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Welcome to the 25th European Microwave Week

It is our great pleasure to welcome you to the European Microwave Week (EuMW) 2022, which come back to Milan after 20 years. Milan is a vibrant, fast-developing European city and wealthiest in Italy, which hosts the headquarters of national and international banks and companies. The surrounding area is one of the most industrialized regions of Europe, and many universities and research centers are located there. Milan is conveniently served by three international airports. The well-developed and very efficient public transportation allows to easily visit all the tourist attractions in the city. Moreover, Milan is well connected to the main Italian cities by high-speed trains, making possible one-day visits to Venice, Florence, Turin, Bologna, and even Rome. Milan has many attractions such as his famous Gothic Cathedral, the Sforza Castle, and world’s most famous opera house La Scala Theater. Moreover, the city hosts many prominent museums. Among them, it is worth remembering the Pinacoteca di Brera, featuring one of the foremost collections of Italian paintings, including masterpieces by Piero della Francesca; the Pinacoteca del Castello Sforzesco, with an art collection including Michelangelo’s last sculpture Pietà Rondanini and Leonardo da Vinci’s Codex Trivulzianus manuscript; the church of Santa Maria delle Grazie, hosting the Last Supper of Jesus, the famous mural painting by Leonardo. More information on the city official website https://www.yesmilano.it/en.

Leonardo da Vinci spent in Milan more than ten years, leaving some of his major masterpieces. This is the main reason to choose the Vitruvian Man for the logo of the Week, and a motto inspired by Leonardo, i.e., “Creative Microwaves”, to remind all of us that the progress of science and technology comes only from curiosity and creativity.

EuMW 2022 is held at the Milano Convention Centre (MiCo), a completely renewed venue in the business district of CityLife, at walking distance of many must-see attractions.

This is the 25th anniversary of EuMW. The whole microwave community is indebted to the founders of the European Microwave Association (EuMA), which in 1998 started the “Microwave Week”. EuMW steadily grew up with a year-by-year addition of technical activities and exciting events, becoming one of the largest worldwide events and the perfect venue to meet colleagues, share ideas, and make friends. EuMW 2022 includes the European Microwave Conference (EuMC), the European Microwave Integrated Circuits Conference (EuMIC), the European Radar Conference (EuRAD), the Defence, Security and Space Forum, the Automotive Forum, and the Beyond 5G and 6G Forum, and more than thirty Workshops covering topics spanning from theory to application, from devices to systems. The event also features the largest RF and microwave trade show in Europe. The opening and closing plenary sessions of each of the three conferences feature keynote lectures by internationally renowned leaders in their fields. Participation to EuMW of students and young professionals is strongly encouraged. We organized many activities specifically for them, namely two Doctoral Schools, a Three Minutes Thesis competition, an IEEE Young Professional technical session, the Career Platform, prizes and grants, student helpers program, networking event.

The Women in Microwave, co-sponsored by the IEEE MTT-S, will be in the beautiful location of Pinacoteca Ambrosiana, and includes a technical session followed by a visit to the museum.

Our thanks go to many colleagues who have volunteered to organize this event and have spent a lot of time and tireless effort putting together an excellent technical program. EuMA and Horizon House are also gratefully acknowledged for their continued support and help.

At the time of writing, the pandemic situation is under control and many restrictions have been relaxed. We really hope that in September we can safely travel and meet freely. Socialization is the nature of human beings and meeting and networking are vital for our community to exchange ideas, make connections, mentor younger colleagues, meet old friends and make new ones. To this aim, we organized many social activities, such as EuMIC dinner, students and young professionals get-together, Automotive Forum Dinner, Welcome Reception, Gala Dinner, TPC lunch, EuRAD lunch.

We look forward to host you in Milan. The city will surprise you, and we are sure you will enjoy EuMW 2022.

LUCA PERREGRINI
EuMW General Chair
University of Pavia, IT

LUCIANO TARRICONE
EuMW General Co-Chair
University of Salento, IT
Welcome from the President of the European Microwave Association

On behalf of the European Microwave Association (EuMA), I warmly welcome you to the 25th edition of the European Microwave Week in Milan! I am excited about going to Milan to attend the 2nd Microwave Week in 2022. This will be a great opportunity for the microwave community to come together again and for our exhibitors to show your technology to existing and new customers. We learned in London during EuMW2021 what we missed during the pandemic; I am looking forward to seeing you in Milan to continue being together again. EuMA stands up for our microwave and RF community. We foster networking between scientists, engineers, decision makers and end-users. The European Microwave Week (EuMW) is our main asset and a real networking event. It’s the place to get information you can’t get anywhere else and to meet colleagues you don’t see every day.

EuMA is continuously improving itself to support you. We recently released a 22 pages White Paper “For a Strong & Competitive European Wireless Technologies Ecosystem”. This white paper is still actual and I invite you to download it for free at our website www.eumwa.org. Soon EuMA also will announce the start of a new series of webinars with interesting and qualified speakers.

EuMA actively supports young researchers. Thereto our Innovation Team is launching the fifth edition of the EuMA Internship Award. Each year, up to seven prizes of €4,500 each are awarded to selected master and PhD students to spend a period of at least 3 months abroad in one of the leading European microwave industries or institutes. Details are at our website. The deadline to submit your application is 28 November 2022. This fifth edition is characterised by even more industries and institutes and that are willing to be a host.

EuMA continues also providing grants and reduced registration fees to students and delegates from NIS countries to attend the EuMW. EuMA offers a membership to all working in the field of microwaves. Members enjoy reduced fees for attending EuMW and EuMA-sponsored events as well as the IEEE IMS and the APMC. EuMA members have free access to our archive of publications and the on-line version of the International Journal on Microwave and Wireless Technologies.

EuMA is very active on social media. Follow us @eumassociation on Facebook, LinkedIn, Twitter, YouTube and Instagram and discover our latest posts.

EuMW is the premier microwave conference and exhibition event in Europe. We value the cooperation with IEEE Societies MTT, AP and ED and the GAAS Association and our long-standing partner Horizon House / Microwave Journal as event organiser.

Preparing and hosting the EuMW is a major effort, from paper submission and review to on-site organisation. This is accomplished by a team of volunteers year by year. My special and sincere thanks go to Luca PERREGRINI the 2022 General Chair; to the Co-Chair and Treasurer Luciano TARRICONE; to the General TPC Chair Maurizio BOZZI; to Alessandra COSTANZO and Marco PASIAN, EuMC Chair and TPC Chair; to Paolo COLANTONIO and Rocco GIOFRÉ, EuMIC Chair and TPC Chair; and to Pierfrancesco LOMBARDO and Debora PASTINA, Fabiola COLONE, EuRAD Chair and TPC Chairs – just to name a few on behalf of the entire team. Thank you!

The European Microwave Week is back again in Italy after the successful events in 2002, 2009, and in 2014. All members of the team have been working hard to set up an outstanding technical and scientific programme and I am sure they will make your stay in Milan exciting, enjoyable, and a rewarding experience of Italy’s hospitality. I would like to cordially invite you to EuMW 2022. Come to the wonderful city of Milan. Join us at EuMW2022 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 Milan! And most of all: Get involved in our community!

FRANK VAN DEN BOGAART
President
European Microwave Association
Welcome to the 17th European Microwave Integrated Circuits Conference

It is a great pleasure for us to welcome you to Milan, Italy, for the 17th European Microwave Integrated Circuits (EuMIC) Conference, which has been jointly organised by the GAAS® Association and EuMA since 2006. After a long trouble period, the conference will be held in its traditional period, fully in presence, on Monday 26th and Tuesday 27th September 2022. The conference venue is the Milano Convention centre (MiCo) representing an International hub for technical and financial activities in a truly dynamic city that never goes to sleep!

EuMIC is the premier European technical conference for RF & microwave microelectronics as part of the European Microwave Week (EuMW). 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 microwave, mm-wave, terahertz and related topics, from materials and technologies to integrated circuits and applications that will be addressed in all of their aspects: theory, simulations, designs and measurements.

Although a very appreciated Short Course and Workshops are offered on Sunday, the EuMIC starts officially on Monday which is a busy day with a large offering: beyond the Opening Session, there will be eleven regular sessions, as well as a Focused Session.

In the pure Italian-style the EuMIC social get-together, once again kindly sponsored by the GAAS® Association, will conclude the first day.

On Tuesday, there will be four regular sessions, a Focused Session, two joint sessions with EuMC, two poster sessions, one jointly with EuMC, and the Closing Session. Within the latter, the lively and traditional Foundry Session will be held bringing together key representatives of the RF and microwave semiconductor foundries. Almost all the regular sessions will feature keynote industry talks on topical themes, while the few others with academic experts.

The EuMIC Opening Session will feature two keynotes addresses by eminent speakers. The first will be given by Anna Caterina Carli, Policy Officer at Future Connectivity Systems -DG CONNECT- European Commission, with a talk entitled “EU’s approach to evolving connectivity and related research”, while Massimo C. Comparini, SVP, Observation, Exploration and Navigation at Thales Alenia Space, with the title “New space race: architectures and technologies for space economy exploitation”.

This year, the EuMIC Closing Session will start with the celebration of our best contributors.

The EuMIC Prize for the best paper and the EuMIC Young Engineer Prize will be awarded by the EuMIC Prize Committee. In addition to these, the GAAS® Association Tom Brazil Fellowship Award in dedication to a friend and colleague who made such significant contribution to our microwave community. This award will focus on promoting and encouraging the achievements of research students. It is an essay competition in which the student should provide her/his idea on the role of microwaves in supporting global challenges, thus describing what kind of future microwave activities would be important and why. In particular, what aspects of their own research work would be applicable. Further announcements on the details will be made prior to the conference.

The Closing Session will be concluded by one keynote presentations by Natanael Ayllon, European Space Agency, on Overview of MMIC developments and trends for spaceborne telecom active antennas at the European Space Agency.

We take this opportunity to show our appreciation to our authors for their technical contributions and for choosing to disseminate their work at EuMW and the dedication of the reviewers and TPC members who have spent their free time making the selection in order to provide the best possible programme.

Workshops and Short Courses are a major offering of the EuMW and so we would also like to thank the organisers for gathering key experts to cover the latest developments.

We also wish to acknowledge the support of the previous EuMIC teams, in particular London, who were always ready to advise. Finally, we would like to thank the 2022 EuMC and EuRAD teams for sharing experiences as well as to all our colleagues working in the background supporting EuMW as a whole. We look forward to welcoming you personally in Milan for an exciting EuMIC!

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PAOLO COLANTONIO
EuMIC Chair
University of Rome Tor Vergata, IT

FRANCESCO BARLETTA
EuMIC Co-Chair
Thales, IT

ALESSANDRO CIDRONALI
EuMIC TPC Chair
University of Florence, IT

ROCCO GIOFRE’
EuMIC TPC Co-Chair
University of Rome Tor Vergata, IT
Welcome to the 52nd European Microwave Conference

We live challenging times. It is not the first time. Leonardo da Vinci, the genius of the Renaissance, who inspired the EuMW2022 logo, the Vitruvian Man, and motto, "creative microwaves", lived during the second half of the XV and early XVI centuries and experienced a world challenged by pandemics, wars and transformations.

At the same time, it is exactly Leonardo who reminds us that, even during dark hours, science and art, engineering and creativity can, if not even must, remain the sources of light inspiring the world, regardless of borders. They are the constant beacon indicating that a better future is waiting for us, as long as we are able to follow the road painted by Leonardo, who suggests that "Man is the measure of all things".

That’s exactly why we warmly welcome you to the European Microwave Conference 2022 in Milano. We firmly believe that, with its 52nd edition, EuMC you will enjoy days delivering new life to your scientific projects and relationships. To achieve this, we have put together a conference program which virtually covers all domains of the microwave and millimeter spectra, including passive and active devices, systems, integrated circuits, emerging materials and technologies (including additive manufacturing and machine learning), field theory, numerical and measurement techniques, antennas, industrial applications (including Internet-of-Things and wireless power transfer), biological and biomedical applications, microwave sensing, from MHz to THz frequencies.

More than 340 submissions have been received from all over the world, from Africa to Americas, from Europe to Asia and Oceania. Along with peer-reviewed scientific works, which will be presented in more than 40 sessions, the program is enriched by contributions from keynote speakers, together with workshops, short courses, forums and PhD and student schools. In addition, four focused sessions offer the latest highlights on technological advancements in the field of millimeter-wave and terahertz communication systems and sensors, as well as on environmental key aspects such as sustainable electronics and cryosphere monitoring.

On the same wave, this year the Women in Microwaves session, entitled: "Wearable devices: engineering meets creativity", with three excellent speeches by international scientists women, will be held in the "Pinacoteca Ambrosiana" the oldest museum in Milano, which will be visited immediately after.

Don’t miss the exhibition, traditionally a focus point for EuMC, not only to get closer to the latest products in the field, but also to get together and meet colleagues, establishing new connections, or bringing new life to old collaborations. We take the opportunity to thank all authors, reviewers, and TPC members, as well as colleagues from EuMIC and EuRAD for making EuMW2022 such an interesting event.

Take your time to visit Milano! It’s nearly impossible to summarize here the endless list of monuments, museums, attractions, or simply landmarks you can enjoy. You may want not to miss its focal point: Piazza Duomo where the largest Gothic cathedral in Italy is located, or Galleria Vittorio Emanuele II, the elegant “living room” of Milan and La Scala, one of the most important Opera theatre in the World.

Milano is also the worldwide recognized capital of contemporary architectural and fashion design: step by the prototype building of a new architecture of biodiversity, the Vertical Forest, consisting of two towers 80 and 112 m high, which house a total of 800 trees.

Last but not least, remember that the famous Leonardo’s painting, "Ultima cena", is at the church of Santa Maria delle Grazie, not far from Piazza Duomo.

We are very much excited to meet again the international Microwave community in Milano!
Welcome to EuRAD 2022!
The 19th European Radar Conference (EuRAD 2022) will be held from the 28th to 30th September 2022 in Milan, Italy, as part of European Microwave Week 2022. EuRAD 2022 is the leading European event showcasing new developments in all aspects of radar systems for civil, security and defence applications. By bringing together scientists and practitioners from academia, industry, and government agencies, the EuRAD conference offers large opportunities for networking and stimulates a wide-ranging scientific and technological debate that is essential for the advancement of knowledge in the radar field.

We are proud to put on the EuRAD 2022 conference at the MiCo - Milano Convention Centre, the largest convention centre in Europe. Late September in Milan is a marvelous time to visit. Temperatures are mild and you can experience the warmth and beauty of Italy, in one of its most vibrant cities!

In the Wednesday opening session, we will host an excellent talk on the perspective of European Space activities. Elena Grifoni Winters, who was appointed Head of the Cabinet of the Director General of the European Space Agency (ESA) in 2016 and is presently the Secretary of the ESA Council, will be offering ESA view of the future evolution of satellite-based radar with special attention to the contributions of the Italian industry. Together with the technological point of view, the talk will show the potentials of Space-based radar observation on society. This EuRAD conference promises an engaging program through leading industrial and academic keynotes, focused sessions and workshops addressing key areas of interest, lectures chosen from hundreds of submissions, and paper awards! The technical program is the result of many hours of hard work by the Technical Program Committee, and we can proudly state that it includes topics in radar techniques, phenomenology, systems and subsystems, as well as consolidated and emerging applications in both civilian and defense scenarios.

The closing session plenary talk will be provided by Giampiero Di Paolo, Director of Domain Earth Observation and Navigation of Thales Alenia Space – Italia, who will give an excellent overview on the future evolution of satellite-based radar with special attention to the contributions of the Italian industry. Together with the technological point of view, the talk will show the potentials of Space-based radar observation on society. This EuRAD conference promises an engaging program through leading industrial and academic keynotes, focused sessions and workshops addressing key areas of interest, lectures chosen from hundreds of submissions, and paper awards! The technical program is the result of many hours of hard work by the Technical Program Committee, and we can proudly state that it includes topics in radar techniques, phenomenology, systems and subsystems, as well as consolidated and emerging applications in both civilian and defense scenarios.

The EuRAD 2022 organisers would like to thank the members of the TPC for their excellent work and all the Reviewers for providing the reviews in time. We truly appreciate your support! Our special thanks also go to all the plenary speakers and the invited keynote speakers for providing the very interesting and informed talks to catalyze subsequent discussions.

Last but not least, we gratefully thank the EuRAD conference authors, session chairs and attendees whose contributions are essential for the success of the event. Enjoy your time at this conference, and we will do our best to make it enjoyable and technically rewarding.
Welcome from the General TPC Chair

It is my great pleasure to welcome you to the European Microwave Week 2022 in Milan, Italy, also on behalf of the Technical Programme Committee. The EuMW is back in Milan after 20 years (the last time was EuMW 2002), and for this event we have prepared an exciting technical programme. After the difficult years of the pandemic, with online editions and postponed events, we look forward to a great normal conference, with large in-person attendance and many technical events!

The technical programme of EuMW 2022 will follow the classical schedule, with the EuMIC planned on Monday and Tuesday, the EuMC running from Tuesday to Thursday, and the EuRAD that closes the week, from Wednesday to Friday. Moreover, Workshops and Short Courses are organized on Sunday, Monday, and Friday.

A novelty of EuMW 2022 is the presence of an invited keynote talk in the first slot of each technical session. The invited keynote speakers have been selected among outstanding scientists, coming both from industry and from academia. They will deliver introductory and review presentations, which will enrich the technical programme of the conference, and this will provide an opportunity to listen to high-quality and well-known speakers, which is a very stimulating experience especially for students and young professionals.

With a number of submissions close to 600 regular papers and an acceptance rate of 66%, the Technical Programme Committee was able to form 75 regular sessions, 7 focussed sessions, and 5 poster sessions. Moreover, we have 5 special sessions: one special session in Memoriam of Prof. Vittorio Rizzoli, one organized in collaboration with the European Association on Antennas and Propagation (EurAAP), and three geographical special sessions (devoted to the microwave research in Asia Pacific region, India, and North Africa). The programme also includes two inter-society technology panels, organized in collaboration with the IEEE Microwave Theory and Technology Society (MTT-S): one panel is devoted to biomedical applications and the other is related to emerging materials, and both panels feature worldwide known authorities with different scientific background, ready for stimulating discussions with the audience. Finally, 6 opening and closing sessions complete the programme, leading to the total round number of 100 technical sessions. The conference programme includes technical sessions on traditional topics (like filters, power amplifiers, and antennas) as well as sessions on emerging technologies (like multiphysics modelling, additive manufacturing, THz systems, and automotive radars).

As General Technical Programme Committee Chair, I wish to thank the many people who have contributed to the development of this technical programme with their hard work and commitment. First of all, any conference technical programme originates from the contribution of paper authors and presenters: I would like to thank them very much for the scientific and technical quality of their submissions, over the entire wide range of topics of the EuMW. A huge thank also goes to the group of over 500 excellent reviewers, experts in the different topics of the three conferences, who evaluated the submitted papers in a time span shorter than usual and provided the TPC members with their valuable recommendations. An excellent work was done by the Technical Programme Committee during the online TPC meeting, which was again selected for this year to accommodate the travel constraints of several colleagues. The TPC was composed of over 100 experienced scientists from all over the world, expert in the various fields: they were grouped in 28 subcommittees, and they were responsible for the selection of the accepted papers and the formation of the sessions. I also wish to thank the Conference Chairs and TPC Chairs of the previous editions, who provided extraordinarily valuable guidance and support. Finally, I will never thank enough the team of the EuMA Software Officers for their tireless work, support, and patience.

It has been a great pleasure and a unique privilege to serve the microwave community as General TPC Chair for EuMW 2022. I look forward to seeing you in Milan in September 2022.
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 ten 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 2022.

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 Marco Pasian, TPC Chair of EuMC 2022 Alessandro Cicronali and Rocco Giofré, TPC Chair and Co-Chair of EuMIC 2022, Debora Pastina and Fabiola Colone, TPC Chairs of EuRAD 2022.

Accepted papers will be published with no extra-cost as Open Access papers 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, which is expected to appear in August 2023.

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The EuMW 2022 Organising Committee

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University of Rome Tor Vergata, IT
2021 European Microwave Week in London Best Paper Prizes: EuMC

MICROWAVE PRIZE

Authors
Yasser Qaragoz, Dominique Schreurs, Sofie Pollin
KU Leuven

Title
FDD for Low Power Backscattering in Batteryless Sensor Nodes

EUMC YOUNG ENGINEER PRIZE

Authors
Orestis Koutsos¹, Francesco Foglia Manzillo¹, Antonio Clemente¹, Ronan Sauleau²
¹CEA - LETI, ²University of Rennes 1

Sponsors – Thales Nederland

Title
Wideband High-Gain Transmitarray Antenna for Point-to-Point Communications at 300 GHz
2021 European Microwave Week in London Best Paper Prizes: EuRAD

**EURAD PRIZE**

![Authors](#)  
**Francesca Schenkel, Christian Schulz, Christoph Baer, Ilona Rolfes**  
Ruhr-Universität Bochum  
**Title**  
Plasma State Supervision Utilizing 140 GHz Radar Measurements

**EUMC YOUNG ENGINEER PRIZE**

![Authors](#)  
**Johanna Geiss, Erik Sippel, Martin Vossiek**  
¹Institute of Microwaves and Photonics, University of Erlangen-Nuremberg  
**Title**  
A Practical Concept for Precise Calibration of MIMO Radar Systems
2021 European Microwave Week in London Best Paper Prizes: EuMIC

**EUMIC PRIZE**

Authors

Christian Schmidt¹, Tobias Tannert², Jung Han Choi¹, Christoph Caspar¹, Detlef Pech¹, Sebastian Wünsch¹, Greta Ropers¹, Jonathan Schostak¹, Volker Jungnickel¹, Ronald Freund¹, Markus Grözing², Manfred Berroth²

¹Fraunhofer Heinrich Hertz Institute, ²Universität Stuttgart

Title

120 GBd SiGe-Based 2:1 Analog Multiplexer Module for Ultra-Broadband Transmission Systems

---

**EUMIC YOUNG ENGINEER PRIZE**

Authors

Tobias T. Braun¹, Marcel van Delden¹, Christian Bredendiek², Jan Schoepfel¹, Nils Pohl¹

¹Ruhr-University Bochum, ²Fraunhofer FHR

Title

A Low Phase Noise Phase-Locked Loop With Short Settling Times for Automotive Radar
EUMA Roberto Sorrentino Prize

This annual award recognizes an outstanding young professional who is a EuMA member who has distinguished technical achievements (not on a single paper) within the microwave fields of interest.

