a great opportunity for beginners in the field but also for expert who wants to expand their scope of knowledge in a really broad sense.
SS-01 (EuMC)
Fundamentals of Microwave PA Design

Chair: Franco Giannini¹, Paolo Colantonio¹
¹University of Roma Tor Vergata

Semiconductor Power Amplifiers are key components in radio frequency and microwave transmitter systems. They have received a great deal of attention and development effort over the last decades and are still a hot topic in research area.

This short course aims to provide a comprehensive overview of all aspects of fundamental semiconductor microwave power amplifier design. It is an introductory course, aimed at graduate engineers who have moved into the field of RF design, as well as to microwave designers who aim to deeply understand the power amplifier basic concepts.

This short course features a range of presentations and will provide a comprehensive overview and basic understanding on recent important progress and novel state-of-the-art achievements in semiconductor power amplifiers. Very recent advances in semiconductor amplifiers and their applications will also be covered.

Starting from the fundamental concepts on semiconductor devices, the core of a power amplifier design, the theoretical foundations of a power amplifier design are discussed. It will include fundamental concepts and state-of-the-art results on actual designs of a range of semiconductor power amplifiers using existing foundries. The load pull technique is also addressed and focused on the designer perspective.

The presentations will also cover a variety of advanced topics, and will provide the attendees with a clear overview of the main streams of current and important research trends worldwide in this field, as the Doherty architecture and the more recent load modulation power amplifier design concepts.

The short course will also focus on the major challenges, such as stability (small and large signal) and how to address these in amplifier design. Finally, accounting for the linearity issue, a basic overview on linearization techniques and their adoption to properly mitigate the amplifier distortion effects will conclude the short course.

Programme

1. Semiconductor devices for PAs
   - Ilitcho Angelov¹
     - Chalmers Univ

2. PA theoretical foundation
   - Franco Giannini¹
     - University of Roma Tor Vergata

3. The Doherty Power Amplifier
   - Paolo Colantonio¹
     - University of Roma Tor Vergata

4. Load Modulated PAs
   - Steve Cripps¹
     - Cardiff University

5. Design of a C-band Single-stage Hybrid 100W GaN PA
   - Francesco Scappaviva¹, Davide Resca¹
     - MEC srl

6. Design and model oriented Load Pull techniques
   - Marco Pirola¹
     - Politecnico di Torino

7. Trading off high efficiency and linearity in PA and transmitter design
   - Zoya Popovic¹
     - University of Colorado

8. X-parameters for high-power PAs modeling and System Level Analysis
   - Alessandro Cidronali¹
     - University of Florence

9. Linear and Nonlinear Stability Analysis of Power Amplifiers
   - Giorgio Leuzzi¹
     - University of L’Aquila

10. Linearization techniques overview
    - Pere L. Gilabert¹, Gabriel Montoro Lopez¹
        - Universitat Politècnica de Catalunya (UPC-Barcelona Tech.)
WORKSHOPS AND SHORT COURSES - SUNDAY

SS-02 (EuMC/EuMIC)
Silicon-Based Integrated Technology Platform for Millimeter Wave (mmW) and Terahertz (THz) Applications

Chair: Safeiddin Safavi-Naeini¹
Co-Chair: Mohamed Basha¹, Aidin Taeb¹
¹University of Waterloo

THz technologies open new market opportunities for a vast range of applications. THz has the ability to be robust and commercially available for a wide range of applications from security screening to biochemical material detection. It has become the most exciting area of research and development in RF technologies with exciting promises for many future generation systems and emerging applications. There has always been a question of "which transmission line or wave guiding technology is suitable for THz applications?" To answer this question, it is desirable to have an overview of the available wave guiding technologies over the entire range of frequencies from microwave to optics, with particular emphasis on the state-of-the-art THz transmission structure technologies.

In recent years mmWave technologies have progressed on many fronts, including semiconductor devices. A wide variety of packaged and unpackaged active electronic devices are available in the mmWave range of frequencies. Obviously, the material selection is essential for designing almost any integrated mmWave system. Among the available compound semiconductor devices, silicon-based devices are dominantly utilized in a wide range of applications from digital to high frequency circuits. Different active elements can be realized on the doped silicon substrate. However, due to the substrate losses in most of the conventional planar on-chip technologies, such as CMOS, SiGe, etc., the realization of high performance passive components and TLs is quite challenging. The on-chip antennas are quite inefficient in the mmWave/THz range of frequencies. Therefore, developing a low-cost technology for passive off-chip transmission structures and devices is inevitable. Dielectric waveguides are highly promising transmission structures for realization of almost any off-chip systems at the mmWave and THz range of frequencies. Generally, dielectric waveguides offer the combined advantages of low-loss, light weight, and ease of fabrication. Also, dielectric waveguide-based devices provide a unique possibility for integration with planar circuits. Among possible candidates, High Resistivity Silicon (HRS) is the most promising material because of its high potential for integration, low-loss characteristics, and mature fabrication technology.

The workshop will discuss current available technologies used in the millimeter wave and terahertz range of frequencies. Then the focus will be on dielectric waveguide based technologies. Afterward, we will talk about different Silicon-based technologies developed in CIARS (Centre for Intelligent Antenna and Radio Systems). Three major technologies, SIG, SOQ, and SOG, will be discussed in detail. The introduced silicon-based technologies provide a high-performance platform for operating at mmWave range of frequency and beyond up to about 1000 GHz.

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<td>Safeiddin Safavi-Naeini¹, Mohamed Basha¹</td>
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<td>Dielectric Waveguide Design Procedure in Different Platforms</td>
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WORKSHOPS AND SHORT COURSES - MONDAY

WM-01 (EuMC/EuMIC)
Advanced CAD Tools and Techniques for the System Co-Design of Smart Antenna and Transmitter Modules
Chair: Sebastien Mons¹, Tony Gasseling²
¹Limoges University (Xlim Lab), ²Amcad Engineering

The development of a new generation of Active Electronically Scanned Array (AESA) to address 5G networks development is a fundamental technical challenge. MIMO and smart antennas represent a great opportunity to build efficient transceivers with better capacity and energy efficiency. However, traditional design rules and tools cannot address appropriately to these challenges effectively, knowing moreover that recent trends towards larger bandwidths at higher frequencies will be necessary for further capacity enhancement.

Such revolution requires more flexibility and interaction between the CAD tools used for the definition and the optimization of the full architecture at system level (radiating panel & transmitter modules) and its constitutive blocks at technological level. It appears that accurate system simulations, based on advanced macro modelling techniques is a promising way to address effectively the EM/circuit paradigm by combining interesting trade-off between performances, consumption and cost for such transceivers. In this workshop, speakers from leading industries and universities will present state-of-the-art results in advanced CAD tools and characterizations techniques for the modelling of complex systems in order to achieve an efficient co-design of antenna array and transmitters that make constructive use of unwanted load modulation effects at the interface.

We will first consider the challenges in future wireless communication systems. This is followed by some advanced MacroModeling techniques both for extracting the appropriate RF and antenna blocks models. Associated Characterizations test setup both for the extraction and the qualification of the building blocks will addresses the issue of these behavioral models. Next part will consider how to combines these efficient behavioural techniques, methodologies and tools for investigate complex systems such as new promising 5G transceiver architectures. Finally, the full behavioral system simulation of a reconfigurable antenna with a reduced number of RF excitations in Ka-band will be presented to promote an efficient co-design and co-simulation of such promising architectures.

OTAs Characterization of nonlinear transmitters using specially designed multi-sines
Nuno Borges Carvalho¹
¹Aveiro University

Advanced RF FrontEnd Modeling for large scale architectures such as active antennas or 5G communication systems
Wissam Saabe¹
¹Amcad Engineering

Modeling of large antenna array for SATCOM applications
Benoit Leaur¹
²Zodiac Data Systems

Advanced CAD tools for an efficient Antenna / Module co-design
Edouard Ngoymb¹
¹Limoges University (Xlim Lab)

Stimulus-response characterization of radio transmitter components under wideband repetitive test signals
Jean-Pierre Teyssier¹
¹Keysight

Design flow challenges for 5G active array antennas
Kristoffer Andersson¹
¹Ericsson

Phase Change Material for Microwave Applications
Chair: Pierre Blondy¹, Petronilo Martín-Iglesias²
¹XLIM, ²European Space Agency

Phase change materials (PCM) is already seen as a disruptive technology when low electrical losses are required together with high level of integration. In addition, high isolator and broadband response are offered. Microwave switches based on PCM can be thermally transitioned between amorphous and crystalline states, showing several orders of magnitude change in resistivity. Phase change switches are fast, small form factor, and can be readily integrated with MEMS and CMOS electronics. Several research groups around the word are working in bringing the maturity level suitable for a product development and, in some of the cases, the use of the technology for space applications. The workshop would like to trigger the discussion regarding performance, challenges and limitations.

Phase Change Switch development for an “RF FPGA”
William Chappell¹
¹DARPA

Double-Port Double-Throw (DPDT) Switch Matrix Based on Phase Change Material
Pierre Blondy¹, Ines Betourn¹, Aurelian Crunteanu²
¹XLIM, ²Univ. Limoges, Xlim, CNRS, UMR 7252

Germanium Telluride Phase-Change RF switches: some design rules
Florence Podevin¹, Alexandre Leon1, Bruno Reig¹, Etienne Perret¹, Philippe Fernet¹
¹Univ. Grenoble Alpes, ²ST Microelectronics, ³CEA Leti, ⁴Grenoble INP, ⁵University Grenoble-Alpes

PCM-Based and MIT-Based RF Switches
Raaif Mansour¹
¹University of Waterloo

5 THz Figure-of-Merit Phase change RF switches with 100 million Cycle Reliability
Jeong-sun Moon¹, Hwa-change Seo¹, Kyung-ah Son¹, Kangmu Lee¹, Daniel Zehnder¹, Haw Tai¹, Dustin Le¹
¹HRL Laboratories

Phases change electro-optical components
Mina Rais-Zadeh¹
¹NASA JPL and U. of Michigan
WORKSHOPS AND SHORT COURSES - MONDAY

WM-03 (EuMC)
Current and Future Use of Spectrum by PMSE

Chair: Georg Fischer¹, Matthias Fehr²
¹FAU University Erlangen-Nürnberg, ²APWPT

This workshop is the 5th workshop in a series of workshops related to PMSE (Program Making and Special Events) at EUMW. PMSE, say professional wireless microphones, wireless in ear monitors, wireless cameras and wireless effect control are, in particular, fundamental elements of our daily cultural life and essential tools for content production. They are employed in journalistic news coverage, sports events, theatres, by educational and cultural institutions, trade fairs, film productions, conference-centres, churches, sports clubs, etc. This workshop addresses recent changes in UHF spectrum from the viewpoint of spectrum access for PMSE. Updates on current and foreseeable changes in radio technology, standardisation and spectrum regulation will be discussed regarding their impact on PMSE radio design and usage. Recent research outcomes on cognitive radio approaches for PMSE and integration of PMSE into 5G cellular communication are presented.

Programme

Welcome and brief introduction in the 5th PMSE WS
Alan March¹
²Sennheiser UK

Short introduction in PMSE
Alain Richer¹
²Sennheiser

A methodology for the practical recording of PMSE frequency use and a quick summary of more than 10 years of spectrum observation in the event production
Matthias Fehr¹
²APWPT

Is PMSE wasting spectrum? A fair view on providing high QoS and high QoE
Georg Fischer¹
²FAU University Erlangen-Nuremberg

The EBU work on feasibility and application of 5G in content production
Darko Ratkaj¹
²EBU

Foreseeable benefits and limitations of 5G Technology for PMSE
Andreas Wilzeck¹, María Perez-Guario²
²Sennheiser

Standardisation and Regulation activities reg. PMSE in CEPT, ETSI and ITU-R
Wolfgang Bilz³
³SHURE

Time: 08:30 – 17:50
Room: 741A
Integration and multi-physics challenges in 5G mm-wave system design

Chair: Christian Fager¹, Kristoffer Andersson²
¹Chalmers University of Technology, ²Ericsson

Millimeter-wave frequency bands and multi-antenna MIMO technologies are now widely explored to address the demand for increased capacity and reliability in emerging mobile communication systems, 5G and beyond. Initial testbed results have demonstrated the potential but also highlighted the practical challenges of such technologies. The combination of high frequency, small size, large signal bandwidth, and increased functionality is raising fundamental integration and multi-physics challenges that have to be addressed before the initial results can be translated into products.

The objective of this workshop is to give a comprehensive overview of some of the most important research challenges in the design and analysis of highly integrated hardware for millimeter wave multi-antenna systems. Heat dissipation and related thermal effects has emerged as one of the most important and limiting factors in realization of millimeter wave 5G hardware. A major theme for this workshop will therefore be multi-physical problems that arise when thermal-, mechanical-, circuit-, and antenna-design considerations have to be jointly satisfied. The workshop presentations will illustrate how recent advances in analysis, simulation, and integration can help researchers in academia and industry to better understand how to optimize their designs under the constraints in future system applications.

The workshop brings together views by leading industry, institute, and academic researchers. This will give the audience both perspectives of detailed technical solutions, as well as, an overview on the requirements that drive industrial system development.
THz technology has reached a certain degree of maturity but there are still important developments necessary for implementing it to systems. At the same time, there are still needs for device and circuit studies in order to improve, frequency, power, sensitivity performance and provide integrated solutions to system requirements. The workshop will provide the opportunity to new generations of scientists and engineers to learn about the unique features of Terahertz technologies, while at the same time addressing the latest achievements in the field. THz applications to be discussed extending among from sensing and spectroscopy to communications and imaging. The workshop will bring together experts from various academic, national labs and commercial enterprises to discuss the most recent advances in their respective fields and to provide insight into what the future might hold for exploration of this frequency range. It will focus on a variety of materials such as traditional III-Vs, III-Nitrides, Silicon, Graphene and Transition metal dichalcogenides (TMDs), as well as various device concepts for efficient THz generation and detection. The operation of the components to be discussed is based on plasmonics, photoconductors, plasma waves, photomixing, Resonant Tunneling, Negative Differential Resistance, CMOS and High-Electron Mobility Transistors. Devices such as Quantum Cascade Lasers, Self-switching Diodes and Uni-Traveling-Carrier Photodiodes will also be addressed. Advanced Sensing, Imaging and Communications and terrestrial, space applications will be discussed. The Workshop is intended for young scientists and engineers who are interested in learning about this emerging field, as well as individuals with a more advanced understanding of related concepts. The topics addressed include fundamental and engineering considerations together with the latest results in Terahertz technology.