This is the second edition of the prize, named in remembrance of Roberto Sorrentino. The prize has been initiated by Linda Di Carlo Sorrentino in cooperation with RF Microtech, the Italian EM Society (SIEm) and EuMA. Awarded every year for at least ten years, it will recognize an outstanding young professional who has distinguished technical achievements (not on a single paper) within the microwave field. The technical achievements may include technical papers in journals and/or conferences/symposia sponsored or technically sponsored by EuMA. The technical achievements may also include services as a committee member for these Journals and/or conferences/symposia. This prize focuses on the individual rather than the achievements and would preferably be in yearly alternation between university and industry.

A nominee must be a member of the EuMA and no more than 38 years of age at the time of nomination deadline (i.e. not having reached their 39th birthday). To help bridge the gender gap in the microwave community however, this deadline is postponed by one year per child for women that have had children. A nomination must be made by a EuMA member (not a student member) who has known the nominee for more than 2 years. Self-nomination is not allowed. Two references in addition to the nominator are required. A selection panel, chaired by a member of the EuMA Board of Directors, selects every year a suitable number of panel members (from 5 to 7), whose names are not public. The Chair does not vote. Because of the large financial coverage, the Jury has one member designated by RF Microtech and one by SIEm, respectively.

The annual prize comprises a certificate, a medal and a financial award of 4,000 €, contributed by Mrs Linda Di Carlo Sorrentino, RF Microtech, SIEm, and EuMA. Collectively this might sustain the prize for a longer period as it is intended to keep the amount of the prize at 4,000 € therefore increasing the number of years of availability of the prize beyond 10 years. The prize will be presented at the Opening Session of the European Microwave Week.

Recipient of the Roberto Sorrentino Prize 2021: Prof. Dimitra Psychogiou
EuMA Pioneer Award

THE PIONEER AWARD TO RECOGNIZE AN INDIVIDUAL “WHO IS RESPONSIBLE FOR A NOTEWORTHY ADVANCE IN THE FIELD OF MICROWAVES WHICH HAS HAD A LASTING AND SIGNIFICANT EFFECT ON THE MICROWAVE COMMUNITY

2022 RECIPIENT: MARIAN POSPIESZALSKI

Marian W. Pospieszalski received the M.Sc. and D.Sc. degrees in Electrical Engineering from the Warsaw Institute of Technology, Warsaw, Poland, in 1967 and 1976, respectively. From 1967 to 1984, Dr. Pospieszalski was with the Institute of Electronics Fundamentals, Warsaw University of Technology (WUT), during which time he held visiting positions with the Electronics Research Laboratory, University of California at Berkeley (1977-1978), the National Radio Astronomy Observatory (NRAO), Charlottesville, VA (1978-1979), and the Department of Electrical Engineering, University of Virginia, Charlottesville, VA (1982-1984). Since 1984, he has been with the NRAO Central Development Laboratory, presently as Scientist with tenure. While on leave during 2001-2002, Dr. Pospieszalski was Chief Scientist-Microwave at Inphi Corporation, Westlake Village, CA. His research interests are in the fields of microwave, millimeter-wave, and high-speed circuits and systems with special emphasis on cryogenic low noise devices and receivers. Dr. Pospieszalski played a major role in the development of cryogenic receivers for all NRAO instruments, Very Large Array (VLA), Very Large Baseline Array (VLBA), Green Bank Telescope (GBT), and Atacama Large Millimeter Array (ALMA). He contributed to radiometer development for Wilkinson Microwave Anisotropy Probe (WMAP) and Low Frequency Instrument on ESA Planck satellite and many other ground based instruments searching for the anisotropies in cosmic microwave background radiation. Major radio astronomy observatories in Europe and Asia are also using his designs. Dr. Pospieszalski has authored or co-authored over hundred journal and conference papers. Over many years he has served IEEE and specifically microwave community in various roles as a member of Editorial Boards, Technical Program Committee of International Microwave Symposium and other conferences, MTT Society Awards Committee, MTT Society Technical Committee on Microwave Low-Noise Techniques (as Chair from 2001-2004) and as a reviewer for many journals. In 1992, he was elected Fellow of IEEE. In 2002, he received the NRAO Distinguished Performance Award, in 2005 the Distinguished MIKON Conference Contributor Award and in 2006 the Microwave Application Award from the IEEE MTT Society.
The first awardee of the DLA is a posthumous award to Professor Roberto Sorrentino who died on Tuesday, 3 March 2020. He was an electronic engineer who had a distinguished career in the field on microwave and mmWave circuits and antennas. He received in recent years the IEEE Microwave Career Award, the EuMA Distinguished Service Award and the Order of Merit of the Italian Republic.

He began his career as an Assistant Professor at "University of Rome "La Sapienza" in 1974. From 1986 to 1990 he was a Professor at the University of Rome "Tor Vergata" and in November 1990 he became a Professor at the University of Perugia. Between 1983 and 1986 he was a Research Fellow at the University of Texas at Austin, where he worked with Professor Tatsuo Itoh. In 2007 he founded RF Microtech srl, a successful spin-off company from the University of Perugia specializing in microwave and RF technologies. This Umbrian company became a leader in the field of antenna design and satellite communication systems, employing 25 people.

Roberto Sorrentino was one of the six Founder Members of the European Microwave Association, which was created in 1998 to manage the annual European Microwave Conference and to create the European Microwave Week. He served as the first President of the Association from 1998 to 2009. In 2010 the EuMA presented him its Distinguished Service Award. In 2014 he was the General Chair of the 17th European Microwave Week, which was held in Rome.

He was an active member of the IEEE and the Microwave Theory and Techniques Society (MTT-S) throughout his career, he was elected an IEEE Fellow for his contribution to the modelling of planar and quasi-planar microwave and mmWave circuits. In 1993 he received the IEEE MTT-S Meritorious Service Award, in 2000 the IEEE Third Millennium Medal, in 2004 the IEEE MTT-S Distinguished Educator Award, and in 2015 the IEEE Microwave Career Award.

He was Vice Chair and then Chair of the International Union of Radio Science (URSI) Commission D (Electronics and Photonics) and from 2007 he was the President of the Italian Commission of URSI. He was one of the founders and from 2002-08 the first President of the Italian Electromagnetic Society (SIEm). In January 2020 Roberto Sorrentino was awarded the prestigious honor of the Grand Officer of the Order of Merit of the Italian Republic for his commitment in the field of research. The award was conferred by the Head of State, Sergio Mattarella.

Roberto Sorrentino was an outstanding member of our technical community because his achievements combined excellence in different fields. He was a gifted educator and many of his former PhD students are now well-respected members of the microwave community.
Tom Brazil Fellowship Award - Student Essay Competition
The role of Microwaves for global challenges

As part of the Tom Brazil Fellowship Award (by the GAAS® Association), we would like to announce the following essay competition which will be open to students pursuing a research degree in RF/Microwave/mmWave electronics. You must register for the EuMIC conference to enter the essay competition. The student should write a maximum of 4000 words essay or max of 12 pages including diagrams and tables, on the role of microwaves in supporting global challenges, thus describing what kind of future microwave activities would be important and why. In particular, what aspects of their own research work would be applicable.

Guidance: What we're looking for is a summary of the role so far of RF/Microwaves/mmWave in telecommunications and other fields which have contributed to remote working (especially during the COVID pandemic) and reducing travel/commuting. Also for enabling developing countries to build sustainable agricultural and other industries that require good communications infrastructure. The use of THz for forecasting of catastrophic weather events has also been an important and ongoing development. Microwave activity can help in reducing carbon footprint: for example high efficiency power amplifiers and other components for base station applications, high efficiency antenna beam steering architectures, use of THz for weather forecasting and warning of catastrophic weather/natural events.

We are looking for creative and original ideas and suggestions on how future microwave related research work can be best directed in fulfilling actual and forthcoming global challenges. The shortlist of 3 selected essays will be announced at the end of the Tom Brazil Doctoral school and these finalists will be asked to do a final pitch in the MicroApps area of the Exhibition Hall. The winners of the money prizes will be announced during the awards session at the EuMIC closing event. Submissions: Please submit your essay by the deadline of 1st September 2022 to brazilaward@eumw2022.org

International Journal of Microwave and Wireless Technologies: former best paper prizes

The International Journal of Microwave and Wireless Technologies selects one paper per year for the Best Paper Award of the Journal and announces it in the next year. EuMA grants an amount of 1,000€ for this award. In the following, the list of the former recipients of the prizes:


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IJMWT Editor-in-Chief: Francesco Medina-Mena

EuMA Honorary Secretary: Andrew F Wilson

By invitation: Wolfgang Heinrich, Past President · Jozef Modelski, MTT-S Observer · Almudena Suárez Rodríguez, Publication Officer · Lorenz Peter Schmidt, EuMW Officer · Annemie Van Nieuwerburg, HQ Assistant

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EuMW 2022 Reviewers

To our reviewers: Thank you for your great work!
Travel Information

GETTING TO THE MICO – MILANO CONVENTION CENTRE

A wide range of transport options are available to travel to Milan – air, rail network, tube, and cable car or walking/cycling. The main entrance for European Microwave Week 2022 is MiCo South, Level 1 which is accessed from Gate 2. There is also access to Level 1 from Gate 16.

VENUE ADDRESS
Allianz MiCo
Piazzale Carlo Magno, 1
20149 Milano

Milan is served by high-speed trains, and a very efficient underground and surface transport system. Many points of interest of Milan are at walking distance from MiCo. You can get to MiCo – Milano Congressi by Bus, Metro, Train or Light Rail. These are the lines and routes that have stops nearby:

- **Bus:** 48, 78, 90, 91, Z301
- **Train:** R17, S4
- **Metro:** M5
- **Light Rail:** 19

For more information, please visit [https://www.micmilano.it/en](https://www.micmilano.it/en)

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.connexhotelsandevents.com/eumw-milan.html](http://www.connexhotelsandevents.com/eumw-milan.html) and make your booking,

or email: sally@connexhotelsandevents.com.

You will find a wide range of accommodation to suit every budget. Alternatively, see the hotel booking pages within this programme.

PERSONAL INVITATION (Visa)

A valid passport will be required for entry into the organising country, in this case Italy. An Italian visa may also be required for the purpose of attending EuMW and we suggest you check with your local embassy. If you are registering as a speaker, a delegate or an exhibitor and you need a visa, we recommend that you contact the Italian Embassy, in your own country at least 3 months prior to EuMW. The organisers will be pleased to send a letter of invitation to any speaker, exhibitor or conference delegate requesting it to assist with their visa application.

In order to request a letter of invitation, please download and complete the request form found here: [https://www.eumweek.com/visitors/passport-visa.html](https://www.eumweek.com/visitors/passport-visa.html) and send it to the visa operational officer: visas@eumw2022.org.
Local Information and Insurance

**WI-FI**
Wi-Fi is available in the exhibition hall and conference area. Login details can be found within your delegate bag.

**ELECTRICITY**
Electricity is supplied at 240V, 50 Hz.

**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.

**HISTORY & SIGHTSEEING**
Milan is the undisputed business and financial capital of Italy, it is also home of the financial markets and is the base for all of the country’s multinationals, making Milan a confirmed international metropolis. Its fine aesthetic traditions are upheld in new projects carried out in the city by star architects. Among the many fascinating monuments, it is worth mentioning the Duomo di Milano, the world’s largest Gothic cathedral, the Sforza Castle, La Scala theatre, the Church of Santa Maria delle Grazie with the Last Supper painting of Leonardo da Vinci. The city also enjoys an enviable setting in Lombardy. Filled with enchanting art cities, this is the Italian region with the largest natural parks and splendid lakes surrounded by mountains and is a paradise for both mountaineers and skiers. The region’s strong attachment to its longstanding traditions is reflected in the unforgettable flavours of internationally renowned local cuisine and wine.

For more information, visit https://www.yesmilano.it/en.

Conference Information

**BADGES AND REGISTRATION**
The registration area will be located near the main entrance to MiCo South on level 1 accessed from Gate 2 as signposted. There is also access from Gate 16. 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. 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. Those who have not pre-registered can do so on site until 30th September 2022. There will be on-site 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.

**CONFERENCE ROOMS**
Conference rooms are located on level 2 of the venue as signposted. The conferences will be held in different rooms over the conference dates. Please refer to the Conference Matrix in 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.

**INSURANCE**
It is highly recommended that all participants carry the proper travel and health insurance, as the organiser cannot accept any liability for any accident, illness, 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 2022.

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

**EXHIBITION HOURS**
The exhibition area will be located in MiCo South on Level 0 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 27th September 2022, 9:00 – 18:00
- Wednesday 28th September 2022, 9:00 – 17:30
- Thursday 29th September 2022, 9:00 – 16:30

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

**CONFERENCE PROCEEDINGS**
All papers published for presentation at your chosen conference will be available to download from an online repository. Four weeks prior to the event, downloading instructions will be communicated to conference registrants.
**Hotel Booking Form**  
**September 2022**

Rooms are held on a guaranteed basis. For this reason, you are asked to supply a credit card number and full company details. If your travel plans change and you wish to cancel your accommodation, please contact Sally Garland on +44 (0)7775 744193 or email sally@connexhotelsandevents.com to avoid any non-arrival or cancellation charges, as each hotel has a different cancellation policy, full cancellation details will be clearly marked on every booking confirmation. Prepay rates are non-refundable and non-cancelable.

**FOR MORE HOTEL OPTIONS AND TO RESERVE YOUR ROOM ONLINE VISIT**


Or complete the booking form below and email to Sally@connexhotelsandevents.com

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**Guest Names**

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I authorise that any no show or late cancellation charges, as stipulated in the Hotelzon / Connex booking confirmation will be charged to this credit card

Signed | Date

Tel: +44 (0)7775 744193  
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<td>HOTEL ASTORIA ★★★</td>
<td>23 minute walk</td>
<td>€89.00 RO</td>
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</tr>
<tr>
<td>Viale Murillo, 9 Fiera Milano City 21013 Milan</td>
<td>19 minutes by Metro</td>
<td>Flexible</td>
<td>€104.00 B&amp;B</td>
</tr>
<tr>
<td>LANCASTER HOTEL ★★★</td>
<td>19 minute walk</td>
<td>€144.00 B&amp;B</td>
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<tr>
<td>Via Abbondio Sangiorgio 16 20145 Milan</td>
<td>15 minutes by Metro</td>
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<td>HOTEL MIRAGE ★★★</td>
<td>22 Minutes by Bus</td>
<td>€117.00 RO</td>
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<tr>
<td>Viale Certosa, 104/106 20156 Milan</td>
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<td>Flexible</td>
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<tr>
<td>DOUBLETREE BY HILTON MILAN ★★★★</td>
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<tr>
<td>Via Ludovico Di Breme 77 Milan</td>
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<td>Flexible</td>
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<td>RADISSON BLU MILAN ★★★★</td>
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<td>B&amp;B HOTEL MILANO SAN SIRO ★★</td>
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<tr>
<td>Via Achille, 4 20151 Milan</td>
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*All rates quoted include VAT at the current rate. **Special Event Rates are only bookable via this form or direct with Sally@connexhotelsandevents.com

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.
Social Events

**EuMIC Get Together**
Monday 26th September 2022
19.30 – 22.30

**Cost:** Free to all EuMIC delegates.
**Sponsor:** Thales Alenia Space.

(EuMIC Delegates are required to collect the event ticket at registration desk, to be exhibited at the event venue entrance)

**Location off-site:** Eastend Studios, www.eastendstudios.it (Shuttle service will be organised from/to MiCo)

All registered EuMIC 2022 delegates are invited to our traditional and convivial “get-together”. A good occasion to unwind at the end of the conference first day, and enjoy a dinner with speakers and colleagues.

**EuMW Welcome Reception**
Tuesday 27th September 2022
18:30 – 21:30

**Cost:** Free to conference delegates & invited exhibitors

**Location:** Gold Room (level 2)

All registered conference delegates, as well as invited representatives from companies participating in the exhibition are invited to the EuMW 2022 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 2022, Milan to EuMW 2023, Berlin as well as an address from the Platinum Sponsor, Keysight Technologies.

The open-buffet dinner will be served from 19.00.

**EuMW 2022 TPC Lunch**
Thursday 29th September 2022
13.00 – 14.20

**Special event for the EuMW 2022 Technical Program Committee members (by invitation). Location:** MiCo Panorama Lounge

A special event to recognize the service of the TPC members.

**EuRAD Lunch**
Friday 30th September 2022
13.00 – 14.20

**Cost:** Free to registered EuRAD delegates

(please bring your badge to gain admission.)

**Location:** MiCo Panorama Lounge

A seated hot plated lunch for EuRAD delegates to catch up and round off a busy week.

**Automotive Forum Networking Dinner**
Monday 26th September 2022
19:00 – 22:00

**Cost:** Free to registered Automotive delegates

(please bring your badge to gain admission.)

**Location off-site:** Museo Alfa Romeo

(Shuttle service from/to MiCo will be provided)

Join us for a guided visit to the museum, and a 3-course dinner to give you the chance to network and discuss the issues raised throughout the Forum in an informal setting.

**Students get together**
Monday 26th September 2022
19:00 – 22:00

**Cost:** Free for student delegates

(please bring your badge to gain admission.)

**Location off-site:** GUD City Life

Come and enjoy networking in a very informal venue!

**Other social events will come: stay tuned!**
Welcome to Milano!

Milan is internationally recognised as one of the world’s most important fashion capitals, but it also has a wealth of interesting museums and things to see and do.

FREE WALKING TOUR OF MILAN

Make the most of your trip to Milan! Discover the secrets of an Italian city that combines the best of history, fashion and architecture on this English-language guided walking tour.

Meet your tour guide in the Piazza del Duomo, in the very heart of the capital. From there, you’ll stroll through Milan’s historic quarter, reaching the basilica of San Nazaro in Brolo. Continue to one of Italy’s most important educational institutes: the Statale University of Milan. Around ten minutes from the university, you’ll arrive at Milan Cathedral.

You’ll then head to the Galleria Vittorio Emanuele II. Walking through the arcade leads you to the Piazza della Scala, after walking through Piazza Mercanti, the final stop on your walking tour will be Piazza degli Affari.

Duration: 2 hours 45 minutes.

THE MILAN PASS

The Milan Pass is the tourist card of the Lombard capital and offers you free entrance into many museums around the city and unlimited use of the public transport.

ATTRACTIONS INCLUDED:

TOURS INCLUDED
Shopping tour at the Seraville outlets – Shopping tour at the Foxtown outlets

The Milan Pass also gives you significant discounts and reduced prices in bars, restaurants, cafes, and shops around the city, as well as various guided tours and attractions.

The Milan Pass includes transport with the choice of two options:

• 48-hour City Sightseeing bus pass: you can hop on and hop off at any of the stops, as many times as you like.
• 48-hour public transport travel card: unlimited travel on the Milan Metro, tram and bus (except for journeys to the airport).

HOW DOES IT WORK?
Your Milan Pass is valid for 48 hours. The card will be activated when it is used for the first time, whether in a museum, a shop, or on public transport. From that moment on, you will have 48 consecutive hours to enjoy its advantages.

You can pick up the Milan Pass at the Milan Visitor Centre – Although your Milan Pass offers you free entry, some of the museums and tourist attractions still require you to queue to enter and to go through security controls. The Milan Pass does not include fast track entry.

Cost from €79
If you would like to have more details or buy tickets for any of the attractions or tours, please contact Sally Garland on sally@connexhotelsand-events.com

MILAN SIGHTSEEING BUS

The Milan sightseeing bus is the perfect way to discover all the main landmarks around the magnificent Italian city. Our comfortable, open-top vehicle follows four different routes, making it easy for you to design your own sightseeing itinerary.

€ 24

MILAN DUOMO TOUR

You can’t go to Milan without visiting its most important monument! Head into the Duomo di Milano, a symbol par excellence of the city, and go up to the terrace to admire the unique panoramic views of the fashion metropolis.

€ 29

NAVIGLI CANALS BOAT TRIP

On the Navigli Canals Boat Trip, you’ll explore a fascinating canal system in Milan. You’ll sail along these 12th-century waterways and discover their history with your audio guide in English.

€ 19

SHOPPING TRIP TO SERRAVALLE

Get a taste of Milan’s designer heritage at prices for all pockets! Serravalle Designer Outlet is Europe’s largest, and the most visited in Italy. The major Italian designer brands sell their clothes here with incredible discounts all year round.

€ 20

LAST SUPPER TOUR

The Last Supper. You’ve seen pictures, you’ve seen reproductions and you’ve even seen parodies. Leonardo’s masterpiece is so ingrained in our culture, that a guided tour is an absolute essential for any visitor to Milan.

€ 49.50

LAKE COMO AND BELLAGIO

On this tour we’ll dive into Italy’s lake district, in the foothills of the Alps. We’ll sail on Lake Como and visit Bellagio, the area’s most beautiful town.

Day Trip € 89

For more information and many more ideas visit the Milano website https://www.introducingmilan.com/
## Workshops and Short Courses List

Despite the organisers’ best efforts to ensure the availability of all listed workshops and short courses, the list below and the numbering are subject to change. Please refer to [www.eumweek.com](http://www.eumweek.com) before registration for final availability and numbering.