Programme

**THz Applications: From Devices to Space Systems**
Imran Mehdi¹
¹Jet Propulsion Laboratory

**Nitride-based Two-and Three-Terminal Devices for THz applications**
Dimitris Pavlidis¹
¹Boston University

**Gated Planar Nanodiodes for THz detection**
Javier Mateos³
³University of Salamanca

**THz oscillators using resonant tunneling diodes and their functions for various applications**
Masahiro Asada¹, Safumi Suzuki¹
¹Tokyo Institute of Technology

**Low Noise Terahertz InP HEMT Technology and Applications**
William Deal¹, Kevin Leong³, Caitlyn Cooke³, Gerry Mei³
³Northrop Grumman Corporation

**Recent advances in THz Antennas**
Maria Alonso¹
¹Jet Propulsion Laboratory, Caltech

**Planar Antennas for THz Sources: What about the Skin Effect?**
Elliott Brown¹, Andrea Mingardi³, Weidong D. Zhang³, Enrique Garcia-Munoz³, Bjørn Globisch³
³Wright State University, Dayton, OH, USA, ³Universidad Carlos III de Madrid, Leganes, Madrid, Spain

**Graphene and Dirac materials beyond graphene: applications in THz metamaterials and plasmonics**
Berardi Sensale-Rodriguez¹
¹University of Utah

**High performance terahertz radiation sources based on plasmonic photoconductors**
Mona Jarrahi¹
¹University of California, Los Angeles

**THz Photomixing, laser sources & applications**
Philippe Latzel¹, Fabio Pavanello¹, E. Peytavit¹, Stefano Barbieri¹, Mohamed Zakhroune¹, Jean-Francois Lampin¹
¹IEMN, Villeneuve d’Ascq, France

**Chip-Scale Molecular Clock Using THz Rotational Spectroscopy**
Ruonan Han¹
¹Massachusetts Institute of Technology

**Optically-Controlled Tunable/Reconfigurable Terahertz Devices for Advanced Sensing, Imaging and Communications**
Lei Liu¹, Li-Jing Chang²
¹University of Notre Dame
²Oregon State University

**Enabling Terahertz Communication Networks: From Theory to Practice**
Josep Jornet¹
¹University of Buffalo, NY
WORKSHOPS AND SHORT COURSES - MONDAY

Time: 08:30 – 17:50 Room: E07

WM-06 (EuMC)
Recent Advances in Technologies and Practical Realizations of Compact Filters

Chair: Vicente E. Boria¹
Co-Chair: Cédric Quendo²
¹Technical University of Valencia, ²Univ Brest, Lab-STICC, CNRS, UMR 6285

Future communication services (with higher requirements in terms of accessibility and quality of service) and modern applications (such as the promising Internet of Things -IoT-) will be supported by enhanced wireless systems (based upon the upcoming 5G technology) and the revolutionary Internet of Satellites -IoS- (to be supported by constellations of thousands of small satellite platforms). Microwave and mm-wave filters are key building blocks in the high-frequency front-end of all these communication systems, which will impose hardest needs in terms of size (topologies), cost (scalability issues), reliability and reconfiguration performance, just to cite a few of them.

In order to cope with all these new requirements and paradigms, presently available and future technologies (including practical realizations) of high-frequency filters (as well as of related components such as diplexers and multiplexers) must be revisited and properly updated. These filters, having reliable and scalable topologies with and without tunable properties, must be capable of controlling different frequency bands with several kind of responses and fractional bandwidths to meet different system needs. There have been significant recent advances in the synthesis and physical realization of such microwave filter networks, as well as on their design and practical application within next-generation communication systems.

This workshop will be focused on the most recent advances in several technologies and practical realizations of microwave and mm-wave filters. It will cover a wide range of different topologies, design techniques, technologies and applications of high-frequency filters for wireless, microwave, communications and radar systems. First, the state-of-the-art of planar technology, considering examples of compact ultra wide-stop band planar filters, filtering components with single and multi-band responses, planar lossy filters, planar tunable/reconfigurable filters and planar self-packaged multilayer filters, will be outlined.

Then, the hybrid technology based on Substrate Integrated Waveguides (SIW) will be considered for the practical implementation of compact filter solutions with reduced losses (i.e. using 3D integrated resonators with a higher Q-factor). SIW-based filtering architectures, including reflection-less and reconfiguration capabilities, as well as more compact solutions based on the novel SIW coaxial resonator technology, will be also shown. In order to implement integrated filters with even further reduced losses, alternative realizations of the SIW technology based on removing the lossy dielectric substrate of the filter body, such as the empty SIW versions (ESIW and ESICL) and the air-filled SIW solution, will be introduced and properly discussed.

Finally, solutions for multi-band filters implemented with several 3D-waveguide technologies (e.g. based on coaxial, dielectric and waveguide resonators) will be also presented, as well as advanced and low-cost additive manufacturing techniques of waveguide cavity filters.
WM-07 (EuMC)
Technologies and modelling for electromagnetically-mediated medical treatments: at the beginning of the “electroceuticals” era

Chair: Luciano Tarricone¹, Caterina Merla²
¹Department of Innovation, University of Salento, ²ENEA, Division of Health Protection Technologies

In 2013, a new idea came out identifying the possibility to use electric pulses (with frequency content spanning up to MW) to precisely and selectively target nerves in order to treat different pathologies. This because nerves supervise the function of a number of organs and physiological processes as inflammation or metabolism. So, in principle, “electroceutical” can strongly affect the treatment of different pathologies with a completely new therapeutic paradigm. The workshop will address the technological aspects related to this new vision of therapeutic approaches, and will provide updated knowledge on modelling interactions between the stimulating signals (in a wide band of frequencies) and the targeted organs, down to the network of neurons. A general overview of the proposed approach will be provided to present the great potentiality of this new vision for treating pathologies. In the workshop, new technological applications related to flexible electronics (at radiofrequency-RF and microwaves-MW) and implantable devices will be proposed. Clearly the bio-electronic (at RF and MW) is one of the main ingredients of this new therapeutic approaches and this topic is a fundamental point of interest in the EUIMA community. The development of innovative implantable devices realized on non-conventional materials is also a key ally for the remote stimulation of various body regions. Coupling of electronics with flexible material and nanotechnologies is crucial. On the other side, there is another level of understanding that has to be improved: the interaction of the applied electromagnetic field distributions with the bio-targets and the relevant interaction mechanisms. Indeed, the modulation of nerves and neuronal cell transmembrane potentials are necessary for the definition of precise activation of action potentials which are the natural electric signals governing our organs and neuronal fibres. Advanced modelling of tissues and organs will be proposed to provide controlled and personalized treatments. In a nutshell, the workshop will give an extensive overview covering the main technological key-points and theoretical background for cutting-edge research and applications in the addressed area.