<table>
<thead>
<tr>
<th>Day</th>
<th>Session Code</th>
<th>Type</th>
<th>Title</th>
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<tbody>
<tr>
<td><strong>Sunday 25th September 2022</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>SC1</td>
<td>EuMIC</td>
<td>Full Day</td>
<td>Fundamentals of Microwave PA Design</td>
</tr>
<tr>
<td>WS1</td>
<td>EuMIC</td>
<td>Full Day</td>
<td>140 GHz: Where radar meets 6G</td>
</tr>
<tr>
<td>WS2</td>
<td>EuMC/EuMIC</td>
<td>Full Day</td>
<td>Latest Digital Predistortion Solutions for 5G and Beyond: from Handsets to MIMO Arrays.</td>
</tr>
<tr>
<td>WS3</td>
<td>EuMC/EuMIC</td>
<td>Full Day</td>
<td>Millimeter-Wave GaN Power Amplifiers</td>
</tr>
<tr>
<td>WS4</td>
<td>EuMC</td>
<td>Half Day</td>
<td>New On-Chip and Scalable RF Packaging Solutions for 5G mmWave and 6G Applications</td>
</tr>
<tr>
<td>WS5</td>
<td>EuMIC</td>
<td>Half Day</td>
<td>RF and mmW reliable ICs: characterization, test and security challenges</td>
</tr>
<tr>
<td>WS6</td>
<td>EuMC/EuMIC</td>
<td>Full Day</td>
<td>Technological needs for future SatCom connectivity</td>
</tr>
<tr>
<td>WS7</td>
<td>EuMC</td>
<td>Full Day</td>
<td>Microwave Design and Metrology for Quantum Computing</td>
</tr>
<tr>
<td>WS8</td>
<td>EuMIC</td>
<td>Full Day</td>
<td>mmWave Front Ends: Challenges and Advances</td>
</tr>
<tr>
<td>WS9</td>
<td>EuMC/EuMIC</td>
<td>Half Day</td>
<td>Advances in Nonlinear Component Modeling and Digital Predistortion under Modulated Signal Conditions</td>
</tr>
<tr>
<td>WS10</td>
<td>EuMC</td>
<td>Half Day</td>
<td>Electromagnetic Waves in Daily Life: Research Insights from Young Professionals</td>
</tr>
<tr>
<td>WS11</td>
<td>EuMC</td>
<td>Full Day</td>
<td>Additive Manufacturing Technologies for Microwave and Millimeter-Wave Applications</td>
</tr>
<tr>
<td><strong>Monday 26th September 2022</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WM1</td>
<td>EuMC</td>
<td>Half Day</td>
<td>Recent Advances in Topologies, Technologies and Practical Realizations of Microwave Sensors dedicated to biomedical applications</td>
</tr>
<tr>
<td>WM2</td>
<td>EuMC</td>
<td>Full Day</td>
<td>Cryogenic RF-mmW Technology and circuit platforms: a path toward Quantum-Computing</td>
</tr>
<tr>
<td>WM3</td>
<td>EuMC</td>
<td>Full Day</td>
<td>Reconfigurable radiofrequency circuits based on ferroelectric materials</td>
</tr>
<tr>
<td>WM4</td>
<td>EuMC</td>
<td>Full Day</td>
<td>Space-Based Solar Power</td>
</tr>
<tr>
<td>WM5</td>
<td>EuMC</td>
<td>Full Day</td>
<td>Substrate Integration Technologies for High-Density Hybrid and Monolithic Integrated Circuits, Antennas and Systems</td>
</tr>
<tr>
<td>WM6</td>
<td>EuMC</td>
<td>Full Day</td>
<td>Reconfigurable intelligent surfaces for smart electromagnetic environment: an integrated vision towards industrial applications</td>
</tr>
<tr>
<td>WM7</td>
<td>EuMC</td>
<td>Full Day</td>
<td>Recent developments in millimetre-wave measurement: S-parameters and material properties</td>
</tr>
<tr>
<td>WM8</td>
<td>EuMC</td>
<td>Full Day</td>
<td>New techniques and foundations for microwave and mm-wave RF filtering devices for emerging communication systems</td>
</tr>
<tr>
<td>WM9</td>
<td>EuMC</td>
<td>Full Day</td>
<td>Nanoparticles in medicine: from diagnosis to treatment</td>
</tr>
<tr>
<td>WM10</td>
<td>EuMC</td>
<td>Full Day</td>
<td>RF Reliability Status and Challenges for 5G mmWave and 6G Applications</td>
</tr>
<tr>
<td><strong>Friday 30th September 2022</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WF1</td>
<td>EuRAD</td>
<td>Half Day</td>
<td>Ubiquitous Radar</td>
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<tr>
<td>WF2</td>
<td>EuRAD</td>
<td>Half Day</td>
<td>Future individual mobility based on automotive radar sensors and more ...</td>
</tr>
<tr>
<td>WF3</td>
<td>EuMC</td>
<td>Half Day</td>
<td>Design and optimization of mmWave wideband radios for 5G and Satcom</td>
</tr>
<tr>
<td>WF4</td>
<td>EuMC/EuRAD</td>
<td>Half Day</td>
<td>Exploiting Symmetries and Higher Symmetries in Classical Electromagnetism for Design and Modelling of Antennas, Filters, Metamaterials, and Metasurfaces</td>
</tr>
<tr>
<td>WF5</td>
<td>EuRAD</td>
<td>Full Day</td>
<td>Applications for advanced passive radar systems</td>
</tr>
<tr>
<td>WF6</td>
<td>EuRAD</td>
<td>Full Day</td>
<td>Radar for Medical and Biological Applications and Bioinspired Radar</td>
</tr>
<tr>
<td>WF7</td>
<td>EuMC</td>
<td>Half Day</td>
<td>Dosimetry and microdosimetry applied to emerging wireless technologies: from human to cell level</td>
</tr>
<tr>
<td>WF8</td>
<td>EuRAD</td>
<td>Full Day</td>
<td>Integrated Sensing and Communications for 6G Systems</td>
</tr>
<tr>
<td>WF9</td>
<td>EuMC</td>
<td>Full Day</td>
<td>Reconfigurable Intelligent Surfaces and Smart Skins for B5G/6G Communications: Recent Advances, Current Trends and Vision</td>
</tr>
</tbody>
</table>
Registration Information

CONFERENCE REGISTRATION DETAILS

See pricing table on the following page.

ONLINE REGISTRATION
- All online registrations should be made at www.eumweek.com.
- Registrations completed up to and including 26th August 2022 will be charged at the ‘Advance Discounted Rate’ and those from 27th August 2022 will be charged at the ‘Standard Rate’.
- Online registration is open from mid June 2022 up to and during the event until 30th September 2022.

ONSITE REGISTRATION
- Onsite registration is available:
  - Saturday, 24th September 2022, 16:00 – 19:00
  - Sunday, 25th September 2022, 08:00 – 17:00
  - Monday, 26th September 2022, 08:00 – 17:00
  - Tuesday, 27th September 2022, 08:00 – 17:00
  - Wednesday, 28th September, 2022, 08:00 – 17:00
  - Thursday, 29th September 2022, 08:00 – 17:00
  - Friday, 30th September 2022, 08:00 – 10:00

Onsite registration will be charged at the Standard Rates.

HOW TO REGISTER

If you have any questions regarding registration procedures and payment, please contact: eumwreg@aventri.com

REGISTER ONLINE AT WWW.EUMWEEK.COM
- Delegates can register for one, two or all three of the conferences.
- 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.
- Bring your receipt, barcode and photo ID with you to the event
- Go to the Fast Track Check In Desk and print out your badge

ONSITE REGISTRATION
- The registration area will be outside the Exhibition Halls as signposted
- 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.

For any question, please contact: eumwreg@aventri.com
Registration Fees

Get the most out of this year’s Microwave Week with a Full Week ticket. Combine all three conferences with access to all forums the Defence, Security and Space and the 5G and Beyond Forum (the Automotive Forum is not included) as well as all the Workshops or Short Courses.

Registration at one conference does not allow access to the sessions of the other conferences.

Subsidised lunchboxes are €8 each (one per day). They are available to all who attend EuMW, and should be ordered at the time of registration, either online or on-site.

Reduced rates are offered if you have society membership to any of the following: EuMA, GAAS®, IET or IEEE. 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 30th September 2022). The fees shown below are invoiced in the name and on behalf of the European Microwave Association. All payments must be in € Euros – cards will be debited in € Euros..

### CONFERENCES

<table>
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<tr>
<th>CONFERENCES</th>
<th>ADVANCE DISCOUNTED RATE (FROM NOW UP TO &amp; INCLUDING 26th August 2022)</th>
<th>STANDARD RATE (FROM 27th August 2022 &amp; ONSITE)</th>
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<tr>
<td></td>
<td>Society Member ○</td>
<td>Non-Member</td>
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<td></td>
<td>Standard</td>
<td>Student/Sr.</td>
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<tr>
<td>1 Conference</td>
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<tr>
<td>EuMC</td>
<td>€ 520</td>
<td>€ 140</td>
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<td>EuMIC</td>
<td>€ 400</td>
<td>€ 130</td>
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<td>EuRAD</td>
<td>€ 360</td>
<td>€ 120</td>
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<td>2 Conferences</td>
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<tr>
<td>EuMC + EuMIC</td>
<td>€ 740</td>
<td>€ 270</td>
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<td>EuMC + EuRAD</td>
<td>€ 700</td>
<td>€ 260</td>
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<tr>
<td>EuMIC + EuRAD</td>
<td>€ 610</td>
<td>€ 250</td>
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<tr>
<td>3 Conferences</td>
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<tr>
<td>EuMC + EuMIC + EuRAD</td>
<td>€ 900</td>
<td>€ 390</td>
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<tr>
<td>Full Week Ticket</td>
<td>€ 1.370</td>
<td>€ 800</td>
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</table>
**BECOME A MEMBER – NOW!**

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

One can apply for EuMA membership by ticking the appropriate box during registration for EuMW. Membership is valid for one year, starting when the subscription is completed. The discount for the EuMW fees applies immediately.

Members have full e-access to the International Journal of Microwave and Wireless Technologies. The printed version of the journal is no longer available.

**EU MA KNOWLEDGE CENTRE**

The EuMA website has its Knowledge Centre which presently contains over 22,000 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.

### SPECIAL FORUMS AND SESSIONS

<table>
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<th><strong>ADVANCED DISCOUNTED RATE (UP TO &amp; INCLUDING 26th August 2022)</strong></th>
<th><strong>STANDARD RATE (FROM 27th August 2022 &amp; ONSITE)</strong></th>
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<tr>
<td><strong>Date</strong></td>
<td><strong>Delegates</strong></td>
</tr>
<tr>
<td>Automotive Forum</td>
<td>26th September 2022</td>
</tr>
<tr>
<td>5G and Beyond Forum</td>
<td>29th September 2022</td>
</tr>
<tr>
<td>Defense, Security &amp; Space Forum</td>
<td>28th September 2022</td>
</tr>
<tr>
<td>Tom Brazil Doctoral School: Build a Frequency – Modulated Continuous Wave Radar in 1 day</td>
<td>25th September 2022</td>
</tr>
<tr>
<td>Doctoral School: Microwaves for Emerging Medical Technologies</td>
<td>26th/27th September 2022</td>
</tr>
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</table>

* Those registered for EuMC, EuMIC or EuRAD  ** Those not registered for a conference

### WORKSHOPS AND SHORT COURSES

<table>
<thead>
<tr>
<th><strong>IN COMBINATION WITH CONFERENCE REGISTRATION</strong></th>
<th><strong>WITHOUT CONFERENCE REGISTRATION</strong></th>
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<tr>
<td><strong>Society Member</strong></td>
<td><strong>Non-Member</strong></td>
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<tr>
<td><strong>Standard</strong></td>
<td><strong>Student/Sr.</strong></td>
</tr>
<tr>
<td>Half Day</td>
<td>€ 110</td>
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<tr>
<td>Full Day</td>
<td>€ 150</td>
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### EUROPEAN MICROWAVE WEEK SPONSORS

- Official Publication: [Microwave Journal](https://www.microwave-journal.com)
- Supported by: [IET](https://www.iet.org)
- Co-Sponsored by: [MTT-S](https://www.mtt-s.org)
- Co-Sponsored by: [IEEE](https://www.ieee.org)
# 12th Tom Brazil Doctoral School of Microwaves

**Practical Workshop: Build a Frequency-Modulated Continuous Wave Radar in 1-day**

**Date:** Sept. 25th 2022  
09:00 – 18:30  
**Room:** Amber 6

**Organizer:** David Ricketts, North Carolina State University  
**Chair of the school:** David Ricketts, North Carolina State University

In this workshop you will learn the theory and design of FMCW Radar. With this theoretical foundation, you will design, simulate and fabricate by hand, each component of the radar. You will then work in a team to assemble a complete radar and test it before the end of the class. The only background you need is basic microwave engineering knowledge and a desire to learn and build with your hands!

## Programme

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00 – 10:40</td>
<td><strong>Introduction and Theory of FMCW Radars and System Simulation of a 2.4 GHz Radar</strong>&lt;br&gt;David Ricketts, North Carolina State University</td>
<td></td>
</tr>
<tr>
<td>10:40 – 11:20</td>
<td><strong>Coffee Break</strong></td>
<td></td>
</tr>
<tr>
<td>11:20 – 13:00</td>
<td><strong>Hands-on Session 1: Radar Component Design and Simulation.</strong>&lt;br&gt;David Ricketts, North Carolina State University</td>
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</tr>
<tr>
<td>13:00 – 14:20</td>
<td><strong>Lunch</strong></td>
<td></td>
</tr>
<tr>
<td>14:20 – 16:00</td>
<td><strong>Hands-on Session 2: Radar component fabrication</strong>&lt;br&gt;David Ricketts, North Carolina State University</td>
<td></td>
</tr>
<tr>
<td>16:00 – 16:40</td>
<td><strong>Coffee break</strong></td>
<td></td>
</tr>
<tr>
<td>16:40 – 17:30</td>
<td><strong>Hands-on Session 3: Radar component testing and system assembly.</strong>&lt;br&gt;David Ricketts, North Carolina State University</td>
<td></td>
</tr>
<tr>
<td>17:30 – 18:20</td>
<td><strong>Testing of Radars with Teams</strong></td>
<td></td>
</tr>
<tr>
<td>18:20 – 18:30</td>
<td><strong>Tom Brazil Fellowship Awards shortlist announcement</strong></td>
<td></td>
</tr>
</tbody>
</table>
Doctoral School
Microwaves for emerging medical technologies

Date: Sept. 26th and 27th 2022
Room: Amber 6

Organizer: Simona Di Meo, University of Pavia, IT
Chair of the school: Simona Di Meo, University of Pavia, IT
Co-Chair of the school: Micaela Liberti, University of Rome La Sapienza, IT

The ‘Microwaves for emerging medical technologies’ school offers PhD students and postdoctoral researchers the opportunity to discover recent advances in the use of electromagnetic waves in the medical field. In particular, a general overview of the mechanisms regulating the interaction between biological tissues and electromagnetic waves, at both the microscopic and macroscopic level, will first be offered. Then, some of the most promising applications of electromagnetism in the biomedical field will be shown, including numerical modelling of different anatomical regions, as well as methods enabling the translation from the prototype stage to the market introduction of new medical devices.

This school is ideal for those already working in this field who wish to deepen and consolidate their knowledge, but also for those with a different background who want to learn about these new diagnostic and therapeutic approaches based on the use of electromagnetic waves largely investigated worldwide since many years.

The school is open even to non-PhD students. All participants will be given a certificate of attendance and a final test will be proposed, if needed. The cost of the school is € 40 until 25 of September, but last-minute registration is strongly discouraged as the number of registrants is limited.

Programme

SESSION 1 – Monday 26th:
Theoretical foundations

09:00
09:50
09:50 – 10:40
11:20
12:10
13:00
14:20
15:10
15:10 – 16.00
16:20
17:10

09:00 – 09:50
09:50 – 10.40
11:20 – 12:10
12:10 – 13:00
14:20 – 15:10
15:10 – 16:00
16:20 – 17:10
16:20 – 17:10

SESSION 2 – Monday 26th:
Methodologies and approaches of EM waves in biomedical field

Dielectric spectroscopy for molecular and cellular analysis, introduction and measurement techniques
Katie Grenier, LAAS-CNRS, FR

Lunch

The challenges of nanosec. and sub-nanosec. Pulsed Electric Fields for electropermeabilization
Lluis M. Mir, DREC CNRS, FR

In Silico Clinical Trials and RF Safety Assessment using Human Anatomical Models and Digital Twins
Lena Kranold – IT’IS fndn., CH

SESSION 2 (cont.) – Tuesday 27th:
Towards patient bed-side applications

14:20
15:10
15:10
16.00

Cancer diagnostics at microwaves
Milica Popovic, McGill Univ., Canada

Brain stroke imaging at microwaves
Francesca Vipiana, Politecnico di Torino, IT

Introduction to radar and tomographic imaging
Marco Pasian, Univ. Pavia, IT

Thermal EM-based approaches for cancer treatment
Martin O’Halloran, NUI Galway, IE

SESSION 3 – Tuesday 27th:

Applications of microwave tumor ablation
Laura Farina, Endowave Ltd, Galway, IE

Final test Tuesday afternoon
Proposed credits: 3
In its first year, the EuMW2022 3MT competition is designed to stimulate interest in the wide range of applications of microwave technology. Contestants will make a presentation of three minutes or less, supported only by one static slide, in a language appropriate to a non-specialist audience. While recognizing the top 4 ranked contestants, it is planned to award prizes to the top three, and to the Honorable Mention winner.

Programme

The list of finalists and the title of their talks are as follows:

"It’s all about power"
Jasmin Gabsteiger

"Focusing microwaves for Transferring Power Wirelessly"
Ricardo Pereira,

"Digital glasses for a triple seeing Automotive RADAR"
Mattia Giovanni Polisano

"Energy where you want with frequency diversity"
Enrico Fazzini

"Enabling faster data converters"
Joseph Fasbinder

"Wearable materials: the new horizon of 3D-printing"
Giulia Battistini

"Why are driverless vehicles not on the road yet?"
Anum Pirkani

"Imaging systems for early breast cancer detection"
Alessia Cannata

"Seeing the world in high definition – Radar for self driving cars"
Dominik Schwarz

"Microwave for Best Surface Rafting Experience"
Nikki Diala Tagdulang

"Optimization of Precise Near-Field Focusing link for Wireless Power Transfer"
Elisa Augello

"Yes, Officer, we know how fast everyone was going."
Lena Krabbe

"Saving our planet with radars: monitoring snow and ice"
Martina Lodigiani

"Generating Superfast Data Signals with a Fancy Switch"
Jonathan Schostak

"Making the space closer"
Davide Arenare

"Time and Cost Reduction of Antenna Production by Use of 3D-Printers"
Adamantia Chletso
The event aims at providing an overview about cutting-edge studies and applications in the broad area of communication and information technology.

Speakers from both the industry and the academia have been invited to provide a talk to describe research, ideas, challenges, future trends and future developments, related to their expertise and their business.

Programme

14:20 – 14:55
The High Frequency In The 6G Digital Era
Jonathan Gambini, Margherita Azzoni, Renato Lombardi; Huawei, Italy

14:55 – 15:30
Data science for real-case robotics and automotive applications
Diana De Falco Alfano, Giacomo Maccagni; Reply, Italy

15:30 – 16:00
Title to be confirmed
TBD
We continue the tradition of holding the Women in Microwave Engineering event, sponsored by IEEE MTT-S, during the European Microwave Week. The event will take place at the Pinacoteca Ambrosiana (Milan), both women and men are welcome. Taking a cue from the wonderful location, Milan, the capital of Italian fashion, this year’s event will focus on wearable technologies and devices. Three invited speakers will present the recent trends on materials, fabrication techniques and devices for wearable applications. The event will end with a guided tour of the Pinacoteca Ambrosiana.

Programme

Prof. Leena Ukkonen  
Tampere University, Tampere, Finland

Prof. Anne Schwarz-Pfeiffer  
Niederrhein University of Applied Sciences

16:20 – 16:45  How Wearable and Epidermal RFID Sensors will empower our bodies to support data-driven Life Science  
Dr. Sara Amendola,  
University of Rome Tor Vergata

17:00 – 18:00  Guided Tour Pinacoteca Ambrosiana  
The Pinacoteca Ambrosiana was established in April 1618, when Cardinal Federico Borromeo donated his collection of paintings, drawings and statues to the Biblioteca Ambrosiana, which he had founded in 1607. The museum consists of 24 rooms, where visitors can admire some of the greatest masterpieces of all time, such as the Portrait of a Musician by Leonardo da Vinci, The Basket of Fruit by Caravaggio, the cartoon for the School of Athens by Raphael, the Adoration of the Magi by Titian, the Madonna of the Pavilion by Sandro Botticelli and the magnificent Vases of Flowers by Jan Brueghel.  
(from https://www.ambrosiana.it/en/)
**Career Platform**

**Date:** Tuesday 27th and Wednesday 28th September 2022

Organiser: Simona Di Meo, University of Pavia, IT  
Co-organiser: Giacomo Paolini, University of Bologna, IT

The Career Platform is a unique event within EuMW2022: open to all, visitors, and delegates, for free, it has the target to foster the Research - Industry - Education triangle by giving the opportunities of bringing together companies and young professionals. Our motto is to help the community bringing jobs and career opportunities to young students and professionals, all in a single place and time, in order to make our field more attractive to students and more productive for companies.  
The Career Platform will be held on two-days (September 27th and 28th) with the support of EuMW and EuMA. It 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 talents in the areas of microwaves / millimeter-waves, radar, wireless, integrated circuits engineering and more.  
This initiative has proven to be a great success as an in-person event, counting more than 30 interactions per company.  
The platform is structured around two events:  
- Career Platform Recruitment Space  
- Special Session

The list of involved companies will be updated continuously at the [https://www.eumweek.com/students/careerplatform.html](https://www.eumweek.com/students/careerplatform.html)  
Stay tuned!

No registration – free access (including visitors)

**Events**

**Special Session entitled “The European Microwave Industry Market and Professional Opportunities”**  
**Tuesday, 10:40-11:20**  
**Room: Amber 8**  
Top industry leading speakers will give their vision and insights. The session will describe the main market of the European Microwave Industry with a focus on Professional Opportunities.

**2 days Career Platform Recruitment Space**  
**Room: Main Hallway**  
A specific space for free-chat and speed-recruiting with recruiting companies partnering with EuMW2022  

Companies willing to join the career platform may contact the Career Platform Organizers at [career.platform@eumw2022.org](mailto:career.platform@eumw2022.org), specifying also if they are interested in giving a talk in the special session “The European Microwave Industry Market and Professional Opportunities”. Companies interested in participating in the Career Platform should specify at least one email address to which interested students can write to arrange an interview. These contacts will be continuously posted on the Career Platform’s dedicated website as part of EuMW2022 ([https://www.eumweek.com/students/careerplatform.html](https://www.eumweek.com/students/careerplatform.html)).  
Students who wish to take advantage of the opportunity provided by the Career Platform to interview with companies must not have current employment contracts with other companies. By contacting companies to interview, students self-declare that they are not employees of other companies on the date of the Career Platform.
The Automotive Forum
Automotive Radar Innovations and Interference Challenges

Monday 26th September 2022
09:00 – 18:20
Room: Brown 1-2

Chair: Benjamin Nuss, Karlsruhe Institute of Technology, Germany
Co-Chairs: Martin Kunert, Bosch, Germany & Frank Gruson, ZF Friedrichshafen AG, Germany & Alessandro Cidronali, University of Florence, Italy

Following applications like keyless entry and tire pressure monitoring systems, mobile communications and recently automotive radar made microwave technologies a strong pillar inside the automotive world. The first 77 GHz automotive radar sensors entered the European market in 1999. In 2019, the European Microwave Association (EuMA) for the first time organized the Automotive Forum to provide an open platform for industrial experts to discuss technical aspects, concepts and radar architectures as well as market issues in the area of microwaves in the automotive industry.

The forum consists of a good mix of technical presentations, plenary and panel discussions as well as networking time. This year’s event will focus on the following topics:
1. Recent progress of imaging RADARs
2. RADAR interference challenges and solutions
3. RADAR interference testing and market prospects
4. Novel RADAR trends and innovations

The forum is mainly devoted to technical

Programme

Session 1: Recent Progress of Imaging Radars
Chair: Benjamin Nuss, Karlsruhe Institute of Technology

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speakers/Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00</td>
<td>Architectural Changes in Automotive Radar Sensor and its Benefits</td>
<td>Andreas Loeffler, Hasan Iqbal, Jonathan Wache, Continental, Germany</td>
</tr>
<tr>
<td>09:20</td>
<td>The Building Blocks of the Best Image Quality</td>
<td>Noam Arkind, Arbe, Israel</td>
</tr>
<tr>
<td>09:40</td>
<td>Wideband Digital Architecture for 4D Imaging Radar</td>
<td>Alon Cohen, Mobileye, Israel</td>
</tr>
<tr>
<td>10:00</td>
<td>First-of-a-Kind System-in-Module Technology for High-Resolution Imaging Radars</td>
<td>Siddhartha Sinha, Ilja Ocket, André Bourdoux, imec, Belgium</td>
</tr>
<tr>
<td>10:20</td>
<td>Open Discussions all Presentations of the Session</td>
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<tr>
<td>10:40</td>
<td>Coffee</td>
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</tbody>
</table>

Session 2: Radar Interference Challenges and Solutions
Chair: Alessandro Cidronali, University of Florence, Italy

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speakers/Institutions</th>
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<tbody>
<tr>
<td>11:20</td>
<td>IMIKO – Overall Evaluation and Recommendation for Standardization</td>
<td>Frank Borngräber, Continental, Germany</td>
</tr>
<tr>
<td>11:40</td>
<td>Radar Interference - A Call for Action</td>
<td>Ophir Shabtay, Mobileye, Israel</td>
</tr>
<tr>
<td>12:00</td>
<td>Technologies and Standardization of Radar Cooperative Interference Mitigation for Autonomous Driving</td>
<td>Tommi Jamsa, Song Sida, Wu Qian, Ma Sha, Zhang Hui, Huawei Technologies, Germany</td>
</tr>
<tr>
<td>12:20</td>
<td>Digital Code Modulation (DCM) Radar for Improved ADAS Safety</td>
<td>Arunesh Roy, Uhnder, USA</td>
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<tr>
<td>12:40</td>
<td>Open Discussions all Presentations of the Session</td>
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<tr>
<td>13:00</td>
<td>Lunch</td>
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Architectural Changes in Automotive Radar Sensor and its Benefits
Andreas Loeffler, Hasan Iqbal, Jonathan Wache, Continental, Germany

The Building Blocks of the Best Image Quality
Noam Arkind, Arbe, Israel

Wideband Digital Architecture for 4D Imaging Radar
Alon Cohen, Mobileye, Israel

First-of-a-Kind System-in-Module Technology for High-Resolution Imaging Radars
Siddhartha Sinha, Ilja Ocket, André Bourdoux, imec, Belgium | Harald Gal, Heinrich Tischler, Erich Schlafer, Ilker Boyacioglu, AT&S, Austria

Open Discussions all Presentations of the Session

Coffee
11:20
11:40
12:00
12:20
12:40
13:00
14:20
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. Early registration is recommended.

**Session 3: Radar Interference Testing and Market Prospects**
Chair: Martin Kunert, Robert Bosch GmbH, Germany

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
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<tbody>
<tr>
<td>14:20</td>
<td>The Journey of the Interference Mitigation Design and Verification</td>
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<tr>
<td></td>
<td>SeungChul Shin, Keysight Technologies, USA</td>
</tr>
<tr>
<td>14:40</td>
<td>Radar Interference Testing and Case Study for PMCW Modulation</td>
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<td></td>
<td>Holger Gryska, Alois Ascher, Rohde &amp; Schwarz, Germany</td>
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<td></td>
<td>Ralf Reuter, Yaohui Liu, Uhnder, USA</td>
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<tr>
<td>15:00</td>
<td>SIL, HIL, OTA: Which Tool for which Use Case</td>
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<td></td>
<td>Andreas Himmler, dSpace, Germany</td>
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<tr>
<td>15:20</td>
<td>Market Requirements Driving Radar Evolution</td>
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<td>Cédric Malaquin, Yole Développement, France</td>
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<tr>
<td>15:40</td>
<td>Open Discussions all Presentations of the Session</td>
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<tr>
<td>16:00</td>
<td>Coffee</td>
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</table>

**Session 4: Novel Radar Trends and Innovations**
Chair: Frank Gruson, ZF Friedrichshafen AG, Germany

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
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<tbody>
<tr>
<td>16:40</td>
<td>3D Waveguide Antenna Radar System: An RF Independent Substrate Solution</td>
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<td></td>
<td>Alejandro García-Tejero, Jerzy Kowalewski, Marco Rossi, Francesco Merli, Huber+Suhner AG, Switzerland</td>
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<td></td>
<td>Brian Ginsburg, Meysam Moallem, Texas Instruments, USA</td>
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<tr>
<td>17:00</td>
<td>Gapwaves Waveguide Antenna Solutions for Automotive Applications</td>
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<td></td>
<td>Carlo Bencivenni, Abbas Vosoogh, Marcus Hasselblad, Gapwaves AB, Sweden</td>
</tr>
<tr>
<td>17:20</td>
<td>Automotive SAR: Challenges and Opportunities for its Practical Implementation</td>
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<tr>
<td></td>
<td>Ivan Russo, Huawei Technologies Italia S.r.l., Italy</td>
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<td>Sergio Duque Biarge, Huawei Munich Research Center, Germany</td>
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<td></td>
<td>Stefano Tebaldini, Umberto Spagnolini, Politecnico di Milano, Italy</td>
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<tr>
<td>17:40</td>
<td>Grid Mapping and Synthetic Aperture Radar based on Millimeter-Wave MIMO Radar for Automotive</td>
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<td>Timo Grebner, Ulm University, Germany</td>
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<tr>
<td>18:00</td>
<td>Open Discussions all Presentations of the Session</td>
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</table>

**Registration and Programme Updates**

Advanced Registration fee (up to & incl. 26th August 2022) is € 280 for those who registered for a conference and € 390 for those not registered for a conference. Standard Registration fee (from 27th August 2022 & onsite) is € 450 for those not registered for a conference.

The Conference Special Events section of the EuMW website will give further details and updates.
Nowadays, the exploitation of the electromagnetic spectrum as well as the processing of electromagnetic signals represent key issues in several aspects of real life with applications ranging from civil to defense fields. Modern radar systems face new and compelling scenarios that are extremely crowded from an electromagnetic standpoint due to the band invasion by the new generation communication systems. In addition, the advancements in technology have led to the development of low-cost sensing devices capable of providing high performances in terms of both computational power and measurement precision. The bleak side of this technology is that it is available for offensive/malicious actions aimed at denying targeting information, using radarguided missiles, or small drones carrying dangerous (e.g., explosive or chemical) substances.

Thus, modern radars incorporate smart solutions to counteract these threats possibly with the help of systems for electronic support measure or for spoofing/deception. For instance, once an intruder drone has been detected, such systems might acquire the control of it and interrupt any malicious action. Therefore, radar growth has been accompanied by the advancement of the electronic defense systems including the cyber domain.

Programme

11:20 - 11:55
Trends in Phased Array Technology for Defense, Security, and Space
Jeff Herd, MIT Lincoln Lab

11:55 - 12:30
Latest Trends in Multifunctional and Multiplatform Radar Applications
Michael Brandfass, HENSOLDT

12:30 - 13:00
Electro-Magnetic Spectrum Operation: Conventional and Unconventional applications
Goffredo Foglia, Elettronica SpA

13:00 - 13:45
Lunch and Learn
Microwave Journal Industry Sessions (Free lunch boxes):
Addressing the test challenges of next generation RADAR & EW Systems
Tim Fountain, Rohde & Schwarz

13:45 - 14:20
Simulations for management optimization of radar with Artificial Intelligence
Myriam Nouvel, THALES DMS

14:20 - 14:55
RF High Voltage GaN and Digital technologies break through the power barrier to enable a new generation of ultracompact system architectures for A&D platforms
Maurizio Cicoli, MBDA Italy Technical Advisor and Integra System Innovation & Technology

14:55 - 15:30
Current trends and developments in the field of spaceborne reconnaissance
Thomas Neff, DLR

15:30 - 16:00
Radar Innovations for Future Maritime Operations: Challenges and Opportunities
Laura Anitori, TNO
The Defense, Security, and Space (DSS) Forum of this year focuses on key technologies of the modern defense systems using the electromagnetic spectrum including radars, electronic support measure systems, electronic countermeasures systems, and platforms for cyber security. In this context, the keynote speakers will consider the state of the art of leading technologies and systems, the estimated evolution of technologies and trends and consider expected capabilities and functionalities to address future challenges. The industry session will reflect the effort and investment that is being made to innovate/develop radar and electronic defense technologies. The DSS “Future Radar Technology Round Table” will be a moderator-lead discussion with radar industry experts discussing the future of radar systems and electronic defense platforms enabled by new semiconductor technologies, faster digital processing speeds and extended memory, better thermal designs/materials, new simulation/testing capabilities and new software capabilities such as artificial intelligence and machine learning for cognitive systems. The experts will review these new capabilities and project how these underlying improvements will shape future radar systems and multi-function platforms.

16:00 – 16:40  Coffe Break
16:40 – 17:40  Round Table
   1. Andrea Zanini (moderator), Advisor, Presidency of the Council of Ministers
   2. Maurizio Cicolani, MBDA Italy Technical Advisor and Integra System Innovation & Technology; confirmed.
   3. John Cowles, Analog Device; Senior Director of Engineering and Technology.
   4. Fabio Sterle, Leonardo SpA; Director of Radar Systems Engineering.
   5. Daniela Pistoia, Elettronica SpA; Corporate Chief Scientist – Head of Technical Directorate
   6. Andrea Pompili, CY4GATE; Chief Scientist Officer.

Registration and Programme Updates
Registration fee is € 30 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.
From 5G to 6G Forum

Thursday 29th September 2022
09:00 - 18:20
Room: Amber 3

Chair: Renato Lombardi, Huawei Technologies, Head of Italy Research center, Italy
Co-Chair: Christian Mazzucco, Huawei Technologies, 5G mmw team leader, Milan Research Center, Italy

The Forum deep dives on the main important research trends that will permit the evolution of services from 5G to 6G with a clear focus on the radio frequency technologies that will enable the use of the millimeter-wave and sub-TeraHz bands. The Forum consists of a full day session with invited speakers from industry, operators and vendors, and academy. In particular the Focus covers all those aspects related integration of communication and sensing, the novel Electromagnetic Information Theory, aspects to improve coverage and performance of millimeter-wave networks. The presence of leading operators and 5G leading vendors together with academy will permit setting the scene in terms of requirements, long term vision and most important research trends. The Forum will include a panel session, coffee breaks and packed lunch.

Programme

09:00 - 09:20 Introduction
Renato Lombardi (Chair of From 5G to 6G Forum)

09:20 - 10:00 Ericsson 6G vision: Connecting a cyber-physical world
Jonas Hansryd (Ericsson)

10:00 - 10:40 6G: The Challenges for the Radio Link Technologies
Tong Wen (Huawei) – CTO of Wireless Product Line

10:40 - 11:00 Coffee Break

11:00 - 11:40 5G Evolution towards 6G
Daniele Franceschini (Telecom Italia) - TIM Head of Innovation Standard IPR and Portfolio

11:40 - 12:20 Integrated sensing and communication: concepts, motivations, and benefits
Umberto Spagnolini (Politecnico of Milan)

12:20 - 13:00 Innovative Synthesis Tools and Architectures for New Generation Wireless Communications
Andrea Massa (Eledia Research Center - University of Trento)

13:00 - 14:20 Lunch Break

14:20 - 15:00 5G in Vodafone: status and perspectives
Marco Zangani (Vodafone Italy - CNO)

15:00 - 15:40 Electromagnetic Information Theory: Past, Present and Future
Merouane Debbah (TII Abu Dhabi, Mohamed bin Zayed University of Artificial Intelligence)

15:40 - 16:20 Reconfigurable Intelligent Surfaces for Wireless Communications
Marco Di Renzo (CentraleSupelec, Paris-Saclay University)

16:20 - 17:00 Coffee Break

17:00 - 17:20 A system-level perspective on smart radio environments
Antonio Capone (Politecnico of Milan)

17:20 - 18:00 Panel session
All

18:00 - 18:20 Conclusions
Renato Lombardi (Chair of From 5G to 6G Forum)
The foundation of mobile telephony

Mobile telephony for everyone

The foundation of mobile broadband

Mobile broadband enhanced

Embracing a networked society

Enabling a smart sustainable society

1st GENERATION wireless network

- Basic voice service
- Analog based protocols

- 2.4 Kbps

2nd GENERATION wireless network

- Designed for voice
- First digital standards (GSM, CDMA)

- 64 Kbps

3rd GENERATION wireless network

- Designed for voice and data
- First mobile broadband
- Voice through circuit & Data-Packet Switching

- 2 Mbps

4th GENERATION wireless network

- Designed primarily for data
- IP based protocol
- True mobile broadband

- 100 Mbps

5th GENERATION wireless network

- 1000 x increase in capacity
- Support for 100+ billion connections
- Below 1 ms latency

- 10 Gbps

6th GENERATION wireless network

- Extension to (sub) mmWave frequencies
- Real-time cloud computing

- 1 Tbps

SPECIAL CONFERENCE EVENTS

Registration and Programme Updates

Advanced Registration fee (up to & incl. 26th August 2022) is € 60 for those who registered for a conference and € 90 for those not registered for a conference. Standard Registration fee (from 27th August 2022 & onsite) is € 80 for those who registered for a conference and € 100 for those not registered for a conference. The Conference Special Events section of the EuMW website will give further details and updates.
**MONDAY 09:00 – 10:40**

**Amber 1**

**EuMIC01**
Multiphysics Modelling Techniques for Advanced Devices and Circuits

Chair: Raphael Sommet¹

Co-Chair: Antonia Raffo²

¹University of Limoges XLIM, ²University of Ferrara

**09:00**

EuMIC01-1
Innovations in Characterizing and Modelling Modulation Distortion in Active Components

Jan Verspecht

**INVITED KEYNOTE**

**09:20**

EuMIC01-2
Surface and Buffer Trap Signatures in Fe-doped AlGaN/GaN HEMT Identified by LF S-parameter TCAD Simulations

Jean-Christophe Nallatamby¹, Jose Anderson Silva dos Santos², Pierre Yvertaguet Raja³, Mohamed Bouslama¹, Raphael Sommet¹

¹XLIM UMR 7252, University of Limoges/CNRS, ²IIT Dharwad, ³CIMME

**10:00**

EuMIC01-3
Efficient EM-based variability analysis of microwave structures through parameterized reduced-order behavioral models

Chiara Ramella¹, Alessandro Zanco¹, Marco De Stefano¹, Tommaso Bradde¹, Marco Pirola¹, Stefano Grivet-Talocia¹

¹Politecnico di Torino

**Amber 2**

**EuMIC02**
Millimeter-wave Integrated Circuits

Chair: Friedel Gerfers¹

Co-Chair: Lars-Erik Wernersson²

¹TU Berlin, ²Lund University

**09:00**

EuMIC02-1
GaN MIMCs for Millimeter-Wave Front Ends

Zora Popovic

**INVITED KEYNOTE**

**09:20**

EuMIC02-2
GaAs MIMC Interferometer for Broadband Interference Suppression

Paige Danielson¹, Megan Robinson¹, Gregor Lasser¹, Zoya Popovic¹

¹University of Colorado Boulder

**10:00**

EuMIC02-3
Design of a 5G Application CML Frequency Divider for Improved Efficiency

Adam Waks¹, Olivier Tesson¹, Mike Bellanger¹, Thierry Tarì¹, Jean-Baptiste Baguerot²

¹NXP Semiconductors, ²IMS Bordeaux (U.Bordeaux)

**Amber 3**

**EuMIC03**
Advanced Microwave Components

Chair: Ulrich Lewark¹

Co-Chair: Juwhan Yoo²

¹IMST GmbH, ²Google

**09:00**

EuMIC03-1
Multifunction X-band MMIC with High Resolution in Phase and Amplitude Control in Antenna Beamforming Networks for Space Communication Application

Francesco Garritta

**INVITED KEYNOTE**

**09:20**

EuMIC03-2
Compact Patch-like Bandpass Filter using grounded CSRR on BiCMOS 55nm technology

Mohamed Welfi¹, Marc-Marguerite Restor², Cédric Durand³, Philippe Ferrer³

¹University of Grenoble Alpes, TIMA Laboratory, ²University of Life - EREM, ³STMicroelectronics

**10:00**

EuMIC03-3
Characterization of GaN Recovery Effects under High-Power Pulsed RF Stress

Marc van Heijningen¹, Diogo Ribeiro¹, Peter de Heer¹, Frank E. van Wiel¹

¹TNO

**10:20**

EuMIC03-4
Stabilisation and burn-in of X-band GaN HPA MIMCs for space applications

Ricard Vila-Valls¹, Leonardo Lagrange¹, Cesar Quiroga¹, Jesús Lázaro¹, Andrew Barnes², Jean-Philippe Reau², Oscar del Rio², Görka Rubio-Cahir³, Maria Ramírez-Barre⁴, Véronique Cerrù³, Laurent Calvi²

¹European Space Agency (ESA), ²Airbus Defence & Space, ³UMS (France, Germany), ⁴MKS Instruments

**Invited KEYNOTE**

**10:40**

EuMIC03-5
Load-pull Techniques for 5G Applications: State-of-the-art and Future

Marco Mischetti

**Invited KEYNOTE**

**Amber 1**

**EuMIC01**
Innovations in Characterizing and Modelling Modulation Distortion in Active Components

Jan Verspecht

**INVITED KEYNOTE**

**Amber 2**

**EuMIC02**
Millimeter-wave Integrated Circuits

Chair: Friedel Gerfers¹

Co-Chair: Lars-Erik Wernersson²

¹TU Berlin, ²Lund University

**Amber 3**

**EuMIC03**
Advanced Microwave Components

Chair: Ulrich Lewark¹

Co-Chair: Juwhan Yoo²

¹IMST GmbH, ²Google

**09:00**

EuMIC01-1
Innovations in Characterizing and Modelling Modulation Distortion in Active Components

Jan Verspecht

**INVITED KEYNOTE**

**09:20**

EuMIC01-2
Surface and Buffer Trap Signatures in Fe-doped AlGaN/GaN HEMT Identified by LF S-parameter TCAD Simulations

Jean-Christophe Nallatamby¹, Jose Anderson Silva dos Santos², Pierre Yvertaguet Raja³, Mohamed Bouslama¹, Raphael Sommet¹

¹XLIM UMR 7252, University of Limoges/CNRS, ²IIT Dharwad, ³CIMME

**10:00**

EuMIC01-3
Efficient EM-based variability analysis of microwave structures through parameterized reduced-order behavioral models

Chiara Ramella¹, Alessandro Zanco¹, Marco De Stefano¹, Tommaso Bradde¹, Marco Pirola¹, Stefano Grivet-Talocia¹

¹Politecnico di Torino

**09:00**

EuMIC02-1
GaN MIMCs for Millimeter-Wave Front Ends

Zora Popovic

**INVITED KEYNOTE**

**09:20**

EuMIC02-2
GaAs MIMC Interferometer for Broadband Interference Suppression

Paige Danielson¹, Megan Robinson¹, Gregor Lasser¹, Zoya Popovic¹

¹University of Colorado Boulder

**10:00**

EuMIC02-3
Design of a 5G Application CML Frequency Divider for Improved Efficiency

Adam Waks¹, Olivier Tesson¹, Mike Bellanger¹, Thierry Tarì¹, Jean-Baptiste Baguerot²

¹NXP Semiconductors, ²IMS Bordeaux (U.Bordeaux)

**09:20**

EuMIC03-1
Multifunction X-band MMIC with High Resolution in Phase and Amplitude Control in Antenna Beamforming Networks for Space Communication Application

Francesco Garritta

**INVITED KEYNOTE**

**10:00**

EuMIC03-3
Characterization of GaN Recovery Effects under High-Power Pulsed RF Stress

Marc van Heijningen¹, Diogo Ribeiro¹, Peter de Heer¹, Frank E. van Wiel¹

¹TNO

**10:20**

EuMIC03-4
Stabilisation and burn-in of X-band GaN HPA MIMCs for space applications

Ricard Vila-Valls¹, Leonardo Lagrange¹, Cesar Quiroga¹, Jesús Lázaro¹, Andrew Barnes², Jean-Philippe Reau², Oscar del Rio², Görka Rubio-Cahir³, Maria Ramírez-Barre⁴, Véronique Cerrù³, Laurent Calvi²

¹European Space Agency (ESA), ²Airbus Defence & Space, ³UMS (France, Germany), ⁴MKS Instruments

**Invited KEYNOTE**

**10:40**

EuMIC03-5
Load-pull Techniques for 5G Applications: State-of-the-art and Future

Marco Mischetti

**Invited KEYNOTE**
MONDAY 11:20 – 13:00

Brown 3

**EuMIC04**
EuMIC Opening Session

Chair: Paolo Colantonio¹
Co-Chair: Francesco Barletta²
¹University of Rome Tor Vergata, ²Thales Alenia Space Italia

---

11:20 – 11:30

**Welcome Address: Opening of the European Microwave Integrated Circuits Conference 2022**

Paolo Colantonio, EuMIC Chair

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11:30 – 12:15

**New space race: architectures and technologies for space economy exploitation**

Massimo Comparini
Thales Alenia Space, Italy

Space has already entered in a new era. We cannot imagine our daily life without a number of space enabled services and applications from global connectivity to geospatial insight. New architectures emerged in terms of global constellation, even mega-constellations, connected and hyper-connected configurations, fast and on-demand response to space infrastructure deployment. Technology evolution is essential part of this architectural, technical and business paradigm evolution. The paper will give an overview of emerging architecture enabled by technology evolution and at the same time give a king of breakthrough vision how technology breakthroughs will potentially feed revolutionary architectures in orbit.