WM-08 (EuMC)
Advanced Microwave Systems for Emerging Healthcare Applications

Chair: Vadim Issakov¹, Amelie Hagelauer²
¹Infineon Technologies AG, ²Friedrich-Alexander University of Erlangen-Nurnberg

Mobile health care systems, based on a multitude of different networked sensors that enable ubiquitous body monitoring, is seen by world leading industry and healthcare suppliers, as a key solution to address chronic diseases and especially multimorbidity, to improve quality of medical services and to raise the independence of elderly people. Technological advantages on top of the upcoming wearable solutions for consumer applications are required for medical systems, which have to be reliable under all conditions and for a very long time (for implants up to 20 years), need a high level of privacy and data integrity and have to be developed under the constraints of a medical approval from the beginning.

The objective of this half-day workshop is to discuss the latest developments of emerging biomedical systems for variable mobile health care applications. The workshop will provide an extended overview about the applications (such as vital functions monitoring and diagnosis), the involved challenges, will show system examples, discuss various type of sensors and discuss the ultra-low-power communications links for data transmission.

Programme

Monitoring of vital functions - Purpose, Approaches and Conflicts of Objectives
Jens Kirschner¹
¹Friedrich-Alexander University of Erlangen-Nurnberg

Integrated Microwave Imaging Radar Systems With Planar Antennas for Early-Stage Breast Cancer Detection
Daniel Oloumi¹
¹Infineon Technologies Austria

Medical Diagnostics by Microwave Interferometry
Alexander Koeplin¹
¹Brandenburg University of Technology

Integrated Microwave and Millimeterwave Dielectric Sensors and Actuators for Biomedical Applications in SiGe BiCMOS Technology
Jan Wessel¹
¹Infineon Technologies AG

A Wearable Noninvasive Measurement System for Water Content Detection in Biological Materials
Marco Dietz¹
¹Friedrich-Alexander Universitat Erlangen-Nurnberg

Inductive Communication Link for Wearable and Implantable Devices
Thomas Ussmueller¹
¹University of Innsbruck

Highly-integrated Biocompatible Encapsulated Ultra-Low-Power Compact Autarky System with a 60GHz Communication Link for Implantable Glucose Monitoring
Vadim Issakov¹
¹Infineon Technologies AG
New challenges and new trends mixing active and passive devices in silicon technology: from components to tunable RF functions

Chair: Denis Le Berre¹, Gaetan Prigent²
¹Univ Brest, Lab-STICC, CNRS, UMR 6285, ²LAAS-CNRS

In recent years, electromagnetic waves are strongly prevalent due to emergence of new applications in field of wireless technology. Microwave has found an ever increasing interest for commercial as well as military applications covering areas from high speed wireless communication, personal area networking, point to point or point to multipoint data links, automotive collision-avoidance radar systems, millimetre-wave imaging and space science to defense security due to wider availability of wireless carrier bandwidths. Consequently, this constant evolution of the telecommunication, radar and sensor domains induces needs for drastic advances in terms of design and technology in the microwave domain. This half-day workshop will focus on new challenges and new trends in silicon dealing with design and technology. It aims to propose several presentations covering all Technology Readiness Level. The different talks will be organized from high Technology Readiness Level to low Technology Readiness Level ie from industrial developments and applications to very prospective academic research. In that way, it will be an overview of the challenges for today and tomorrow and trends for after-tomorrow needs. Indeed, the first talk will be given by Globalfoundries to show the technological and design challenges notably for the 5G telecommunication systems and the impact of silicon as an emerging technology. Then, the second talk, given by IHP Microelectronics, will focus on technology developments to address very high frequencies and Terahertz applications. The third one, presented by the GREMAN (University of Tours) will concern porous silicon technology. Once these technological aspects developed, several high frequencies designs regarding fixed and tunable devices will be proposed by the LAAS-CNRS of Toulouse mastering the design process from synthesis to technological implementation. Finally, a novel way to allow the co-design of active and passive distributed components on semiconductor technology will be proposed by the Lab-STICC, University of Brest.

Multibeam Antennas and Beamforming Networks

Chair: Piero Angeletti¹, Giovanni Toso¹
¹European Space Agency

Multi-Beam Antennas (MBAs) find application in several fields including wireless and satellite communications, RADARs for electronic surveillance and remote sensing, science (e.g. radio telescopes), RF navigation systems, etc. Beam-Forming Networks (BFNs) play an essential role in any antenna system relaying on a set of radiating elements to generate a beam. Depending mainly on the antenna mission (i.e. operational frequency, pattern requirements, transmitting and/or receiving functionality, number of beams to be generated, etc.) different MBA architectures may be selected: from antenna systems completely based on independent feeds illuminating a number of reflectors, to hybrid systems based on both arrays and reflectors, from phased arrays to lens antennas.

The trade-off on the antenna solution largely involves the BFN interconnectivity and flexibility requirements, with a wide range of applicable BFN architectures with different complexity and performance.

The objective of the course is to present design principles and state-of-the-art in MBAs and BFNs.

The course presents design principles and state-of-the-art in Multi-Beam Antennas (MBAs) and Beam-Forming Networks (BFNs) covering both theoretical and practical aspects. The covered topics include:

* Overview of Multibeam Antennas and system requirements.
  - Satellite Communication Systems;
  - Wireless Communications;
  - RADARs.
* Digital Beamforming Networks
  - Multibeam Array Antennas
    - Linear and Planar Direct Radiating Arrays (based on Periodic or Aperiodic lattices)
    - Reflector-based architectures (Single-Feed-per-Beam, Multiple-Feed-per-Beam)
    - Lens-based architectures (free space and constrained)
  - Analog Beamforming Networks
    - Corporate divider/combiners;
    - Blass and Nolen matrices;
    - Butler matrices.
  - Overview of some Operational Multibeam Antennas/BFNs
    - MBAs for Spaceborne Narrowband and Broadband Satellite Communication Systems
    - MBAs for Wireless Communications
  - On-going European Developments and Current Design and Technological Challenges

Programme

WM-09 (EuMC/EuMIC)
New challenges and new trends mixing active and passive devices in silicon technology: from components to tunable RF functions

Chair: Denis Le Berre¹, Gaetan Prigent²
¹Univ Brest, Lab-STICC, CNRS, UMR 6285, ²LAAS-CNRS

SM-01 (EuMC)
Multibeam Antennas and Beamforming Networks

Chair: Piero Angeletti¹, Giovanni Toso¹
¹European Space Agency

Programme

The impact of Silicon as an emerging technology for 5G mmWave Circuits and System Solutions
Alvin Joseph¹, Shankaran Janardhanan¹, Paul Colestock¹, Anirban Bandyopadhyay¹
¹Globalfoundries

Latest Developments on SiGe BiCMOS Technologies with "More-than-Moore" Modules for mm-wave and T/Hz Applications
Mehmet Kaynak¹, Matthias Wietstruck¹
¹IHP - Leibniz-Institut fur innovative Mikroelektronik

Hybrid Porous Silicon - Silicon substrate for RF devices integration
Jerome Biloue¹, Gael Gaulier¹, Thomas Deforge¹
¹GREMAN, Univ. Tours

Design of millimeter- and submillimeter-wave tunable filters in advanced BiCMOS technology
Gaetan Prigent¹
¹LAAS-CNRS

A Novel Approach to Co-design Tunable Microwave Devices on Silicon
Rozenn Allanic¹, Denis Le Berre¹, Cédric Quendo¹
¹Univ Brest, Lab-STICC, CNRS, UMR 6285

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STu-01 (EuMC)
Antenna Booster Technology for IoT Applications

Chair: Jaume Anguera¹, Aurora Andújar²
¹Fractus Antennas and Universitat Ramon Llull, ²Fractus Antennas

The short-course will introduce the audience to an antenna technology based on replacing a complex and customized antenna design with an off-the-shelf and miniature component called antenna booster. Being surface-mount and chip-like in nature, the antenna booster fits seamlessly in an electronic printed circuit board the same way any other electronic component such an amplifier, filter or switch, to name a few, does. It can be assembled with a conventional pick-and-place machine, making the manufacture and design of the new generation of IoT devices simpler, faster and more cost effective reducing time to market.