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12:15 – 13:00

**EU’s approach to evolving connectivity and related research**

Anna Caterina Carli
Policy Officer at Future Connectivity Systems, DG CONNECT, European Commission

In this talk, EU’s strategy to support evolving (wireless) connectivity from 5G towards 6G, building on the pillars of both research and innovation and deployment actions, will be presented. The scope, objectives and structure of the strategy will be discussed, motivated by the goals of supporting the community sector in developing innovative technologies as the key for future digital services towards 2030, and in the context of European plans of fostering resilience and technological sovereignty, strengthening EU’s digital supply chain, and building the required level of infrastructure and technology capacities for the data economy.
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<th>Time</th>
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<td>14:20</td>
<td><strong>Amber 1</strong></td>
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<td>14:20</td>
<td><strong>EuMIC05</strong></td>
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<td></td>
<td>SiGe mmWave Components &amp; Sub-systems</td>
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<td>Chair: Herbert Zirath¹</td>
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<td>Co-Chair: Jürgen Hasch¹</td>
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<td>Chalmers University of Technology,</td>
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<td>Robert Bosch GmbH</td>
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<td>15:40</td>
<td><strong>EuMIC06</strong></td>
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<tr>
<td></td>
<td>LNAs for Wireless Communications</td>
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<td>Chair: Markus Mayer³</td>
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<td>Co-Chair: Peter L. Gilabert³</td>
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<td>Aretis LGM, Universitat Politècnica de Catalunya</td>
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<td>16:00</td>
<td><strong>EuMIC07</strong></td>
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<td></td>
<td>Advanced Active Gallium Nitride Devices</td>
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<td>Chair: Valdim Issakov³</td>
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<td>Co-Chair: Rundiger Quay³</td>
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<td>Braunschweig University of Technology,</td>
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<td>Albert-Ludwigs-University Freiburg</td>
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<td>14:40</td>
<td><strong>EuMIC08</strong></td>
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<td>GaN Integrated Power Amplifiers</td>
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<td>Chair: Franco Giannini³</td>
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<td>Co-Chair: Holger Arthaber³</td>
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<td>Università di Roma, 7TU Wien</td>
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<td></td>
<td>SiGe Circuits for Millimeter-wave Radar Systems</td>
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<td>Nils Pohl, Tobias T. Braun, Jan Schepel¹</td>
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<td>GaN-based Receiver Front-ends</td>
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<td>Markus Rudolph</td>
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<td>A 2.5-2.6 dB Noise Figure LNA for 39 GHz band in 22 mm FD-SDI with</td>
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<td>Back-Gate Bias Tunability</td>
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<td>Lucas Nyssens, Martin Ruck², Titia Wane, Christoph</td>
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<td>Schwab, Thomas Lehmann³, Xiaoming Jang, Changyong Park</td>
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<td>Ka-band Wide Gain Control Range CMOS Variable Gain Amplifier Using</td>
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<td>PMOS for 5G Communications</td>
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<td>Dongbin Hong², Jeongyoun Lee, Seoamhyung Jang, Sangjin Jang², Changyong</td>
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<td>Stacked-FETs for High Power</td>
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<td>A 1.5kW 90V S-band GaN Transistor for Air Traffic Control Radars</td>
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<td>Gabriele Forrester⁴, Jeff Burger³, Richard Keshishvili³, John Walker⁴</td>
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<td><strong>EuMIC07-3</strong></td>
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<td>Development and RF-Performance of AlGaN/GaN and InAlN/GaN HEMTs on Large-</td>
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<td>Diameter High-Resistance Silicon Substrates</td>
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<td>Matthias Heuer², Marcus Pradhan³, Mohamed Alami², Benjamim Schoch³, Kana</td>
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<td>Sharma³, Ignatr Kallfass³, Armin Gehrige³, Irene M. Martin-Guerres²,</td>
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<td>Janneke N. Schrauf³</td>
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<td>Inst. Mikroelektronik Stuttgart (IMS CHIPS), Inst. Robert Power</td>
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<td>Univ. Bologna</td>
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<td>15:40</td>
<td><strong>EuMIC07-4</strong></td>
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<td>A Miniature 100V, 130W Multi-Octave UHF GaN on SiC Transistor with</td>
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<td>Internal Feedback</td>
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<td>Gabriele Forrester³, James Cutler³, Jeff Burger³, John Walker³</td>
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<td>16:00</td>
<td><strong>EuMIC07-5</strong></td>
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<td>Differential Coupler Topologies for Built-In Self-Test of SiGe Automotive</td>
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<td>Microwave Radar Receivers</td>
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<td>Frank Wenger³, Herman F. A. Kopp³, Bernd Neumann³, Vadim Issakov³</td>
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<td>Keyight Technologies Deutschland GmbH, Hochschule Karlsruhe, Transistors</td>
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<td>for High Performance Microelectronics (HHF), TU Braunschweig</td>
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<td>16:00</td>
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<td>Assessment of the Doherty Amplifier Concept for Space Applications</td>
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<td>Victor Valentà³, Ian Davies³, Salvador i Aldeco³, Naturalis Apollo³</td>
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<td><strong>EuMIC08-1</strong></td>
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<td>5 Watts, MMIC, K-Band Doherty PA for Satellite Communications</td>
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<td>Eduard Fedorchenko³, Renato Negri³, Victor Valenta³, Ian Davies³,</td>
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<td>Sharon Jardell³, Efstratios Richard³</td>
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<td>RWTH Aachen University, European Space Agency (ESA), Thales Alenia Space,</td>
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<td>5 Watts, MMIC, K-Band Doherty PA for Satellite Communications</td>
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<td>Eduard Fedorchenko³, Renato Negri³, Victor Valenta³, Ian Davies³,</td>
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<td><strong>EuMIC08-3</strong></td>
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<td></td>
<td>Compact High-Gain Driver Amplifier MMICs for 60 nm GaN-on-Si</td>
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<td>W-Band Single-Chip Transceivers</td>
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<td>Robert Münzberg³, Ralf Janssen³, Mingguang Bao³, Renato Negri³,</td>
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<td>Kristoffer Andersson³</td>
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<td>Swedish Defence Research Agency (FEL), Ericsson Research, Ericsson AB,</td>
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<td>5MMIC, S.A.S</td>
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<td>14:40</td>
<td><strong>EuMIC08-4</strong></td>
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<td>Broadband BW Ka-band MMIC Power Amplifier Using 100nm GaN Technology</td>
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<td>Sotirios Faklaris³</td>
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<td>United Monolithic Semiconductors (UMS)</td>
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<td>14:40</td>
<td><strong>EuMIC08-5</strong></td>
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<td>A Non-Uniform Distributed GaN LD Amplifier for Wideband 5-38 GHz</td>
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<td>Applications</td>
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<td>Matthew Heesk⁴, Edward Girard⁴, Chris Bausch⁴, Nicholas Miller⁴, Ryan</td>
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<td>Gilbert⁴, John Papadopoulos⁴</td>
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<td>Michigan State University, EMST, Air Force Research Laboratory, KBR</td>
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**MONDAY 16:40 – 18:20**

**Amber 1**

**EuMIC09**

Components & Technologies for mmWave Applications

Chair: Frank E. van Vliet¹

Co-Chair: Ingrid Kalfass¹

¹TNO Defense, Safety and Security, University of Stuttgart

**EuMIC09-1**

Latest Advanced MMIC’s Developments for ESA ARTES AT Studies in Thales Alenia Space Italia

Francesco Vitali

**INVITED KEYNOTE**

Thales Alenia Space Italia

**Amber 2**

**EuMIC10**

Millimeter-wave LNAs

Chair: Marco Pirolo¹

Co-Chair: Markus Mayer¹

¹Politecnico di Torino, Anelis LGM

**EuMIC10-1**

From Space-born Arrays to MMIC Specifications

Marc van Heijningen¹, Frank E. van Vliet²

¹University of California - Santa Barbara, ²University of Stuttgart

**Amber 3**

**EuMIC11**

Focused Session GaN Device Modelling

Chair: Teresa M. Martin-Guerrero¹

Co-Chair: Alberto Santarelli²

¹University of Malaga, University of Bologna

**EuMIC11-1**

EM-based Parasitic Extraction Applied to Scaled Transistor Models for High Frequency GaN Technologies

Christopher Zhang¹, Valerio Di Giacomo-Brunelli²

¹Institute of Telecommunications - University of Aveiro, ²University of Aveiro

**Amber 4**

**EuMIC12**

Integrated Power Amplifiers for Broadband Communications

Chair: Simon J. Mahon³

Co-Chair: Leonardo Ghanbari⁴

³University of California - Santa Barbara, ⁴University of Bologna

**EuMIC12-1**

High Power GaN-based SSPAs for Satellite Systems, Cutting-edge Solutions for Ground and On-board Satellite Applications

Jose Maria Aguayo¹, Lourdes Cabanal¹, Francisco de Arbolz², Miguel Angel Perla³

¹University of California - Santa Barbara, ²University of Aveiro

**Amber 1**

**EuMIC09-2**

A Fully Differential Hybrid Coupler for Automotive Radar Applications

Jan Schoppe⁵, Tobias I. Braun⁵, Simon Koppers⁵, Klaus Außler⁵

⁵Ruhr-University Bochum, ²Qpi-Labs GmbH, Triebenberg Technologies AG

**EuMIC09-3**

Demonstration of 300-nm InP/GaInAsSb DHBT MMIC Technology in a 60-160 GHz Ultra-Broadband Amplifier Test Vehicle

Sara Hamamci⁶, Colombo Boglonеры⁶, Anastor Malabeyi Arabali⁶, Filipi Lukativa⁶, Oliver J. S. Brink⁶, Mubaba Ibrahim⁶, Diego Mant⁶, Kai Fluscher⁶

⁶ETH Zürich

**EuMIC09-4**

A D-band, High Switching Speed, Differential Reflection-Type Phase Shifter in 250-nm InP HBT

Jeff Shi¹, Cheol Green¹, James Buckwalter¹

¹University of California - Santa Barbara

**EuMIC10-2**

High Linearity 76-81 GHz LNA Using a 16 nm FinFET Technology for Phased Array Radar Applications

Natalia Lundberg¹

¹MBDA

**EuMIC10-3**

A Q/V Band Low Noise Amplifier using Space de-rated Bias Conditions

Urich Lenz⁸, Gerald Langgartner⁸, Rüdiger Follmann⁸, Dorko Mi⁸, Dysten Jensen⁸

⁸IMST GmbH, ²Kongsberg Defence & Aerospace AS

**EuMIC10-4**

20 GHz LNA and 29 GHz PA on SiGe BiCMOS technology for SatCom phased array systems

Raffael Semper⁹, Alessandro Coluzzi⁹, Matteo Angelo Fortunati⁹

⁹Aveiro University

**EuMIC10-5**

A V-band Double-Transformer-Coupling and Current Steering VGLNA in 90-nm CMOS

Wei Zh Hu², Yingpeng Li³, Yuem Su⁴, Jiayi Gu⁴, Yuan Wang⁴, Huan Wang⁵

⁵National Taiwan University

**EuMIC11-2**

A Simple Thermally Activated Trapping Model for AlGaN/GaN HEMTs

Lauri Estremo Nuteri¹, Joli L. Karmo¹, Filip Barradas¹, José Carlos Porto¹

¹Institute of Telecommunications - University of Aveiro

**EuMIC11-3**

150-nm GaN HEMT Degradation under Realistic Load-Line Operation

Antonio Raffi¹, Valeria Vadalà², Gianni Boni¹, Roccio Gatti¹, Gabriele Nanni¹

¹University of Ferrara, ²University of Milano-Bicocca, ³University of Roma “Tor Vergata”

**EuMIC11-4**

High frequency GaN HEMT Modeling with ASM-HEMT

Raphael Sommer¹, Jose Bonfante Silva Dos Santos¹, Alexandre Sonnet¹, Jean Christophe Nataf²

¹XLIM/Université de Limoges, ²University of Roma “Tor Vergata”

**EuMIC11-5**

Localization of Trapping Effects in GaN HEMTs with Pulsed S-parameters and Compact Models

Pietro Bertolazzi¹, Frank Schneider¹, Soroush Chorshchekan², Matthias Rudolph²

¹Brandenburg University of Technology (BTU), ²Technische Universität Berlin

**EuMIC12-1**

A 30-97 GHz Psat, 3dB Broadband PA with 18.5-21.5dBm Psat and 18-26% PAE in 90nm SiGe Supporting Concurrent Multi-Band Operation

Zheng Liu¹, Gaurav Karaha¹, Kaushik Sengupta¹

¹Princeton University

**EuMIC12-2**

Microstrip GaAs Power Amplifiers for High Capacity 92-114 GHz 5G and 6G Backhaul

Simon J. Mahon³, Jakov J. Miladinovic³, Sudipta Chakraborty⁴, Melissa Gorman⁴, Michael Hendlich⁴, Yingqiao Li⁴

³Macquarie University, ²University of Waseda, ⁴University of Roma “Tor Vergata”

**EuMIC12-3**

High Power GaN-based SSPAs for Satellite Systems, Cutting-edge Solutions for Ground and On-board Satellite Applications

José María Aguayo¹, Lourdes Cabanal¹, Francisco de Arbolz², Miguel Angel Perla³

¹University of California - Santa Barbara, ²University of Aveiro

**EuMIC12-4**

High frequency GaN HEMT Modeling with ASM-HEMT

Rafael Perera¹, Jose Bonfante Silva Dos Santos¹, Alexandre Sonnet¹, Jean Christophe Nataf²

¹XLIM/Université de Limoges, ²University of Roma “Tor Vergata”

**EU-MIC 12-5**

A 46% Peak PAE 28 GHz High Linearity Stacked-FET Power Amplifier IC with a Novel Two-Step Adaptive Bias Circuit in 45-nm SOI CMOS

Nagendra Suguna¹, Suderikrishna Kesavan¹

¹Waseda University, ²The Graduate School of Information, Production and Systems, Waseda University
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<td>09:00</td>
<td>EuMC01</td>
<td>EuMC02</td>
<td>EuMC03</td>
<td>EuMIC/EuMC01</td>
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<td>Microwave Through Terahertz Measurement Techniques</td>
<td>Novel Transceiver Concepts</td>
<td>Focused Session Advances in Terahertz Technologies for Communication and Sensor Applications</td>
<td>Receivers</td>
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<td>09:20</td>
<td>EuMC01-1</td>
<td>EuMC02-1</td>
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<td>Recent Progress in mmWave Water-level Characterization Techniques to Accelerate 6G Deployment</td>
<td>Judging Aperture Efficiency for Multi-Tone Arrays</td>
<td>Technology for the Heterointegration of nH DHB Chiplets on a Sige BiCMOS Chip for mm-wave MMICs</td>
<td>Transmit/Receive Modules for ECM AESA: Architectures and Enabling Components</td>
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<td>EuMC02-2</td>
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<td>10:00</td>
<td>EuMC01-3</td>
<td>EuMC02-3</td>
<td>EuMC03-3</td>
<td>EuMIC/EuMC01-3</td>
</tr>
<tr>
<td></td>
<td>16-Term On-Wafer Calibration with Leaky Standards and Flexible Algorithm Definition</td>
<td>OFDM Upconverting Transmitter Using a Frequency Multiplier</td>
<td>Terahertz imaging arrays for industrial inline measurements</td>
<td>28 GHz Down-Conversion Mixer with RF Back-Gate Excitation Topology in 22-nm FD-SOI</td>
</tr>
<tr>
<td>10:20</td>
<td>EuMC01-4</td>
<td>EuMC02-4</td>
<td>EuMC03-4</td>
<td>EuMIC/EuMC01-4</td>
</tr>
<tr>
<td>10:40</td>
<td>EuMC01-5</td>
<td>EuMC02-5</td>
<td>EuMC03-5</td>
<td>EuMIC/EuMC01-5</td>
</tr>
<tr>
<td></td>
<td>Contactless Flanges and Rail System for mmW and THz Testing</td>
<td>Energy Efficient ADC for Low Fan-Out MIMO Sub-Thz Imaging System in SiGe:BiCMOS Technology</td>
<td>MMICs Technology for the Heterointegration of nH DHB Chiplets on a Sige BiCMOS Chip for mm-wave MMICs</td>
<td>A 8-18 GHz Low Noise Variable Gain Amplifier with 30 dB Gain Control Range</td>
</tr>
</tbody>
</table>
# TUESDAY 09:00 – 10:40

## Amber 1

### EuMIC13
Highly Integrated mmWave Systems  
Chair: Ingmar Kallfass¹  
Co-Chair: Ernesto Limiti²  
¹University of Stuttgart, ²University of Rome Tor Vergata

### EuMIC14-1
Remote Sensing and High Data Rate Satellite Communication Based on Metamorphic HEMT Technology  
Sébastien Chartier¹, Axel Tessmann¹, Arnulf Leuther¹, Ingmar Kallfass², R Ewald, P Piironen  
¹Fraunhofer Institute for Applied Solid State Physics (IAF), ²University of Stuttgart

### EuMIC14-2
A 44 GHz-BW 18.5 GS/s Sampling Front-End Robust to Power Supply and Common-Mode Variations in 22 nm FDSOI  
Rima Luthi, Philipp Scholz, Friedel Gerters  
Technische Universität Berlin

### EuMIC14-3
150 GBD PAM-4 Electrical Signal Generation using SiGe-Based Analog Multiplexer IC  
Jonathan Schmitt, Tobias Sanner, Christian Schmidt, Nadir Mock, Volker Jungnickel, Markus Gierling, Manfred Benner, Roland Fründ  
Fraunhofer Heinrich Hertz Institute, University of Stuttgart, IHP, Leibniz-Institut für innovative Mikroelektronik

### EuMIC14-4
A 55-GHz Highly Linear Direct-Conversion RF Transmitter in 40 nm CMOS  
Yongho Lee¹, Seungwoo Kim¹, Hyunchol Shin¹  
¹Kwangwoon University

## Amber 4

### EuMIC14
Focused Session Beyond Millimeter-wave Integrated Technologies for Wireless Communications  
Chair: Antonio Traversa¹  
Co-Chair: Alessandro Fonti  
¹SIAE Microelettronica S.p.A.

### EuMIC14-1
Energy Efficient and Flexible Baseband Processing for Wide-band mmWave Radio  
Anthony Lukas  
INVITED KEYNOTE  
AMD Veritek

### EuMIC14-2
An assembly process oriented thermal-mechanical characterization of a fan-out wafer-level package  
Zhao Li, Bruno Hennders, Alphonzi Zuer, Mehmet Koyuk  
IHP microelectronics, *Epsen Engineering, Titles*

### EuMIC14-3
A third order analogue pre-distorter MMIC for E-band PA linearisation  
Marcus Gawler, Göran Granström, Christian Fager  
*Ericsson AB, Chalmers University of Technology*

### EuMIC14-4
A 28 GHz Doherty PA with 22.9% PAEmax and 17.4% PAE at 6-dB PBO in 0.13 µm SiGe Technology for 5G Application  
Ran Guo, Siva Montesquain Ihaban, David Seelbacher, Gernot Haderer, Mattias Bäck  
Silicon Austria Labs, Austria, Infineon Technologies, Austria AG, Villach, Austria

### EuMIC14-5
Wideband mmWave Transceiver IC for 5G Radios  
Nirav Nakrani, Nikos Alexiou, Spyros Gkardiakos, Aris Aghihristakis, Nikos Tsaousis, Konstantinos Kontos, George Kiousis, Ioannis Kougioumtzis  
†ARKONIC P.C.

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10:00  
**EuMIC13-2**  
A 44 GHz-BW 18.5 GS/s Sampling Front-End Robust to Power Supply and Common-Mode Variations in 22 nm FDSOI  
Rima Luthi, Philipp Scholz, Friedel Gerters  
Technische Universität Berlin

10:20  
**EuMIC14-5**  
A 38-GHz Millimeter Wave Transmission System for Unmanned Aerial Vehicle in 65 nm CMOS  
Yuan-Soon Ng, Jianzeng Wang, Saitroh Kumar Khalid, Chuan-Nien Chen, Tao Chen, Yang Yan, Wei-Chang Huang, Hua-Chieh Lo, Tan-Wei Huang, Hus Wang  
National Taiwan University, IIT Bombay, India

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09:00  
**EuMIC13-1**  
Remote Sensing and High Data Rate Satellite Communication Based on Metamorphic HEMT Technology  
Sébastien Chartier, Axel Tessmann, Arnulf Leuther, Ingmar Kallfass, R Ewald, P Piironen  
Fraunhofer Institute for Applied Solid State Physics (IAF), University of Stuttgart
TUESDAY 10:40 – 13:00

Exhibition Hall
EuMIC15
Posters
Chair: Rocco Giofrè¹
Co-Chair: Marco Passafiume²
¹Università di Roma Tor Vergata, ²University of Florence

EuMIC15-1
3D EM Multi-technology simulation flow for GaN and RF-SOI heterogeneous integration technique
Jasmine Leonarde², Iremne Lalabas¹, Gregory D’Uffino¹, Vincent Piazzo³, Ihsan Song³, Qutai³
²IMST, ³Sölden

EuMIC15-2
A High-Power InP Resonant Tunneling Diode Heterostructure for 300-GHz Oscillator Sources
Davide Centin², Razvan Morariu¹, Afsooneh Ofiare¹, Edward Vassg⁸
¹University of Glasgow

EuMIC15-3
A Highly Efficient W-Band Rectifier MMIC in InP HBT Technology
Andreas Wendt¹, Hady Yacoub¹, Tom-Keniche Johansen¹, Wolfgang Heinrich², Viktor Krozer¹
¹Ferdinand-Braun-Institut (FBH), ²Technical University of Denmark (DTU)

EuMIC15-4
Design of two Low DC-Power High-Efficiency D-Band Power Amplifiers in 22 nm FDSOI
Andre Engelmann¹, Philip Hettermann¹, Florian Probst¹, Robert Weigel¹, Marco Dietz¹
¹Friedrich-Alexander-Universität Erlangen-Nürnberg

EuMIC15-5
A New Architecture of Broadband GaAs MMIC Balanced Mixer for Very High RF/IF Isolation for 0.5–18.5 GHz Signal Analysis
Lorena Pagnini¹, Giovanni Colaldo¹, Marco Passafiume², Alessandro Cichillini¹
¹Dept. Information Engineering, University of Florence, ²University of Florence

EuMIC15-6
GaN SPA-D with 8-dB Back-Off for Wideband mm-Wave Applications
Florian Dietrich¹, Renato Negra¹, Elaide Richard², Iain Davies³, Olivier Jardel⁴, Vodar Valentu⁴
³Friedrich-Alexander-Universität Erlangen-Nürnberg, ²University of Rome Tor Vergata, ³European Space Agency, ⁴Thales Alenia Space

EuMIC15-7
On the Burn-in of GaN-on-Si MMIC High Power Amplifiers for SATCOM Applications
Rocco Giofrè¹, Paolo Colombo¹, Francesco Giannini³, Lorent Gábris¹, Mariano Lopez⁷, Rémy Leblanc⁹, Fabio Vitiello⁷
¹Università di Roma Tor Vergata, ²University of Rome Tor Vergata, ³Università di Roma “Tor Vergata”, ⁷TITI, ⁹OMMIC SAS, ⁷European Commission, Brussels, Belgium

EuMIC15-8
MMIC Up-Down-Converter with Integrated Band-Pass Filter for 5G mm-Wave Measurement Applications
Martin Obermaier¹, Martin Laabs¹, Dirk Plettemeier¹
¹Technical University Dresden

EuMIC15-9
A 315 GHz Source with Integrated Antenna in InP-DHBT Technology
Manaf Hossam¹, Tom Koeniche Johansen¹, Ralf Doerner¹, Hady Yacoub¹, Wolfgang Heinrich², Viktor Krozer¹
¹Ferdinand-Braun-Institut (FBH) gGmbH, Leibniz-Institut für Höchstfrequenztechnik, ²Technical University of Denmark (DTU)

EuMIC15-10
Checking Rollett’s Proviso for Degenerated Devices through S-Parameter Analysis
Sergio Colangelo¹, Patrick Ettore Longhi¹, Walter Cocconi², Antonio Sorrentino³, Ermesto Lewis⁴
¹University of Rome Tor Vergata, ²University of Florence, ³University of Rome Tor Vergata, ⁴University of Rome Tor Vergata

EuMIC15-11
A 10-GHz Single-Supply GaAs MMIC Self-Synchronous Rectifier
Jack Molles¹, Megan Robinson¹, Eric Kwiatkowski², Zoya Popovic¹
¹CU Boulder, ²UTVATE and CU Boulder

EuMIC15-12
Switched shield mm-wave tunable slow wave CPW in FinFET CMOS technology
Carla Moran Guizan¹, Peter Baumgartner¹, Stefan Heinrich¹
¹Intel Deutschland GmbH, ²RWTH Aachen University

Posters presenters will be ready around their stands by 10:40.
## TUESDAY 11:20 – 13:00

**Space 3-4**

EuMW01

**EuMW/EuMC Opening Session**

Chair: Luca Perregrini¹  
Co-Chair: Alessandra Costanzo²  
¹University of Pavia, ²University of Bologna  

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker</th>
<th>Institution/Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:20</td>
<td>Welcome Address: Opening of the European Microwave Week 2022</td>
<td>Luca Perregrini</td>
<td>EuMW General Chair</td>
</tr>
<tr>
<td>11:25</td>
<td>European Microwave Week 2022 Welcome Address</td>
<td>Frank van den Bogaart</td>
<td>EuMA President</td>
</tr>
<tr>
<td>11:35</td>
<td>Greetings from the IEEE MTT-S</td>
<td>Rashaunda Henderson</td>
<td>IEEE MTT-S President</td>
</tr>
<tr>
<td>11:40</td>
<td>Greetings from the EuMW 2022 Platinum Sponsor</td>
<td>Keysight Technologies</td>
<td></td>
</tr>
<tr>
<td>11:45</td>
<td>Technical Program of EuMW 2022</td>
<td>Mauro Brizz</td>
<td>EuMW General TPC Chair</td>
</tr>
<tr>
<td>11:50</td>
<td>Announcements and Notifications</td>
<td>Alessandra Costanzo and Luca D’Antonio</td>
<td>EuMC Chair and Co-chair</td>
</tr>
<tr>
<td>12:15</td>
<td>Awards Ceremony</td>
<td>Andy Gibson</td>
<td>EuMA Award Chair</td>
</tr>
<tr>
<td>13:00</td>
<td>EuMA Pioneer Award</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:25</td>
<td>Quantum Technology: Where Maxwell Meets Schrödinger</td>
<td>Dana Z. Anderson</td>
<td>The JILA Institute and Department of Physics, University of Colorado, Boulder, USA &amp; ColdQuanta Inc., USA</td>
</tr>
</tbody>
</table>

No doubt you have heard a lot of noise about an impending quantum revolution. For many, the word “quantum” is implicitly followed by the word “computing”. In fact, though, computing is just one of many applications that will likely be impacted by quantum technology. Timekeeping, for example, gives a glimpse of quantum things to come: clocks utilizing quantum phenomena based on ultracold atoms have demonstrated performance that is more than a factor of 10,000 times higher precision than today’s clocks that maintain the world’s time. One can reasonably expect such incredible performance and capability enhancements to emerge in other applications where quantum knowhow and technology can be used to advantage. This presentation has three objectives. This first is to describe some things that quantum brings to the table from an engineering perspective. What do “quantum superposition” and “entanglement” mean from a practical view, for example. The second is to introduce a particular brand of quantum technology based on ultracold atoms, i.e. atoms that are cooled to less than a millionth of a degree of absolute zero using optical and electromagnetic techniques. The third is to introduce a number of examples in which microwave engineering impacts quantum applications, and where quantum technology can impact microwave applications.
<table>
<thead>
<tr>
<th>Time</th>
<th>Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:20</td>
<td>EuMC04-1 Enhancing the Performance and Compactness of 3D-printed Microwave Filters with Shape Optimization (Adam Lamecki, Michal Baranowski, Lukasz Baluniński, Michał Mrozowski)</td>
</tr>
<tr>
<td>14:40</td>
<td>EuMC04-2 Novel Dual-Band In-Line Filters Using Coaxial Dual Post Resonances (Oliver Rosenberg, Smail Amari)</td>
</tr>
<tr>
<td>15:00</td>
<td>EuMC04-3 Utilization of Higher Order Dual-Post Resonance Modes for Advanced Coaxial Filter Designs (Oliver Rosenberg, Smail Amari)</td>
</tr>
<tr>
<td>15:20</td>
<td>EuMC04-4 Transmission Zeros in In-line Filters by Using Source-to-Load Paths With Suppressed Spurious Frequencies (Abdo Ramirez, Enrique López-Olvera, Cristiano Tomassen)</td>
</tr>
<tr>
<td>15:40</td>
<td>EuMC04-5 EM-Based Design of Microwave Filters and Diplexers: Full-Wave Coupling Matrix and its Narrow-band Counterpart (Fotini de Brabander, Universidad Politécnica de Madrid)</td>
</tr>
<tr>
<td>14:20</td>
<td>EuMIC/EuMC02-1 E-band Ultra-low-noise (4.5 dB) and High-power (27 dBm) GaN T/R Front-end MMIC (Erwin T overdue, Fabian Thorne, Dirk Schwaatzchere, Michael Misula, Rüdiger Oeppe)</td>
</tr>
<tr>
<td>15:00</td>
<td>EuMIC/EuMC02-2 Long-Reach E-band HPA for 5G Radio Link (Alessandro Fonte, Alberto Coluzzi, Matteo Angelo Funagalli, Antonio Traversa, Enrico Tore)</td>
</tr>
<tr>
<td>15:20</td>
<td>EuMIC/EuMC02-3 Opportunities, Prospects and Challenges in Active Heatsink Antenna Arrays for 5G and Beyond (Yuri Asjad)</td>
</tr>
<tr>
<td>15:40</td>
<td>EuMIC/EuMC02-4 Highly Integrated Realtime Imaging MIMO D-Band Radar for Industrial Applications (Sven Luchte, Bettina Fischer, Emico Rübel, Justin Rentzlag, Thomas Hauke, Thorsten Hug, Marta Arias Campo, Simona Bruni, Nolan Papertos, Christian Kyoko, Sabine Gütgemann, Stefan Thomas, Ralf Pehke, Arno Schempp)</td>
</tr>
<tr>
<td>14:20</td>
<td>EuMIC/EuMC03-1 mm-Wave and sub-Thz Integrated Circuits for Wireless Link Applications: Technology and Research Trends (Mauro Faggin)</td>
</tr>
<tr>
<td>15:00</td>
<td>EuMIC/EuMC03-2 Polarisation Multiplex in 300 GHz Wireless Communication Link using Orthomode Transducer (Simon Harzommi, Dimoski Wata, Benjamin Schmitz, Axel Reisner, Jakob Heiderberg, Jürgen Kallass)</td>
</tr>
<tr>
<td>15:20</td>
<td>EuMIC/EuMC03-3 Sub-Thz Radio Communication Links from Research to Field trial (Pierluigi Baij, Maurizio Manca, Philippe Perrin, Matthieu Barbe-Miller, Philip Mcleod, Emmanuel Ping, Paolo De Prisco, Pierre Lopez)</td>
</tr>
<tr>
<td>15:40</td>
<td>EuMIC/EuMC03-4 A D-Band High-Gain Antenna Module Combining an In-Package Active Feed and a Flat Discrete Lens (Juhan Gonzalez Jimenez, Francesco Foglio, Marco Rinaldi, Andrea Siligaris, Antonio Clemente, Cedric Delens)</td>
</tr>
<tr>
<td>14:40</td>
<td>EuMC16-1 Sub-Thz Transceivers with Advanced CMOS Technologies (Nathalie Delfontaine, Sebastien Soudy, Antoine Muniel, Francesca S:un, Andrea Coletta)</td>
</tr>
<tr>
<td>15:00</td>
<td>EuMC16-2 A 79 GHz reconfigurable highly linear Low-Noise Amplifier for Civil-Automatic Short-Range Radars in 22-nm FD-SOI CMOS (Singh, M. S. Mano, Gu, L. Chad, Salgado, G. C. Carrot, F. E.)</td>
</tr>
<tr>
<td>15:20</td>
<td>EuMC16-3 Design of a Low Voltage D-band LNA in 22nm FD-SOI (Philip Hettinger, Andre Lichtermann, Roman Probst, Robert Weigt, Marcus Deutz)</td>
</tr>
<tr>
<td>15:40</td>
<td>EuMC16-4 108 and 124 GHz Fundamental VCOs with 2% and 7% DC-to-RF Efficiency in 22nm CMOS FDSOI (Carmen Hidalgo, Mikko Karet, Heike Alber, Robert Weigt, Marcus Deutz)</td>
</tr>
<tr>
<td>16:00</td>
<td>EuMC16-5 An 8 bit 1.73 mW 1.25 GS/s Single-Core SAR ADC in 22 nm FDSOI CMOS (Simon Gouba, Jen Pihla, Tobias Schmeier, Mohammad Muhdi, Kaipa, Frank Elbing)</td>
</tr>
</tbody>
</table>
### TUESDAY 14:20 – 16:00

**Amber 2**

**EuMIC17**

**Frequency and Signal Generation**

Chair: Lars-Erik Wernersson¹  
Co-Chair: Frank van den Bogaard¹  
¹Lund University

**EuMIC18**

**Transmitters and Switches**

Chair: Pere L. Gilabert¹  
Co-Chair: Marco Pirola¹  
¹Universitat Politècnica de Catalunya

**EuMIC17-1**

**Low-phase-noise Frequency Synthesizers for Wireless Communication and Radars**

Almudena Suarez Rodriguez¹  
¹University of Cantabria

**EuMIC18-1**

**Micropackaged MMIC Switching Networks for Space Application**

Gianluca Momparler²  
²Politecnico di Torino

**EuMIC17-2**

**A 33-37 GHz Phase-Aligning Frequency Generator with 3.5° Accuracy and 20ns Switching Time**

Ruixing He¹, Yahya Beza⁴  
¹University of Minnesota, ⁴Tampa U.

**EuMIC18-2**

**Scalable, Modular Feed-Forward Equalizer for Baseband Applications**

Stefano Cancellapiedi¹, Zhenguo Simon He¹, Lars Svensson¹, Herbert Zirath¹  
¹Chalmers University of Technology

**EuMIC17-3**

**A 30-GHz CMOS LC VCO with Optimal Tail Filter Considering Tail FET’s Output Resistance**

Yongho Lee¹, Seungwoo Kim¹, Hyunchul Shin¹  
¹Kwangwoon University

**EuMIC18-3**

**Inductorless 96 Gb/s PAM-4 Optical Modulators Driver in SiGe:C BiCMOS**

Mesut Inac¹, Anna Peczek¹, Friedel Gerfers², Andrea Malignaggi¹  
¹IHP - Leibniz Institut für innovative Mikroelektronik, ²Technische Universität Berlin

**EuMIC17-4**

**A High-Efficiency D-Band Frequency Doubler in 22-nm FDSOI CMOS**

Matthias Mied⁴, Ibrahim Kagan Aksoyak¹, Ahmed Gashi Uluç⁴  
⁴Karlsruhe Institute of Technology (KIT)

**EuMIC18-4**

**Counter-Intermodulation in the Context of CMOS Outphasing Transmitters**

Stefan Marler¹, film Hane⁵, Remo Negra²  
¹Chair of High Frequency Electronics, RWTH Aachen University

**EuMIC17-5**

**A 37-87 GHz Continuously Tunable Signal Source in a 130 nm SiGe:C BiCMOS Technology**

Christian Grabenhofer¹, Florian Vogelsang², Klaus Altmann¹  
¹Fraunhofer FHR, ²Ruhr-Universität Bochum

**EuMIC18-5**

**Machine Learning Technologies for RF/Microwave CAD: Past, Present and Future Perspectives**

Sigrun Zhang¹, Feng Feng⁶, Weicheng Xu⁶  
¹Tianjin University, ⁶Beijing University of Technology

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**Amber 3**

**EuMW02**

**Special Session in Memoriam of Prof. Vittorio Rizzoli**

Chair: Alessandra Costanzo¹  
Co-Chair: José Carlos Pedro²  
¹University of Bologna, ²Instituto de Telecomunicacoes

**EuMW02-1**

**The Role of Nonlinear Microwave CAD in RF Power Amplifier and Active Antennas Design**

Alessandra Costanzo¹, José Carlos Pedro²  
¹University of Bologna, ²Instituto de Telecomunicacoes

**EuMW02-2**

**Stability and Phase-Noise Analysis**

Almudena Suarez Rodriguez¹  
¹University of Cantabria

**EuMW02-3**

**Counter-Intermodulation in the Context of CMOS Outphasing Transmitters**

Stefan Marler¹, film Hane⁵, Remo Negra²  
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**Brown 1-2**

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Gianluca Momparler²  
²Politecnico di Torino

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¹Chalmers University of Technology

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¹Kwangwoon University

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¹Tianjin University, ⁶Beijing University of Technology
TUESDAY 16:00 – 18:20

Exhibition Hall
EuMIC/EuMC04
Posters

Chair: Alessandro Cidonali
Co-Chair: Lorenzo Silvestri
¹University of Florence, ²University of Pavia

Posters presenters will be ready around their stands by 16:00.
TUESDAY 16:40 – 18:20

Amber 1

EuMC05  Focussed Session Sustainable Microwave Electronics
Chair: Anthony Giustetto¹
CoChair: Alessandra Costanzo²
¹University of Bordeaux, ²University of Bologna

Amber 2

EuMC06  Focussed Session Microwave Systems for Cryosphere Monitoring
Chair: Marco Pasian¹
CoChair: Pedro Espín-López²
¹University of Pavia, ²Centre Tecnologic de Telecomunicacions de Catalunya (CTTC), Castelldefels, Barcelona

Amber 3

EuMC07  Permittivity Measurement Techniques
Chair: Xiuhang Shang¹
CoChair: Dominique Schreurs²
¹National Physical Laboratory (NPL), ²KU Leuven

Amber 4

EuMC08  Non-planar Filters II
Chair: Richard Snyder¹
CoChair: Miguel A. G. Lasa³
¹RS Microwave, ²Public University of Navarre

16:40 – 17:00

EuMC05-1  Low Environmental Impact RF Devices for IoT Applications
Georgio Zalia¹, Enrico⁴

INVITED KEYNOTE
Bernhard Höfer

17:00 – 17:20

EuMC05-2  Reconfigurable Screen-Printed Patch Antenna on Paper for 4G and 5G Applications
Thi-Hong Le Bant¹, Victor Thoen¹, Justin Boyce¹, Thierry Lacour¹, Gregory Hous¹, Tan-Phi Vo¹, Pascal Kneer⁴
Gina Gennadi Alperº, Urša Štorek Blaž, CMRL, Gorenje INP, VAP, Ljubljana, Slovenia

EuMC05-3  A Novel Additively-Manufactured Pressure Transducer for Zero-Power Wireless Sensing
Valentina Pazzini¹, Marco M. Ferronii, Federico Alimenti¹, Paolo Mezzanotte¹, Luca Rosti¹
University of Pavia, "Georgia Institute of Technology"

17:20 – 17:40

EuMC06-1  Multi-Spectral Analysis of Dry Alpine Seasonal Snowpack
Martina Lodigiani¹, Lorenzo Sirtori¹, Ricardo Barata², Carla Marín³, Baghi El Mouden³, Roberto Colombi³, Claudia Notarnicola², Marco Pasian¹
University of Pavia, EURLAC Research - Institute for Earth Observation, Institute of Polar Sciences, National Research Council of Italy (ISP-CNR), "University of Milano-Bicocca"

EuMC06-2  A novel approach for calculating the internal layers of snowpacks using a S-band radar
Pedro Espín-López¹, Marco Pasian¹
Centre Tecnologic de Telecomunicacions de Catalunya (CTTC), Castelldefels, Barcelona, "University of Pavia"

EuMC06-3  Investigation of cryosphere processes in the boreal forest zone using ground-based SAR
Jorge Jorge Ruiz¹, Àlvaro Llompart¹, Imma Lladó¹, Carles Sanz¹, Jordi Pujol¹, Javi Prats³
Finnish Meteorological Institute, Harp Technologies Ltd, "Arto University"

EuMC06-4  Evaluation of UWB Radar Module for Snow Water Equivalent Monitoring
Kristian A. A. Agerblad², Tor Svends Lund¹
University of Oslo

EuMC06-5  Monitoring of snow water equivalent and snowmelt through space-borne synthetic aperture radar techniques
Simone Pettinato¹, Marco Pasian¹, Fabio Benvenuto¹, Roberto Colodro¹, Mauro Di Maggio¹, Emanuele Santori¹, Simonetta Pulitano¹, Lucia Di Gregorio¹, Claudia Notarnicola², Gianluca Ceasarì¹, Carlo Menzi¹, Fabio Barnè², Ricardo Barata², Marta Callegari¹, Martina Lodigiani¹, Gabriele Bruni¹, Eduardo Emebrovente¹, Antonella Belmondo¹, Alberto Scalia¹
"BIC - CNR, Univ. Pavia, IREA - CNR, Univ. Milano-Bicocca, "ISP - CNR, "EURAC Research, "ARRA AOSTA"

17:40 – 18:00

EuMC05-4  Wearable Coplanar-Fed 2.45 GHz-Rectenna on a Flexible 3D-Printable Low-Cost Substrate
Galia Barantseva¹, Giacomo Pasolini¹, Diego Massetti¹, Alessandra Costanzo¹
University of Bologna

EuMC06-6  Characterisation of dielectric materials at G-band (140-220 GHz) using a guided free-space technique
Pietro Siani¹, Xiuhang Shang¹, Niki Höller¹, Mira Nattähr¹, Cheng Gao¹, Anze Zhang¹
National Physical Laboratory (NPL), Teddington, "University of Kent";

EuMC06-7  Ka-band Cavity Filter Manufactured in 3D-printed Alumina Technology
Francesco Aquino¹, Davide Tiradossi¹, Antonio Traversa¹, Fabrizio Cacciamani², Luca Pelliccia², Francesco Pierobon³, Fabrizio De Paolis³
RF Microtech s.r.l / University of Perugia, "RF Microtech s.r.l, University of Pavia, "ESA ESTEC";

18:00 – 18:20

EuMC05-5  High Speed, Low Power, and Low Cost Solutions for a Connector-free World
Hendrik Gillens

INVITED KEYNOTE
STMicroelectronics

EuMC06-8  Micromachined On Silicon Miniaturized Ka-Band Diplexer for Ground-Segment User Terminals
Davide Tiradossi¹, Luca Pelliccia², Antonio Traversa¹, Iordanos Lambrinos³, Peter Jankovic³, Fabrizio De Paolis³
RF Microtech s.r.l, "DIEE Microelettronica S.p.A., "ESA ESTEC";

EuMC06-9  Recent Advances on True Inline Filters with Transmission Zeros
Gaetano Russo²

INVITED KEYNOTE
Invited Institution

18:20 – 19:00

EuMC05-6  High Power Ka-Band Bandpass Filter based on Movable Dielectric-Loaded TE01 mode Resonators
Pietro Wallenbroek¹, Fabiano Lucchetti¹, Luca Pelliccia², Cristiano Tomassoni¹, Vittorio Tomellini di Crotendale¹
RF Microtech s.r.l, "University of Pavia, "RF Microtech s.r.l, "University of Pavia, "ESA ESTEC";

EuMC07-2  Compact Ultra-Wideband Bandpass Filter Using Additively Manufactured TM-Mode Dielectric Resonators
Abdulrahman Widaa¹, Fabio Baranè², Andrea Tomassini², Marco Pasian¹
University of Pavia, "University of Perugia, "University of Pavia, "ESA ESTEC"

EuMC07-3  A Method for Extracting an Apparent Permittivity from Band Limited Measurements of Homogeneously Filled Transmission Lines
Felix Bachbauer¹, Konstantin Lunakov¹, Tim Philper¹, Gerald Gold¹
Friedrich Alexander Universität Erlangen Nürnberg

EuMC07-4  Relative Permittivity Measurements With SiW Resonant Cavities at mm-Wave Frequencies
Gabriele Federico¹, Alessio Hollenstein², Diego Caratelli², A. Bart Smolders¹
University of Pavia, "Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Castelldefels, Barcelona, "University of Pavia"

EuMC07-5  Quasi-optic Permittivity Measurements from 50 to 750 GHz
Roger Appleby¹, Elena Soria¹, Michal Minka¹, Richard Williams¹

INVITED KEYNOTE
Roger Appleby Miniextreme Wireless Consulting Ltd, "ESA, "University of Exeter, "Thomas Hewlett Ltd.