Traditionally multiband antennas are mainly designed by optimizing the antenna geometry. A completely different approach will be given in the course: the main attention will be on the matching network instead, in combination with antenna boosters. The advantage of this procedure is that no antenna customization is needed but only the proper design of a matching network is required. This way, the frequency response of an antenna system for an IoT device will be tailored by the proper design of a matching network.

Examples will be given on how an antenna booster can be tuned with a matching network to operate at multiple communications systems such as IoT devices for 4G, ISM, GNSS, WIFI, Bluetooth allocated in 0.69GHz up to 6GHz.

The audience (from PhD students to wireless/microwave engineers) will be introduced to the theory behind antenna booster technology, will be given practical examples, and will participate in a hands-on, practical application using Microwave Office circuit design software. Attendants will practice the design of single-band and multiband antenna system from scratch by tailoring the frequency response of the antenna system by designing matching networks with antenna boosters.
Advanced passive radar techniques and applications

Chair: Fabiola Colone¹, Diego Cristallini², Krzysztof Kulpa³
¹University of Rome La Sapienza, ²Fraunhofer FHR, ³Warsaw University of Technology

The workshop focuses on advanced techniques and applications for passive radars. The lectures foreseen are addressed to wide public, while only general radar knowledge is needed. The proposed workshop will start from passive radar fundamentals and end with advanced techniques and applications. The workshop is conceptually structured in several macro-areas. In the first macro-area of the workshop the basics of passive coherent location (PCL) will be presented. This includes the short brief of passive radar history, passive radar fundamentals, discussion of different illuminators, and detection in passive radar systems. One macro-area will address the exploitation of multiple channels (either in frequency, space/time, or in polarimetry) for improved target detection performance and increase the reliability of such systems from both stationary and moving platforms. The specific challenges related to moving platforms PCL will be addressed in the following macro-area, which also includes PCL-GMTI, and PCL-SAR. Imaging applications will be then also analyzed in two specific contributions on PCL-ISAR and PCL imaging using satellite illuminations. One macro-area will be entirely devoted to tracking and data fusion for PCL systems. Finally, one macro-area will be devoted to specific topics of passive radars such as short range WiFi-based applications, and forward scattering radar. For each addressed topic, a theoretical background will be presented, which sets the basis to understand the main challenges and potentials. Then, appropriate signal processing techniques will be presented and the results will be illustrated against experimental data. As a consequence, in addition to the theoretical aspects, the workshop provides the attendees with an insight into the real-world applications of passive radar. Walking through these results gives the chance to describe in more detail some technical aspects related to system design issues and signal processing techniques as well as to understand the current limitations and future perspectives of passive radar sensing.
WW-02 (EuMC/EuRAD)
Radar Interference and Coexistence

Chair: Christoph Fischer¹, Martin Kunert²
¹HENSOLDT Sensors GmbH, ²Robert Bosch GmbH

In this workshop the possible ways forward to reduce or even eliminate the interference risk between radio emitting devices in the tens of GHz frequency range is addressed and discussed in more details. The main focus is placed on radio location systems in the road transportation domain, where safety requirements stipulated by future automated driving features result in very demanding interference robustness needs by the underlying ASIL requirements. To date vehicular radar interference mitigation techniques are mostly limited to the radar receive path with signal data repair and healing methods. Interference suppression concepts on the transmit side are, if at all, only realized in specific products on a company level without any standardization or coordination effort. Workshop contributions from other domains as the automotive sector may lead to incubator activities into the vehicular interference and frequency regulation framework by adopting or adapting well-established concepts accordingly.

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<td><strong>Requirements for cooperative interference avoidance in automotive radar</strong></td>
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<tr>
<td>Werner Soergel¹</td>
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<td><strong>Benefits of coordination on the mutual interference of automotive digitally modulated radars</strong></td>
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<td>André Bourdoux¹</td>
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<td><strong>Impacts of FMCW vs. PMCW</strong></td>
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<td>Noam Arkind¹, Shlomit Hacohen¹</td>
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<td><strong>Interference of digitally modulated radars</strong></td>
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<td>Christina Knill¹, Christian Waldschmidt¹</td>
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<td><strong>Estimating impacts of mutual interference of automotive radars</strong></td>
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<td>William Buller¹</td>
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<td><strong>Overview of automotive radar regulation and standardisation activities</strong></td>
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<td>Andreas John¹, Frank Ernst²</td>
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<td><strong>Automotive radar interference needs from an OEM perspective</strong></td>
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<tr>
<td>Hans-Ludwig Bloecher¹</td>
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<td><strong>Coexistence of different RF systems on a platform - RADAR point-of-view</strong></td>
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<td>Magdalena Letsche-Nüsseler¹, Christoph Fischer¹</td>
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<td><strong>Coexistence of different RF systems on a platform - Radio communication point-of-view</strong></td>
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<td>Rainer Bott¹</td>
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<td><strong>Cognitive waveform adaption for UWB radar</strong></td>
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<td>Marcel Warnke¹, Christian Bräu¹</td>
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<td><strong>State-of-the-art interference mitigation methods and their performance</strong></td>
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<tr>
<td>Mate Toth¹, Paul Meissner¹, Alexander Melzer¹</td>
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<td><strong>Discussion Panel</strong></td>
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<td>Christoph Fischer¹, Martin Kunert²</td>
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Automotive Radar Systems and Signal Processing

Chair: Thomas Zwick¹, Christian Waldschmidt²
¹Karlsruhe Institute of Technology, ²Ulm University

Automotive radars can dramatically increase the safety of the passengers and their environment, which is absolutely fundamental for autonomous driving. However, with the increasing demands on new radar sensors in terms of range, velocity and angle resolution as well as simultaneously covered field of view and interference robustness the conventional radar modulation schemes reach their limits. This difficulty will be further tightened in the near future due to the significantly increasing number of radar sensors in cars, which is expected to double within the next five to eight years. Furthermore, autonomous driving will additionally boost this number. Thus, new approaches, concepts and waveforms are necessary to overcome the present limitations. Many of the proposed ideas to solve the arising problems include digitally modulated waveforms due to their high flexibility and adaptability, which is necessary to be suitable in many different use cases. The workshop will show a large variety of these new approaches and modulations schemes like OFDM and PMCW radar as well as their possible use in automotive applications. Additionally, modifications of the state of the art chirp sequence waveforms and antenna array designs will be demonstrated that try to expand the current limitations. Finally, new signal processing techniques will be presented which increase the usable information of the obtained radar images. Thereby, the field of applications of the radars will be further increased.