EuMC07-6  Microwave Measuring Techniques With SIW Resonant Cavity Measurements From 50 To 750 GHz
Roger Appleby¹, Elena Soria¹, Michal Minka¹, Richard Williams¹

INVITED KEYNOTE
Roger Appleby Miniextreme Wireless Consulting Ltd, "ESA, "University of Exeter, "Thomas Hewlett Ltd.

EuMC08-1  Recent Advances on True Inline Filters with Transmission Zeros
Gaetano Russo²

INVITED KEYNOTE
Invited Institution

EuMC08-2  High-Power Ka-Band Bandpass Filter based on Movable Dielectric-Loaded TE01 mode Resonators
Pietro Wallenbroek¹, Fabiano Lucchetti¹, Luca Pelliccia², Cristiano Tomassoni¹, Vittorio Tomellini di Crotendale¹
RF Microtech s.r.l, "University of Pavia, "RF Microtech s.r.l, "University of Pavia, "ESA ESTEC";

EuMC08-3  Compact Ultra-Wideband Bandpass Filter Using Additively Manufactured TM-Mode Dielectric Resonators
Abdulrahman Widaa¹, Fabio Baranè², Andrea Tomassini², Marco Pasian¹
University of Pavia, "University of Perugia, "University of Pavia, "ESA ESTEC"

EuMC08-4  Micromachined On Silicon Miniaturized Ka-Band Diplexer for Ground-Segment User Terminals
Davide Tiradossi¹, Luca Pelliccia², Antonio Traversa¹, Iordanos Lambrinos³, Peter Jankovic³, Fabrizio De Paolis³
RF Microtech s.r.l, "DIEE Microelettronica S.p.A., "ESA ESTEC";

EuMC08-5  Micromachined On Silicon Miniaturized Ka-Band Diplexer for Ground-Segment User Terminals
Davide Tiradossi¹, Luca Pelliccia², Antonio Traversa¹, Iordanos Lambrinos³, Peter Jankovic³, Fabrizio De Paolis³
RF Microtech s.r.l, "DIEE Microelettronica S.p.A., "ESA ESTEC";

EuMC08-6  Non-planar Filters II
Chair: Richard Snyder¹
CoChair: Miguel A. G. Lasa³
¹RS Microwave, ²Public University of Navarre
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<td>16:40 – 18:20</td>
<td><strong>Amber 5</strong></td>
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</table>
| 16:40 – 17:00 | **EuMC09** Oscillators and Phase Shifters                                    | Chair: Nils Weimann¹  
Co-Chair: Lorenz Peter Schmidt¹  
¹University of Duisburg-Essen, ²University of Erlangen-Nürnberg |                                                                                |
| 17:00 – 17:20 | **EuMC09-1** Millimeter-waves Propagation in Real In-building Environment   | Marco Fantuzzi²  
¹University of Oulu |                                                                                |
| 17:20 – 17:40 | **EuMC09-2** Achieving a Relative Bandwidth of 176% with a Single PLL at up to 12.5 GHz | Robin T. Braun¹, Jan Schrödter¹, Alfredo J. Marquez M.¹, Nils Pohl¹  
¹Ruhr-University Bochum |                                                                                |
| 17:40 – 18:00 | **EuMC09-3** Analysis of a self-oscillating mixer based on a slow-wave structure | Mabel Pontón¹, Francisco Ramírez¹, Sergio Sánchez¹,  
Almudena Suarez Rodríguez²  
¹Universidad de Cantabria, ²Recherche en Physique et Electronique de Grenoble |                                                                                |
| 18:00 – 18:20 | **EuMC09-4** Digital-Controlled High-Linearity Phase Shifter Using Vernier Ladder Network for Beyond 5G Phased Array Antenna | Akira Inui³, Hidetaka Noda³  
³Waseda University |                                                                                |
| 18:20 – 18:40 | **EuMC09-5** Push-Push Oscillator Based on Packaged Space-Qualified Components Operating at 11.8 GHz | Damien Trinhmivic², Przemyslaw Kietl¹, Enrico Lüd²,  
Jurzyk Julian Michael²  
²SpaceForest, ³ESA / ESTEC |                                                                                |
| 16:40 – 18:20 | **Suite 2**                                                                  |                                                                            |                                                                                |
| 16:40 – 17:00 | **EuMC10** Devices for Sub-THz Front-ends                                     | Chair: Joachim Oberhammer²  
Co-Chair: Gaëlle Ducournau²  
¹KTH, ²University of Lille |                                                                                |
| 17:00 – 17:20 | **EuMC10-1** Challenges and Future of Sub-THz Communications Using CMOS Integrated Circuits | Minoru Fujishima¹  
¹Hiroshima University |                                                                                |
| 17:20 – 17:40 | **EuMC10-2** 232-242 GHz Coherent Transmitter with 1.2mW Peak Radiated Power in 28nm CMOS | Samuel Lundström¹, Yan Sacher²  
¹Tel Aviv University, ²University of Göttingen |                                                                                |
| 17:40 – 18:00 | **EuMC10-3** THz Broadband Antenna on GaAs using Laser-structured Fused Silica Matching Layer | Marco Anteschmann¹, Christian Böhm⁴, Benjamin Nuss⁴,  
Akhil Khurana⁴, Axel Tessmann⁵, Arne Nix⁵  
⁴University of Duisburg-Essen, ⁵Fraunhofer Institute for Applied Solid State Physics IAF |                                                                                |
| 18:00 – 18:20 | **EuMC10-4** Performance Comparison of Broadband Optical Modulators for 40GSPS All-Optical ADC | Joseph Fastender³, Anthos Garmaut⁴, Xia Wei⁵  
³University of York, ⁴University of Orsay, ⁵Drexel University |                                                                                |
| 18:20 – 18:40 | **EuMC10-5** Reconfigurable Intelligent Surface Technology: 6G System Enabler and Implementation Challenge | Tony Phan³, Jonas Koolen³,幻暉 nuevos³, Jack Sah³,  
Haakon Teren⁴, Markus E. Lehnen⁴, Vita Sager⁴,  
Anne Fissan⁴, Markku Junttila⁴  
³University of Oulu |                                                                                |
Overview of MMIC developments and trends for spaceborne telecom active antennas at the European Space Agency

Natanael Ayllon
European Space Research and Technology Centre, European Space Agency, Noordwijk, The Netherlands

Current and future satellite communication payloads are more and more required to offer flexibility and re-configurability capabilities in terms of coverage and capacity allocation. Flexibility of capacity allocation involves, in particular, the ability to flexibly allocate payload resources such as spectrum and power on the service coverage, in order to cope effectively with the non-uniform spatial and temporal traffic demands. In this context, payload architectures based on active antennas and digital processors are key enablers for covering such needs and are nowadays the reference architecture for LEO, MEO and GEO satellite communication systems. In all active antenna architectures, the performance of the MMICs onboard the transmit and receive chains play a key and critical role in the overall system performance. For this reason, many institutions worldwide are investing significantly in means to improve the overall performance of the RF input and output sections. This talk will introduce recent developments carried out at the European Space Agency for satellite communication payloads based on active antennas and it will provide an overview of the latest developments of MMIC high power amplifiers, low noise amplifiers, beamforming networks and integrated input and output sections.
WEDNESDAY 09:00 – 10:40

**Amber 1**

*EuMC11*

Interconecting and Packaging

Chair: Amelie Hagelauer¹
Co-Chair: Akanksha Bhutani¹
¹Fraunhofer IEMT, ²Karlsruhe Institute of Technology (KIT)

**Amber 2**

*EuMC12*

Multiport, Reconfigurable Antennas

Chair: Anthony Ghiozzi²
Co-Chair: Alessandra Costanzo¹
¹University of Bordeaux, ²University of Pavia

**Amber 3**

*EuMC13*

Imaging for Biomedical Applications

Chair: Panos Kosmac¹
Co-Chair: Simona Di Meo¹
¹Kings College London, ²University of Pavia

**Amber 4**

*EuMC14*

Non-planar Passive Components

Chair: Antonio Morini¹
Co-Chair: Luca Pelliccia²
¹Università Politecnica delle Marche, ²RF Microtech Srl

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**EuMC11-1**

Industrial Solutions and Perspectives on Chip Packaging for mm-Wave Transceivers

Alessandro Fratazzi¹, Antonio Traversa¹, Stefano Moscato¹, Gabriele Fatare¹

**EuMC11-2**

An Ultrawideband and Cost-Effective Submount Technology up to 90 GHz on Organic Substrates

Andreas Schäfer¹, Franz-Kai Hohn², Peter Seipünter³, Johannes Jakobi¹, Werner Bürger¹, Stefan Zurn¹
¹DE-Adderndorf Institute of Technology, ²Rohde & Schwarz GmbH & Co. KG

**EuMC11-3**

Broadband Circuit Board Interconnects Based on Anisotropic Conductive Adhesives

Kevin Eicheldingen¹, Noah Seifeld¹, Alexander Küpsel¹, Arne P. Jacob³
²Hamburg University of Technology

**EuMC11-4**

EM Modeling and Measurement of 3D-RDL Interconnects in LGA package for 5G RF SIP Application

Mohamad Kourouga¹, Sandra Kats¹, Jurins Zhao¹, John Gaquidahang¹
³Apoplex Nederland BV

**EuMC11-5**

E-band Phased Array eWLB Package Evaluation

Ahmed Abdelkareem¹, Wenyong Zhu², Hari Krishna Pathak¹, David Wessel¹
¹Huawei Technologies Canada Co., ²Nokia Siemens Networks, Finland

**EuMC12-1**

Wide-band, Wide-scan, Long Slot Array for Satcom Applications in K/Ka-band

Aftab Pervez¹, Renad Sauliad¹, Mauro Ettorre¹
¹University of Ferrara, ²IEIIT

**EuMC12-2**

Wideband Quadruple-Differential-Led Aperture-Coupled Stacked Patch Antenna

Timothée Le Gall¹, Anthony Ghiozzi², Stefano Mazzone¹, Gennadiy Monson¹, Boris Lisyn¹, Grégoire Pillet¹
¹Thales DMS France, ²Bordeaux INP, IMS Laboratory

**EuMC12-3**

Fully-Integrated Dielectric Image Line Phased Array with Liquid Crystal Phase Shifters at W-Band

Hermann Forster¹, Uzan Piali¹, Dongwen Wang¹, Rolf Jakoby¹
¹Technical University of Darmstadt

**EuMC12-4**

Nonlinear circuit model of IDCs on ferroelectric nanomaterial for reconfigurable applications

Simone Ferraro¹, Alessandra Di Franco², Renado Sauliad¹, Matteo Allegri³, Diego Mazzone¹, Mauro Brugnaro¹, Alessandra Costanzo¹
¹University of Bologna, ²IEMBT

**EuMC12-5**

A New Wideband and Passive Tx & Rx SatCom Antenna Module for Beam Steering in the K- and Ka-Band

Engelbert Voigt², Stefan Lindenmeier¹
²IEMBT, ³IIT Munich

**EuMC13-1**

Solution of Complex Bioelectromagnetic and Biomedical Problems with Machine-learning

Luciano Tonacci¹, Alfredo de Chirò¹, Letizia Merla¹, Giuseppe Marco¹, Marco Zappatore¹
¹University of Salento, ²ENEA

**EuMC13-2**

PDMS Unidirectional Antenna Array for Microwave Breast Screening

Mikael Bakari¹, Milica Popovic¹
¹Technical University of Brunswick

**EuMC13-3**

Wedgegave Array Applicator for Microwave Medical Imaging

Mikael Bakari¹, Jan Vitha²
¹Technical University of Darmstadt

**EuMC13-4**

Compact 5G N77 bandpass filter design mixing IPD and MIS technologies

Clare Lafortune¹, Laurent Schwartz³, Eric Saugier¹, Wild Ezzeddine¹, Sylvain Charley¹
¹STMicroelectronics, France

**EuMC13-5**

Preliminary Study of Breast Cancer Detection Using A Computational Microwave Imaging System

Alfredo de Chirò¹, Vincent Fusco¹, Daniel Yordanov³
³The Institute of Electronics, Communications and Information Technology (EICT), Queen’s University of Belfast

**EuMC14-1**

Smooth-Profiled Rectangular Waveguide Filters

Jahar Husain¹, Ansar Ahmed¹, Julio Arregui¹, Petronilo Márquez-Crespo¹, Daniel Acedo¹, Tommaso Lupieri¹, Miguel Á. G. Luis¹
¹Polytechnic University of Valencia, ²European Space Agency

**EuMC14-2**

Full-Band E-Plane Waveguide Phase Shifters with Self-Compensating Characteristics for THz Circuits and Systems

Jie Bao¹, Paco Bengoëchea², Xe Wu³
¹Polytechnique Montréal, ²Nokia Bell Labs, ³University of Wollongong

**EuMC14-3**

Compact 5G N77 bandpass filter design mixing IPD and MIS technologies

Claire Lafortune¹, Laurent Schwartz³, Eric Saugier¹, Wild Ezzeddine¹, Sylvain Charley¹
¹STMicroelectronics, France

**EuMC14-4**

Wideband Compact Dielectric-less Launcher of an X-band Ferrite Faraday Rotator

Marco Formà¹, Andrea Morini¹, Andrea Di Donato¹, Davide Mescarianni¹, Daniele Saldustani¹, Domenico Serri¹, Alberto Falorni¹, Lamberto Rondini¹, Francina Serrani¹
²Public University of Navarre, ³European Space Agency

**EuMC14-5**

Three-Step Monoblock Waveguide Twist

Stefano Moscato¹, Matteo Oldoni¹, Dario Tresoldi¹
¹SIAE Microelettronica S.p.A.
### Wednesday 09:00 – 10:40

#### Brown 1-2

**EuMC15**
**Load Modulated Power Amplifiers**
**Chair:** Gavin Watkins¹
**Co-Chair:** Roberto Quaglia¹

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<tr>
<td>09:00</td>
<td><strong>EuMC15-1</strong> Balancing the Unbalanced: Using the OLMBA for PA Load Mismatch Mitigation</td>
<td>Roberto Quaglia¹, Jeff R. Pospel, Kauser Chaudhry¹, Steve Crapo²</td>
</tr>
<tr>
<td>09:20</td>
<td><strong>EuMC15-2</strong> Wideband Sequential Circulator Load Modulated Amplifier with Back-off Efficiency Enhancement</td>
<td>Han Zhou¹, Jose-Ramon Perez-Escrenes³, Christian Fager³</td>
</tr>
<tr>
<td>09:40</td>
<td><strong>EuMC15-3</strong> 90 W 15-dB OBO reflective-type DPA</td>
<td>Florian Dietrich¹, Moh Gey Wei¹, Renato Negra³</td>
</tr>
<tr>
<td>10:00</td>
<td><strong>EuMC15-4</strong> A Load Insensitive Doherty Power Amplifier with better than −39 dBC ACLR on 2:1 VSWR Circle using a Constant 50 Ω Trained Pre-distorted Signal</td>
<td>Gupta Deep Singh¹, Dusminder Nqul, Nitin Chaudhary¹, Mansi S. Jadhav¹, Leo C. van de Wiel³</td>
</tr>
<tr>
<td>10:20</td>
<td><strong>EuMC15-5</strong> A 3.5G 500W Asymmetric Doherty Amplifier Employing Subharmonic Oscillation Suppression</td>
<td>Zhang Wei¹, Zhong Zhang¹, Fred van Oosterom¹, John Gudapathi²</td>
</tr>
</tbody>
</table>

#### Suite 1

**EuMC16**
**Advances in Electromagnetic Modeling and Analytical Methods**
**Chair:** Alessandro Galli¹
**Co-Chair:** Walter Fuscaldo¹

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<tr>
<td>09:00</td>
<td><strong>EuMC16-1</strong> Numerical Analysis of SIW Devices and RLSA Antennas for the Design of Large Structures Capable of Broadband Radiation and Near-field Shaping</td>
<td>Masanori Akaishi¹, Matteo Bernardi², Guido Valentino¹, Maurizio Bocelli³</td>
</tr>
<tr>
<td>09:10</td>
<td><strong>EuMC16-2</strong> Effective TE-Polarized Bessel-Beam Excitation for Wireless Power Transfer Near-Field Links</td>
<td>Eduardo Negri¹, Francesco Benussi¹, Walter Fuscaldo¹, Diego Mountein¹, Paolo Burchgrod³, Alessandra Costanzo³, Alessandro Galli¹</td>
</tr>
<tr>
<td>09:30</td>
<td><strong>EuMC16-3</strong> Excitation in Time-Domain Analyses: A Pivotal Element for Accurate Simulations</td>
<td>Jinhong Gu¹, Roy van Krieken¹, Martin Stumpf¹, Joan E. Lago¹</td>
</tr>
<tr>
<td>09:50</td>
<td><strong>EuMC16-4</strong> An Analytical Model to Approximate the Radiation Conductance of Microstrip Gaps</td>
<td>Benedikt Servett¹, Mariet Geijer¹, Jan Tino Sørensd, Daniel Erz¹, Andreas Reminger³</td>
</tr>
<tr>
<td>10:10</td>
<td><strong>EuMC16-5</strong> Lasing Threshold Conditions for Transversal Modes of Twin Graphene-Covered Circular Quantum Wires</td>
<td>Daria Pyaslavskaya¹, Sergiy Oleshpihyko³, Suman Srinivas¹</td>
</tr>
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#### Amber 5

**EuMW03**
**Special Session on Emerging RF Technologies in Asia Pacific Countries**
**Chair:** Wenquan Che¹
**Co-Chair:** Maurizio Bocci¹

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<td>09:00</td>
<td><strong>EuMW03-1</strong> Introduction</td>
<td>Wenquan Che¹</td>
</tr>
<tr>
<td>09:10</td>
<td><strong>EuMW03-2</strong> Reflectarray Antennas Supporting 5G/BSG Communication</td>
<td>Quan Jue¹</td>
</tr>
<tr>
<td>09:40</td>
<td><strong>EuMW03-3</strong> Millimeter-Wave/THz CMOS Phased-Array Transceiver for 5G and Beyond</td>
<td>Renchui (Ziad) Al-Halim¹</td>
</tr>
<tr>
<td>10:10</td>
<td><strong>EuMW03-4</strong> Electromagnetic Medical Imaging: From Bench To Bedside</td>
<td>Alex Avedisian¹</td>
</tr>
</tbody>
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¹South China University of Technology
²University of Pavia
³Sapienza University of Rome, CNR-IMM, Consiglio Nazionale delle Ricerche, Rome, Italy
©University of Dusseldorf, Essen
³Tokyo Institute of Technology
⁴The University of Queensland
# WEDNESDAY 09:00 – 10:40

### Brown 3

**EuRAD01**  
EuRAD Opening Session

**Chair:** Pierfrancesco Lombardo¹  
**Co-Chair:** Marco De Fazio²

¹Sapienza University of Rome, ²Leonardo S.p.A.