Programme

- Digitally Modulated Radars: Basics of OFDM Radar
  Benjamin Nuss¹, Thomas Zwick¹
  ¹Karlsruhe Institute of Technology

- Digitally Modulated Radars: OFDM for Automotive Applications
  Benedikt Schweizer¹, Christian Waldschmidt¹
  ¹Ulm University

- Digitally Modulated Radars for Automotive Applications
  André Bourdoux¹
  ¹IMEC

- Digital Modulation Radar: A dream became true, highest performance at lowest costs due to modern technologies and processing strategies
  Ralf Reuter¹
  ¹Uhnder

- Doppler multiplex MIMO as an efficient approach to 3D automotive radar
  Christian Sturm¹
  ¹Valeo

- Achieving Ultra High Resolution Through Radar Innovation
  Noam Arkind¹
  ¹Arbe

- Machine Learning Concepts For Multiclass Classification Of Vulnerable Road Users
  Nicolas Scheiner¹, Ole Schumann¹
  ¹Daimler AG

- Machine Learning for Gesture Recognition by Automotive Radars
  Karim Ishak¹, Christian Waldschmidt¹
  ¹Ulm University

- Sparse array design for high-resolution DoA estimation using Compressed Sensing
  Maria Antonia Gonzalez-Huici¹
  ¹FHR
Gained significant traction as a means of realizing real-time imaging technologies. Space reconstruction methods, including range migration and stationary phase, more advanced iterative reconstruction algorithms. Moreover, emerging Fourier research in the literature, from simple, single-shot reconstruction techniques to spatial and spectral frequency (k-space) domains has been the subject of much importance for any EM imaging system. Image processing in the spatial and spectral frequency (k-space) domains has been the subject of much importance for any EM imaging system.

Programme

Autonomous Drive Sensors and Fusion Market Overview
Cedric Malaquin¹
¹Yole Development

Challenges in Comprehensive Automotive Radar Testing
Steffen Heusel¹
¹Rohde & Schwarz

Automotive Radar Simulation for Testing in Challenging Environments
Marina Gashinova¹
¹University of Birmingham

Operational Time Continuous Self-Diagnostics of Automotive Radars
Alexander Yarovoy¹
¹Delft University of Technology

Oakland Yurduseven¹, Thomas Fromenteze²
¹Queen’s University Belfast, ECIT, ²University of Limoges, Xlim

Imaging using different parts of the electromagnetic spectrum, from microwaves to millimeter-waves, has enabled numerous emerging radar applications, from security-screening to biomedical imaging, nondestructive testing and through-wall imaging. Advantages such as non-ionizing radiation and their ability to operate in all-weather conditions make such modalities an excellent choice for these applications. Today, there is a strong demand for simplifying the physical hardware architecture and the development of more efficient image reconstruction techniques, especially in support of real-time imaging capabilities. From the physical hardware point of view, these efforts include: (a) the development of computational imaging and compressive sensing techniques to simplify the system hardware constraints, (b) the investigation of alternative system architectures to optimize the k-space coverage, and (c) the design of polarimetric apertures to extract susceptibility information for imaging.

In addition to the physical system hardware architecture, image processing is of significant importance for any EM imaging system. Image processing in the spatial and spectral frequency (k-space) domains has been the subject of much research in the literature, from simple, single-shot reconstruction techniques to more advanced iterative reconstruction algorithms. Moreover, emerging Fourier space reconstruction methods, including range migration and stationary phase algorithms, and their development for multi-static radar architectures have recently gained significant traction as a means of realizing real-time imaging technologies.

In this short-course, we will review modern advances in computational imaging and radar at microwave and millimeter-wave frequencies. This short course will first cover an overview of conventional imaging modalities, such as synthetic aperture radar (SAR) and phased array systems. Following, we will introduce the concept of computational imaging, from the design of unusual antennas for imaging to innovative image reconstruction algorithms. This shortcourse will present a unique opportunity for active discussion, interaction and information exchange. The proposed short-course aims to provide a platform for researchers from industry and academia working on or interested in the field of imaging and radar for an active exchange with the leading experts in those fields, to learn from cross-platform implementations, and to get ready to actively contribute to the next-level generation of microwave & millimeter-wave sensors and imagers.

Programme

General introduction to microwave and millimeter-wave computational imaging: Formalisms, Systems, and Image reconstruction
Okan Yurduseven¹
¹Queen’s University Belfast, ECIT

New advances in computational imaging: Polarimetric imaging, phaseless imaging, and recent advances in antenna systems and k-space reconstruction techniques.
Thomas Fromenteze¹
¹University of Limoges, Xlim
More than one decade ago, Millimeter-wave Radar showed potentials for automotive applications, but during that time, the realization was based on very expensive niche technologies. Due to the improvements of frontend technologies and semiconductor technologies, during the last decade, the integration of Radar-on-chip operating at these frequencies became possible and led to compact and cheap radar sensors. Therefore, Millimeter-wave Radar found its way to a mass-market solution in automotive Radar.

This workshop will cover the full scope starting from the requirements and potentials coming to the used technologies and circuits in SiGe and CMOS to frontend and finally antenna design.
In recent years, there have been many new technological developments that require the use of electromagnetic signals at millimetre-wave and terahertz frequencies. Such applications have included communications technologies (5G, IoT, etc), the automotive industry (Connected and Autonomous Vehicles - CAVs), security scanners and imagers, space-borne radiometers, medical diagnostics, etc. This has led to the need for new hardware to realise the systems necessary for these applications. A major building block for this hardware is waveguide, due to its inherent low loss, usability and technology readiness at these frequencies. New waveguide sizes and interfaces have recently been introduced specifically to enable the efficient exploitation of these frequencies - particularly, frequencies above 100 GHz. This, in turn, has led to the need for new measurement techniques to enable reliable and accurate measurements to be available at these frequencies. This workshop will review the latest developments that are taking place for this waveguide technology and will focus on both the new waveguide sizes and interfaces that have been introduced to enable the efficient and reliable use of these frequencies by end-users. This includes activities by the IEEE and IEC standardisation bodies. The workshop will also present the current state of the art of the measurements - both using waveguide and quasi-optical techniques - that are available at millimetre-wave through to terahertz frequencies (i.e. from 30 GHz to at least 1.5 THz).
Rohde & Schwarz Tutorial Seminars & Technical Workshops

- Free to attend -

For more information, details and registration:
http://www.eumw.rohde-schwarz.com/

Location: 733+734

Tutorial Seminars – RF Basics in Test and Measurement

Tutorial abstract:
A sound understanding of RF and mmWave testing methods is a key factor for every mmWave engineer, helping them to successfully implement solutions and designs in mmWave and RF circuits. Moreover, digital communications engineering and mmWave engineering are merging more and more and becoming a cross-discipline. As a result, mmWave engineers are confronted with the challenge of how to master the territory of the former RF and digital communications world.

The Rohde & Schwarz seminars about RF basics in test and measurement will familiarize you with the elementary aspects of signal generators, spectrum analyzers and network analyzers. You will learn to benefit from the great flexibility of our T&M equipment when designing communications and radar systems.

New this year is a seminar on realtime spectrum analysis that will introduce you to the methods for debugging RF and mmWave circuits in the time and the frequency domain.

Using vector network analyzers for component testing and evaluation and applying various calibration techniques common in advanced network analysis lets you characterize mmWave and RF components, which are necessary for mmWave designs and digital communications systems, to the highest precision.

Tuesday 1st October 2019
09:30 – 11:00
Fundamentals of Signal Generators and Oscillators (YIG vs. VCO)

Tuesday 1st October 2019
11:15 – 12:45
Fundamentals of Spectrum Analysis

Wednesday 2nd October 2019
09:30 – 11:30
Introduction to Digital Signals and Digital Modulation

Wednesday 2nd October 2019
11:45 – 13:15
Realtime Spectrum Analysis Embedded in Advanced Spectrum Analyzers

Thursday 3rd October 2019
09:30 – 10:30
Fundamentals of Vector Network Analysis

Thursday 3rd October 2019
10:45 – 12:15
Calibration in Vector Network Analysis

Technical Workshops

Tuesday 1st October 2019
13:30 – 17:30

Wednesday 2nd October 2019
13:30 – 17:30

Thursday 3rd October 2019
12:30 – 16:30

Contents of the technical workshops will be announced later.
MathWorks Hands-on Workshops

- Free to attend -

Location: 735+736
1st – 3rd October 2019

Join one or more of the 90-minutes MathWorks hands-on workshops on Tuesday, Wednesday, and Thursday (October 1,2,3) at the European Microwave week.

Topics include: using MATLAB® for designing and testing 5G and WLAN systems, antenna and antenna array design for radar applications, power amplifier modeling and transmitter linearization techniques, using Software defined radios (SDR) for rapid prototyping and over the air testing, plus lots more!

These workshops are free to attend, do not require familiarity MATLAB, and if you bring your own laptop you can get a hands-on experience under the supervision of MathWorks experts.

Just register for a free exhibition pass for European Microwave Week and sign up to our workshops here:
https://www.mathworks.com/MATLAB-Workshops-2019

EuMW MicroApps 2019

Free Admission
with Exhibition and Conference Badges
1st - 3rd October
MicroApps Theatre

Welcome to the ninth annual European Microwave Week (EuMW) Microwave Application Seminars (MicroApps), sponsored by National Instruments, Rohde & Schwarz, and Horizon House. MicroApps will be held from Tuesday, October 1st through Thursday, October 3rd, 2019 in the MicroApps Theatre, which is located within the exhibition floor, making it a convenient stop while attending EuMW.

MicroApps are 20-minute exhibitor technical presentations that provide an opportunity for EuMW attendees to experience state-of-the-art applications, products, design techniques, and processes of interest to the RF and microwave community.

2019 MicroApps highlights include:
• Keynote by Dr. Steve Cripps, Cardiff University, UK
• Industry workshops
• A variety of practical application topics describing novel products and processes.

Once finalized, a complete agenda will be posted on the EuMW MicroApps website at www.eumicroapps.com and published in the official EuMW Show Guide. Additional printed copies will also be available on site at the EuMW registration desks.

MicroApps admission is free for both exhibition-only and conference badges. Also included is a complimentary web download of the papers presented and bottled water.

We look forward to seeing you at EuMW 2019 in the MicroApps Theatre.

Antti Lautanen
EuMW 2019 MicroApps Co-chair
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<th>Lunch</th>
<th>14:00-15:40</th>
<th>Coffee Break</th>
<th>16:20-18:00</th>
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<td>721+722</td>
<td>WS-09 THz Applications: Present and Future</td>
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<td>WS-08 RF Technologies &amp; Techniques for Multi-Band Power Amplifiers for Radars and Communications</td>
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<td>WS-05 Microwave measurements at systems, components and materials levels: a global approach to improve energy efficiency of the next generation of electronic devices</td>
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<td>727+728</td>
<td>WS-04 Real Amplifier Devices for 5G New Radios</td>
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<td>WS-03 Microwave Characterization and Modelling at Nano and Micro-Scale of Advanced Materials to Enhance Emerging Products Manufacturing</td>
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<td>SS-01 Fundamentals of Microwave PA Design</td>
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<td>SS-02 Silicon-Based Integrated Technology Platform for Millimeter Wave (MMW) and Terahertz (THz) Applications</td>
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<td>737+738</td>
<td>WS-06 Future Wireless Technologies in the Terahertz and Optical Frequency Bands</td>
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<td>WS-07 New materials and technologies for reconfigurable RF components</td>
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## Conference Sessions Matrix - Monday

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<tr>
<th>Room</th>
<th>08:30-10:10</th>
<th>Coffee Break</th>
<th>10:50-12:30</th>
<th>Lunch</th>
<th>13:50-15:30</th>
<th>Coffee Break</th>
<th>16:10-17:50</th>
<th>18:30 - 21:00</th>
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<td>EuMIC01</td>
<td>EuMIC04</td>
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<td>EuMIC08</td>
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<td>Integrated mmWave circuits on BiCMOS &amp; CMOS</td>
<td>EuMIC Opening Session</td>
<td>New GaN process development for improved thermal and efficiency properties</td>
<td>Advanced Solutions for Integrated Power Amplifiers</td>
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<td>S01, S02, S03</td>
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<td>EuMIC06</td>
<td>EuMIC09</td>
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<td></td>
<td>GaN Characterization and Modelling</td>
<td>Nonlinear CAD</td>
<td>Modelling and Extraction Techniques</td>
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<tr>
<td>E01</td>
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<td>EuMIC07</td>
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<td>GaN technology and device characterization for improved circuit demonstrators</td>
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<td>mm-wave Transceiver Components</td>
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<td>E03</td>
<td>WM-01</td>
<td>WM-02</td>
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<td>Phase Change Material for Microwave Applications</td>
<td>Integration and multi-physics challenges in 5G mm-wave system design</td>
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<tr>
<td></td>
<td>Terahertz Devices, Circuits and Systems: from fundamentals to applications</td>
<td>Recent Advances in Technologies and Practical Realizations of Compact Filters</td>
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<td>WM-07</td>
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<td>Technologies and modelling for electromagnetically-mediated medical treatments: at the beginning of the electroceuticals era</td>
<td>Advanced Microwave Systems for Emerging Healthcare Applications</td>
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<td>New challenges and new trends mixing active and passive devices in silicon technology: from components to tunable RF functions</td>
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<td>Multibeam Antennas and Beamforming Networks</td>
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# CONFERENCE SESSIONS MATRIX - TUESDAY

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<tr>
<th>Room</th>
<th>Time</th>
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<tr>
<td></td>
<td>08:30-10:10</td>
<td>Coffee Break</td>
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<tr>
<td>N01</td>
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<td>EuMW01 EuMW/EuMC Opening Session (End: 12:45)</td>
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<td>S01/503/503</td>
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<td>EuMW Welcome Reception</td>
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<tr>
<td>E01</td>
<td>10:50-12:30</td>
<td>EuMC/EuMIC01 Low-noise amplifiers</td>
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<tr>
<td>E02</td>
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<td>EuMC/EuMIC02 Photonic-Electronic Devices</td>
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<td>E03</td>
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<td>EuMC/EuMIC05 Sub THz Components and Systems</td>
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<td>E04</td>
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<td>EuMC/EuMIC07 UHF, UWB and mmWave Techniques for Autonomous Sensors</td>
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<tr>
<td>E05</td>
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<td>EuMC01 Passive Devices - Theory and Applications</td>
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<tr>
<td>E07</td>
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<td>EuMW Career Platform Special Session The European Microwave Industry Market and Professional Opportunities</td>
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<td>E08</td>
<td>13:50-15:30</td>
<td>EuMC/EuMIC04 Active Circuits</td>
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<td>16:10-17:50</td>
<td>EuMC03 Battery-Less Circuits for Emerging Technologies</td>
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<td>18:30-21:00</td>
<td>EuMC08 Dividers and Couplers</td>
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<td>EuMC05 Novel Antenna Materials</td>
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<td></td>
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<td>EuMC09 Emerging Antenna Concepts</td>
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<td></td>
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<td>EuMC06 Applied Computational Electromagnetics</td>
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<td></td>
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<td>EuMC08 Non-Planar Filters I</td>
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<td>EuMC03 Welcome: 13:00 - 13:30 Presentations: 13:30 - 14:30</td>
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<td>WiM CNAM Museum 15:30 - 17:00</td>
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<td>EuMC02 High Directivity Antennas</td>
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<td>EuMC05 Emerging Antenna Concepts</td>
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<td>EuMC02 Student School Presentation + P. Ferrari</td>
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<td>STu-01 Antenna Booster Technology for IoT Applications</td>
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<td>10:50-12:30</td>
<td>EuMC02 Doctoral School T.Taris - B. Reig</td>
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<td>13:50-15:30</td>
<td>EuMC02 Doctoral School R. Gomez Garcia - L. Boccia</td>
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<td>16:10-17:50</td>
<td>EuMC02 Doctoral School Justin King</td>
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<td>18:30-21:00</td>
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<td>EuMC02 Student Design Competition AMCAD/PA Booth 320D</td>
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<td>EuMC02 EuMW Career Platform</td>
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<td>EuMC02 Student Design Competition AMCAD/PA Booth 320D</td>
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<td>EuMC02 EuMW Career Platform</td>
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**Note:** The table represents the agenda for Tuesday, including session topics, times, and locations. The sessions are categorized under EuMC, EuMIC, EuRAD, and EuMW, with joint sessions indicated as well.
# Conference Sessions Matrix - Wednesday

<table>
<thead>
<tr>
<th>Room</th>
<th>08:30-10:10</th>
<th>Coffee Break</th>
<th>10:50-12:30</th>
<th>Lunch</th>
<th>13:50-15:30</th>
<th>Coffee Break</th>
<th>16:10-17:50</th>
<th>18:00 - 18:45</th>
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<tr>
<td>N01</td>
<td>EuRAD01</td>
<td>The Defence, Security and Space Forum</td>
<td>EuMC/EuRAD03</td>
<td>Space and UAV applications</td>
<td>EuMC32</td>
<td>Numerical Methods in Microwave Technology</td>
<td>EuMC20</td>
<td>Interactive Session</td>
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<tr>
<td>E01</td>
<td>EuMC10</td>
<td>Biomedical Applications</td>
<td>EuMC16</td>
<td>Transmitter/Receiver Circuits</td>
<td>EuMC21</td>
<td>GaN HEMT Based Power Amplifiers</td>
<td>EuMC27</td>
<td>Outphasing and Doherty Power Amplifiers</td>
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<tr>
<td>E02</td>
<td>EuMC17</td>
<td>Special Session LAMC</td>
<td>EuMC18</td>
<td>Emerging Components and Integration Techniques</td>
<td>EuMC22</td>
<td>Near-Field and Far-Field Millimeter-Wave Measurements</td>
<td>EuMC28</td>
<td>Calibration and Characterization Techniques</td>
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<td>EuMC11</td>
<td>Special Session AMPC</td>
<td>EuMC19</td>
<td>Non-Planar Filters II</td>
<td>EuMC24</td>
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<td>Active Antenna Arrays</td>
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<td>EuMC12</td>
<td>MEMS, Phase-Change and Oxide Material Devices</td>
<td>EuMC23</td>
<td>Millimeter-wave Transition Structures and Packaging Techniques</td>
<td>EuMC29</td>
<td>Techniques and Technologies for the Enhancement of WPT Systems</td>
<td>EuMC28</td>
<td>Calibration and Characterization Techniques</td>
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<td>EuMC13</td>
<td>Planar Filters I</td>
<td>EuMC24</td>
<td>Planar Filters II</td>
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<td>Planar Filters III</td>
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<td>EuMC14</td>
<td>Focused Session Electromagnetic Methods for Monitoring and Manipulating Cells and Tissues</td>
<td>EuMC25</td>
<td>Antennas for 5G</td>
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<td>Active Antenna Arrays</td>
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<td>Transmitter/Receiver Circuits</td>
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<td>Outphasing and Doherty Power Amplifiers</td>
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<td>Numerical Methods in Microwave Technology</td>
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<td>Antennas for 5G</td>
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<td>Techniques and Technologies for the Enhancement of WPT Systems</td>
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<td>Millimeter-wave Transition Structures and Packaging Techniques</td>
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**WW-01**
Advanced passive radar techniques and applications

**WW-02**
Radar Interference and Coexistence

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Exhibition Hall

- EuMW Career Platform
- Student Design Competition
- Student/PhD School
- Hands-on Experience: 9:00 - 12:30

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Exhibition Hall

- EuMC02 | Antennas for Radar Application
- EuMC25 | Antennas for 5G
- EuMC31 | Active Antenna Arrays
- EuMC20 | Interactive Session
- EuMC26 | Interactive Session

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Exhibition Hall

- EuMC02 | Antennas for Radar Application
- EuMC25 | Antennas for 5G
- EuMC31 | Active Antenna Arrays
- EuMC20 | Interactive Session
- EuMC26 | Interactive Session

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Exhibition Hall

- EuMC02 | Antennas for Radar Application
- EuMC25 | Antennas for 5G
- EuMC31 | Active Antenna Arrays
- EuMC20 | Interactive Session
- EuMC26 | Interactive Session

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Exhibition Hall

- EuMC02 | Antennas for Radar Application
- EuMC25 | Antennas for 5G
- EuMC31 | Active Antenna Arrays
- EuMC20 | Interactive Session
- EuMC26 | Interactive Session

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## CONFERENCE SESSIONS MATRIX - THURSDAY

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<td>EuRAD07 Automotive Radar Models and Systems</td>
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<td>Communication Systems</td>
<td>mmW Systems</td>
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<td>Advanced Detection for Distributed Radar Systems</td>
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<td>FMCW and Radar Communications</td>
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<td>Measurement and Modeling of Electromagnetic Field Scattering</td>
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<td>Modern Advances in Computational Imaging at Microwave and Millimeter-Wave Frequencies</td>
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<td>Radar Technology</td>
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# EXHIBITOR WORKSHOP MATRIX

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- **Rohde & Schwarz Workshops**
- **MathWorks Ltd Workshops**

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**Future EuMW 2020:**

![Future EuMW 2020 Poster](image-url)
EXHIBITOR LIST

The exhibitor list is correct at the time of going to press. It is subject to change.
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