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<th>Description</th>
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<td>09:00</td>
<td>Opening of the European Radar Conference 2022.</td>
<td>Prof. Pierfrancesco Lombardo - Sapienza University</td>
<td>EuRAD Chair</td>
</tr>
<tr>
<td>09:10</td>
<td>Welcome Address</td>
<td>Dr. Marco De Fazio – Leonardo SpA</td>
<td>EuRAD Co-Chair</td>
</tr>
<tr>
<td>09:20</td>
<td>A Perspective of European Space Activities</td>
<td>Elena Grifoni-Winters - Secretary of the ESA Council</td>
<td>The presenter gives a global perspective of the activities ongoing and planned by the European Space Agency, including long term objectives, policies, and open issues. Special attention is given to the space radar systems, including their applications for Space weather, space debris detection and tracking, Earth Observation, and much more.</td>
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<tr>
<td>10:00</td>
<td>Hypersonic Threat and Radar Defense</td>
<td>Alfredo Farina, CTO - Leonardo Company (Retired); Marco Frasca (MBDA); Luca Timmoneri CTO Land &amp; Naval - Leonardo Company</td>
<td>The presenter gives some review of the types of hypersonic threats available from open literature. He discusses the possible ways ahead to face such threats and some approaches with multilayer sensors, waveform optimization and neural networks. Some key players with enough know-how to counter hypersonic missiles are also pointed out.</td>
</tr>
<tr>
<td>EuMC17-1</td>
<td>An Ultra-Compact Power Divider for MMIC Applications</td>
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<td>EuMC17-2</td>
<td>Uniaxially Symmetrical T-Junction OMT with 45-Degree Tilted Branch Waveguide Ports</td>
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<tr>
<td>EuMC17-3</td>
<td>Filtering Waveguide Cavity Couplers with Tight Amplitude Balance</td>
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<tr>
<td>EuMC17-4</td>
<td>Hybrid TM-Mode / Coaxial Triple-Band Bandpass Filter</td>
<td></td>
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<tr>
<td>EuMC17-5</td>
<td>A Substrate Integrated Waveguide Frequency Switchable Filter using Vanadium Dioxide Tuners</td>
<td></td>
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<tr>
<td>EuMC17-6</td>
<td>Reconfigurable Parametric Mid-Infrared Frequency Up/Down Conversion Using Multimode Plasmon Resonances in Graphene Ribbon Metasurfaces</td>
<td></td>
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<tr>
<td>EuMC17-7</td>
<td>Spin-Wave Delay Lines Utilizing Metal-Insulator Switching of Vanadium Dioxide</td>
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<tr>
<td>EuMC17-8</td>
<td>Study on 3D Printed Snap Fit Joints for Assembly of PCB-Integrated Additively Fabricated Air-Filled Waveguide</td>
<td></td>
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<tr>
<td>EuMC17-9</td>
<td>Characterization of the Dielectric Properties of Commercially Available Low-loss UV-curable Resins from 60 GHz to 90 GHz</td>
<td></td>
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<tr>
<td>EuMC17-10</td>
<td>On-Wafer Characterization and Modelling of InP Resonant Tunneling Diodes up to 500 GHz</td>
<td></td>
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<tr>
<td>EuMC17-11</td>
<td>Using RCS Radial Pattern Combined with Multi-Path Effect for Automotive Radar Simulations</td>
<td></td>
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<tr>
<td>EuMC17-12</td>
<td>2-D Scattering and Absorption of E-polarized Plane Wave by a Circular Dielectric Wire with Partial Graphene Cover</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Exhibition Hall**

**EuMC17 Posters**

**Chair:** Marco Pasian¹  
**Co-Chair:** Simona Di Meo¹  
¹University of Pavia

Posters presenters will be ready around their stands by 10:40.
WEDNESDAY 11:20 – 13:00

**Amber 1**

**EuMC18**
Interconnects and Packaging for Sub-millimeter Wave Applications
Chair: Mohsen Kaynak¹
Co-Chair: Maria Paoli²
¹HP Microelectronics GmbH, Karlsruhe Institute of Technology (KIT)

**EuMC19**
Antenna and Array Characterization Techniques
Chair: David Pimblott¹
Co-Chair: Ying Hu²
¹Netherlands Institute for Radio Astronomy - ASTRON, Queen Mary University of London

**EuMC20**
Multi-Functional and Multi-Band Planar Filtering Devices
Chair: Roberto Gomez-Garcia¹
Co-Chair: Michael Höff¹
¹University of Alcala, ²Christian-Albrechts-Universitat zu Kiel

**EuMC21**
Power Amplifiers Linearization Techniques
Chair: Anding Zhu¹
Co-Chair: José Carlos Pedro²
¹University College Dublin, ²Instituto de Telecomunicacoes - Universidade de Aveiro

**EuMC18-1**
Recent Advances in System in Package
Amelie Hopfeiner¹, Marco Dietz², Robert Wegel³
¹University of Birmingham, UK, ²STFC Rutherford Appleton Laboratory, ³Fraunhofer IFAM

**EuMC19-1**
Air-filled Substrate Integrated Technology - a Paradigm for High Performance Antenna Systems
Karel Vyskočil-Kozák¹, Sam Lemney², Hendrik Roger³
¹Glasgow University, ²Institute of Technology (KIT)

**EuMC20-1**
Coupling Matrix Based Design of Filters with Pole Generating Couplings
Michael Mrozowski¹, Adam Lamecki¹, Matej Jasnik³, Roberto Gomez-Garcia¹
¹University of Alcala

**EuMC21-1**
A 60-GHz CMOS Power Amplifier with Combined Adaptive-Bias and Linearizer in 28-nm Process
Koong Il Jung¹, Tae Hoon Jang², Jun Soo Choe³, Chul Soon Park⁴
¹Korea Advanced Institute of Science and Technology, ²Institute for Energy Conversion Technology, ³Korea University, ⁴Seoul National University

**EuMC18-2**
Mechanically Flexible Dielectric Waveguides and Bandstop Filters in Glass Technology at G-band
Thomas Galler¹, Malte Schulz-Ruhtenberg², Tobias Kroh³
¹University of Erlangen-Nuremberg, ²Technische Universität München, ³FRAUNHOFER-IWES

**EuMC19-2**
Contactless Antenna Radiation Efficiency Measurement Within Reverberation Chambers: Sensitivity Improvement
François Samurtz², Alphonse Lambin², Wafa Krouka², Julien de Rooy², Émile Richalot¹
¹Université Gustave Eiffel, ²Institut Langevin, ESPCI Paris, CNRS

**EuMC20-2**
Input-Reflectionless Two-Branch Channelized Passive Dual-Band Bandpass Filters
Mohamed Mak¹, Li Fang², Roberto Gomez-Garcia¹
¹University of Alcala

**EuMC21-2**
Modeling and Compensation of AlGaN/GaN HEMT Dynamic Nonlinearities
José Carlos Pedro¹, Juan L. Gómez², Luis Correas-Núñez³, Filipe Barrantes¹
¹University of Alcala, ²University of Vigo, ³University of A Coruña

**EuMC18-3**
Aerosol Jet Printed Millimeter Wave Interconnects in D-Band
Georg Granin², Robert Huber¹, Ulf Lemmer¹, Thomas Zwick¹
¹Karlsruhe Institute of Technology

**EuMC19-3**
Broadband Antenna Radiation Pattern Measurement From Backscattering Coefficient in a Reverberation Chamber
François Samurtz², Antoine Her¹, Lozzy Zeghib¹, Philippe Bernier¹, Émile Richalot¹
¹Université Gustave Eiffel, ²Institute of Technology (KIT)

**EuMC20-3**
Multifunctional Switchable Filter Using Shorted Coupled-Line Sections
Mitsuki Shira±¹, David Divale-Troncosob¹, Abdul Quddi§¹, Nacheen Shub¹, Dimitra Psychogiou⁴, Kamil Yavuz Kapusuz¹, Sam Lemey¹, Hendrik Rogier¹
¹Ghent University, ²Instituto de Telecomunicacoes - Universidade de Aveiro, ³Instituto de Telecomunicacoes - Universidade de Coimbra, ⁴University College Cork

**EuMC21-3**
Accelerating Model Adaptation of Multi-Metric Digital Predistortion for RF Power Amplifiers Using Composited Quadratic Loss Function
Yang Hao¹, Chennan Chi², Anding Zhu¹
¹University College Dublin, ²Queen Mary University of London - ASTRON

**EuMC18-4**
A 300 GHz Waveguide Cavity Filter Fabricated by 3D Screen Printing Technology
Saif Shawkat¹, Milan Andjelic¹, Yi Wang², Peter Hugard², Peter Winter³, Xia Wang³
¹University of Birmingham, UK, ²STFC Rutherford Appleton Laboratory, ³Fraunhofer IFFM

**EuMC19-4**
Spherical mm-Wave Anechoic Chamber for Accurate Far-Field Radiation Pattern Measurements
All Reneers¹, Anouk Haustermans¹, Gabrielle Fedorcz⁴, Sandor Bronckers¹, A. Bart Smolders¹
¹KU Leuven, ²Instituto de Telecomunicacoes - Universidade de Aveiro, ³Instituto de Telecomunicacoes - Universidade de Coimbra, ⁴University of Twente

**EuMC20-4**
Input-Absorptive High-Order Wideband Balun Bandpass Filters With Quasi-Elliptic-Type Response
Li Yang¹, Roberto Gomez-Garcia¹
¹University of Alcala

**EuMC21-4**
A 28 GHz 22FDX R PA with 31.5 % Peak PAE and Output Power of 21 dBm in CW, 18.5 dBm in OOK, and 12.5 dBm in 64QAM Z
Zaid Al-Husseini¹, Shafiullah Syed¹
¹Globalfoundries

**EuMC18-5**
Differential bondwire interface for chip-to-chip and chip-to-antenna interconnect above 200 GHz
Joachim Heidel¹, Luca Slawenga¹, Thomas Zwick¹
¹Universität Dresden, Germany

**EuMC19-5**
Inter-Beam Modulation Prediction and Test for Multi-Beam Active Arrays with Beam-Hopping Capability
Christian Nemeth¹, Adrian Martin-Gonzalez¹, Antonio Montesano¹, David Prieto-Diaz², Francisco José Lara-Frías³, David Alvarez-Mendez¹
¹Arbit Defence and Space

**EuMC20-5**
Self-Packaged Dual-band Filter with High Selectivity and Low Radiation Loss
Haimo Tant¹, Yuanran Dong¹
¹University of Electronic Science and Technology of China

**EuMC21-5**
GaN Power Amplifier Linearization Using Forward Second Harmonic Injection into the Input
Farhad Akhavanrezaei¹, Majid Pourazad¹, Abdelkader Akrout¹, Abdul Quddi§¹
¹University of Elephant (USA), ²National Institute of Technology (Pakistan), ³University of Science and Technology
**Wednesday 11:20 – 13:00**

**Suite 1**

**EuMC22**
Simulation-Oriented Characterization of Microwave Devices
Chair: Gian Guido Gentili
Co-Chair: Simone Bastioli
Polytechnic of Milan, "RS Microwave"

11:20 – 11:40

**EuMC22-1**
An Overview of Leaky-Mode Effects on Printed-Circuit Transmission Lines
David R. Jackson¹, Francisco Menéj ¹, Alexandra Gaha², Paolo Baccari³, Paolo Burghidi³, Gianpiero Levai⁴, Walter Fascała⁵

*INVITED KEYNOTE*
University of Houston, University of Malta, University of Rome "Tor Vergata", University of Rome "La Sapienza", Università di Bologna, Rome, Italy

11:40 – 12:00

**EuMC22-2**
Accelerated Partial Inductance Evaluation via Cubic Spline Interpolation for the PEEC Method
Daniel Romero¹, Fabrizio Lotti², Gabriele Antonevi³, Ivanova Kociumecźquadro⁴, Ulrike Geissendorfer⁵
université degli studi dell’aquila, "ETH Zürich"

12:00 – 12:20

**EuMC22-3**
Simulation-Based Miniaturization of Microwave Passive Components with Explicit Equality Constraint Correction
Shawreen Nazir¹, Anna Pietrenko-Dabrowska²
University of Pittsburgh, "Glasgow University of Technology"

12:20 – 12:40

**EuMC22-4**
Noise in Coherently Radiating Periodic Structures Beam-Forming Networks
Carlos Buzanar-Gallart¹, Carlos de la Roza²
Public University of Navarra (UPNA)

12:40 – 13:00

**EuMC22-5**
RF MEMS Switch Design Methodology by Electromagnetic Simulations and Machine Learning
Loulou Miszczak¹, Antoni Konstantynowicz², Paolo Furre³, Goodarz Mansoor⁴, George Kostantynowicz⁵
"IESL - FORTH, Imperial College London, "RF Microtech s.r.l."

**Amber 3**

**EuMW04**
Inter-Society Technology Panel on Biomedical Waves – The Next Breakthrough!
Chair: Luciano Tarricone¹
Co-Chair: Alessandra Costanzo²
University of Salento, University of Bologna

11:20 – 13:00

**EuMW04-1**
Panelists
Louis de Fornal¹, Panos Kosmas², Gianlucia Lazzù³, Milena Pecoraro⁴, Hof Sharnim⁵, Liana Ukkonen⁶
University of Malta, "Kings College London", University of Southern California, "McGill University", King Abdullah University of Science and Technology "KAUST", "Tampere University"

**Amber 5**

**EuRAD02**
Automotive Radar I
Chair: Marina Gashinova¹
Co-Chair: Willem A. Hol²
University of Birmingham

11:20 – 13:00

**EuRAD02-2**
Marvin Voelke¹, Christian Schübbe², Marcel Hoffmann³

*INVITED KEYNOTE*
Friedrich-Alexander University Erlangen-Nuremberg

11:40 – 13:00

**EuRAD02-3**
Variable Traffic Scenario Generation for Testing Automotive Radar Sensors
Patrick Ripp¹, Pirmin Schoeder², Timo Grebner², Christian Waldschmidt², Thomas Walter¹
Ulm University

12:00 – 13:00

**EuRAD02-4**
Measurement-Based Analysis of a Non-Coherent MIMO Radar Network for Automotive Applications
Sergio López Fernández¹, Andréas Tzaridis², Jerkides Samarakis³, Richard Pope⁴, Andreas Stelzer⁵
Johannes Kepler University Linz

**EuRAD02-5**
Measurement-Based Analysis of a Non-Coherent MIMO Radar Network for Automotive Applications
Sergio López Fernández¹, Andréas Tzaridis², Jerkides Samarakis³, Richard Pope⁴, Andreas Stelzer⁵
Johannes Kepler University Linz
**Wednesday 14:20 – 16:00**

**Amber 5**

**EuMC/EuRAD01**

Automotive Radar II

Chair: Thomas Zwick¹

Co-Chair: Kevin Cinglant²

¹Karlsruhe Institute of Technology (KIT), "ZF Autocruise" ²Sensys Gatso Group

**EuMC/EuRAD01-1**

Status and Trends in Automotive Radars

Marlene Hutter

**Amber 1**

**EuMC23**

Additive Manufacturing for Microwave Components

Chair: Giuseppe Addamo¹

Co-Chair: Oscar Antonio Peverini¹

¹CNR-IENIT

**EuMC23-1**

Trends and Prospects of All-metal 3D-printing Technologies for Next-generation Space-borne Antenna Systems

Oscar Antonio Peverini¹, Giuseppe Addamo¹, Filomena Calipari², Mauro Luscia³, Diego Giavani Mantovani³, Giuseppe Vire³

**Amber 2**

**EuMC24**

Novel Array Topologies and Beamsteering Techniques

Chair: Wim van Cappellen¹

Co-Chair: Nuno Borges Carvalho¹

¹ASTRION, "University of Aveiro - Instituto de Telecomunicaciones" ²Machine Learning and Data Analytics Lab (MAD), Friedrich-Alexander-Universität Erlangen-Nürnberg, ³Machine Learning and Data Analytics Lab (MAD), Friedrich-Alexander-Universität Erlangen-Nürnberg

**EuMC24-1**

Wideband Connected Slot Arrays at mm-Wave Frequencies

Alexander van Katwijk¹, Gianluca Cavalli¹

**Amber 3**

**EuMC25**

Sensing in Biological Systems I

Chair: Luciano Tarricone¹

Co-Chair: Francesca Appollonio¹

¹University of Salento, ²Sapienza University of Rome

**EuMC25-1**

Status on Microwave Dielectric Spectroscopy for Cellular Analysis

Karin Gmunder¹, David Zibert

INVITED KEYNOTE

**EuMC25-2**

Investigation of Hydrogel Skin Phantoms Using Terahertz Time-domain Spectroscopy

Droja Jassal¹, A.J. Henderson-Serrano¹, Rachel A. Hard¹, Jan Balsek¹, Emma MacPherson²

Chair: University of Technology, "University of Warwick"

**Amber 5**

**EuMC/EuRAD01-2**

Instantaneous Ego-Motion Estimation Using a Coherent Radar Network

Marcel Hofmann¹, Lena Krabbe¹, Christian Schüßler¹, Petter Golden³, Martin Voskuil³

Friedrich-Alexander Universität Erlangen-Nürnberg, ²indie Semiconductor

**EuMC/EuRAD01-3**

Doppler Beam Sharpening for High-Resolution Imaging in Dynamic Automotive Scenes

Scott Curran¹, Sajdeh Piovis¹, Jayan Ahmed Piorkar¹, Edward Hur³, Michael Chernenko³, Marina Gafni³

University of Birmingham

**EuMC23-2**

Additively Manufactured WR15 Waveguide to Microstrip Transition for Broadband V-Band Applications

Andreas Holmaren¹, Laura Kier⁵, Konstantin Lukashkin⁵, Mark Sippel¹, Gerald Gold¹

Friedrich Alexander Universität Erlangen-Nürnberg

**EuMC23-3**

Additive Manufactured CPW lines Cured by Intense Pulse Light for Automotive Microwave Applications

Amaro Monte Carlo², Alexandre Barre³, Konstantin Lukashkin⁵, Lauren Bennett⁵, John F. Lucas³, John Poppleton³⁵

Michigan State University, ²PalorForge Inc., ³Yard Motor Company

**EuMC24-2**

Thinned Array with Steerable Nulls to cancel Grating Lobe for Automotive Radar Applications

Maiuto Kato³, Takahiro Cho³, Paul Schlamber³, Jae Lee³, Long Li³, Tschikito Takahli³, Shinya Yamaura³, Toshiki Matsuoka³, Gabriel Rebou³

MARTESE Technologies Corporation, ³Toyota Research Institute - North America, ³University of California San Diego, USA

**EuMC23-4**

Site-Specific Ultra-Low-Sidelobe Phased Array Topologies for Sparse Areas of Particular Shape

Ynko Aslan³

Columbia University

**EuMC25-3**

In Vivo Skin-Type Classification Using Millimeter-Wave Near-Field Probe Spectroscopy

Damaso Hecz³, Tim Flatter¹, Ingred Uhlmann¹, Thomas Aitoff¹, Nada Ame³, Vuj³, Björn Esköfier³, Martin Voskuil³

Institute of Microwaves and Photonics (LHFT), Friedrich-Alexander-Universität Erlangen-Nürnberg, ³Machine Learning and Data Analytics Lab (MAD), Friedrich-Alexander-Universität Erlangen-Nürnberg

**EuMC24-3**

Nulls to cancel Grating Lobe for Thinned Array with Steerable Nulls to cancel Grating Lobe for Automotive Radar Applications

Masato Kohtani¹, Toshihiko Matsuoka¹, Gabriel Rebou³

Chair: Delft University of Technology

**EuMC25-4**

In Vivo Skin-Type Classification Using Millimeter-Wave Near-Field Probe Spectroscopy

Josephine Muniz¹, Rana Shaban¹, Fredeique Dehon¹, Georges Alqué¹, Chaiman B. Buxton¹, Hamid Kakása³

Turbome Company

**EuMC25-5**

Penetration Depth in Multilayered Biological Tissues using a Compact Microwave Biosensor

Josephine Muniz¹, Rana Shaban¹, Fredeique Dehon¹, Georges Alqué¹, Chaiman B. Buxton¹, Hamid Kakása³

Turbome Company

**EuMC24-4**

A Compact 5.2 GHz Reflection-Type Retrodirective Array Using Butler Matrix with Broadside Couplers

Rizka Hossina¹, Jean Benga¹, Takashi Shib³, Noriharu Suzuki³

Research Institute of Electrical Communication, ³Tohoku University

**EuMC24-5**

Phase Adjustment for Beamforming Arbitrarily-Shaped Phased Arrays

Alicardo A. M. Pereira¹, Nuno Borges Carvalho¹

Instituto de Telecomunicacoes - Lisboa Avenu

**EuMC25-6**

Millifluidic Sensor Designed to Perform the Microwave Dielectric Spectroscopy of Biological Liquids

Váger Kustermanski

EUMWEEK.COM
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<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Chairs/Co-Chairs</th>
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<tr>
<td>14:20</td>
<td>EuMC26</td>
<td>Advanced Filters in Compact Realizations</td>
<td>Chair: Photos Vrionides¹, Co-Chair: Dimitra Psychogiou¹, 'Universidad de Alcala'</td>
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<tr>
<td>14:40</td>
<td>EuMC26-1</td>
<td>Recent Progress on Multi-Configurable RF Filters</td>
<td>Dimitra Psychogiou¹, Roberto Gomez-Garcia¹, 'University of Technology Graz'</td>
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<tr>
<td>14:40</td>
<td>EuMC26-2</td>
<td>BAW Filter for space applications at 4.2 GHz</td>
<td>Denis Mercier¹, Thiby Claret¹, Marc Samuelson¹, 'University of Technology Graz'</td>
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<tr>
<td>15:00</td>
<td>EuMC26-3</td>
<td>Quasi-elliptic SAW Filters Using Multi-Resonant Acoustic Wave Stages</td>
<td>Mohammad Ali Kasaei¹, Dimitra Psychogiou¹, 'University of Technology Graz'</td>
</tr>
<tr>
<td>15:20</td>
<td>EuMC26-4</td>
<td>High-Performance Inline Bandpass Filters Using Stub-Loaded Resonators</td>
<td>Vinay Narayane², Swathika Suresha², 'Indian Institute of Technology Bombay'</td>
</tr>
<tr>
<td>15:40</td>
<td>EuMC26-5</td>
<td>Coupling Matrix Approaches for the Synthesis of Acoustic Wave Multiport Functions</td>
<td>Luis Acosta², Eloi Guzmán², Carlos Cabañeres², Jordi Verdú², 'Universitat Autònoma de Barcelona'</td>
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<tr>
<td>14:20</td>
<td>EuMC27</td>
<td>Integration of Power Amplifiers</td>
<td>Chair: Zora Popovic¹, Co-Chair: Gregor Lasser¹, 'University of Colorado Boulder'</td>
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<td>15:00</td>
<td>EuMC27-1</td>
<td>Wideband Transmit-Receive MMICs for S-band Power Amplifiers</td>
<td>Charles Campbell¹, Deep E. Duville¹, Kevin W. Kellogg¹, 'University of Technology Graz'</td>
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<tr>
<td>15:20</td>
<td>EuMC27-2</td>
<td>High Performance Stacked-FETs in 0.25 um GaN Technology for S-band Power Amplifiers</td>
<td>Gaspard van der Bergh¹, Peter de Heer¹, Bob Knight¹, Frank E. van Vliet¹, 'NIST'</td>
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<tr>
<td>15:40</td>
<td>EuMC27-3</td>
<td>A 10-W 6–12 GHz GaN MMIC Supply Modulated Power Amplifier</td>
<td>Corinne Negulescu¹, Zoya Popovic¹, Gregor Lasser¹, 'University of Technology Graz'</td>
</tr>
<tr>
<td>15:00</td>
<td>EuMC27-4</td>
<td>An Efficient and Fast Reverse Buck Converter for High-Power Envelope-Tracking Systems</td>
<td>Sophie Paul¹, Nicola Wolf¹, Christophe Collecapo¹, 'Universiteit van Hasselt'</td>
</tr>
<tr>
<td>15:20</td>
<td>EuMC27-5</td>
<td>Embedding of High Power RF Transistor Dies in PCB Laminate</td>
<td>Kees Peerlings¹, 'Delft University of Technology'</td>
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<tr>
<td>14:20</td>
<td>EuMC28</td>
<td>Developments in Electromagnetic Techniques</td>
<td>Chair: Malgorzata Cekuch¹, Co-Chair: Michal Mozowski¹, 'Gdansk University of Technology'</td>
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<tr>
<td>15:00</td>
<td>EuMC28-1</td>
<td>Recent Advances in Hybrid Solver Technology for EM Simulations</td>
<td>Ralf Meyer¹, Ralf Rimke¹, Peter Krauss¹, Thomas Gerding², 'University of Technology Graz'</td>
</tr>
<tr>
<td>15:20</td>
<td>EuMC28-2</td>
<td>Two-dimensional TE Series Node Transmission-Line Modelling Based on Unstructured Triangular Meshes</td>
<td>Kajq Tay¹, Ana Mencik¹, Philip Jost², 'University of Technology Graz'</td>
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<tr>
<td>15:40</td>
<td>EuMC28-3</td>
<td>Computation of Time Domain Scattering Parameters Through the Numerical Inversion of the Laplace Transform</td>
<td>Fabrizio Lauren¹, Giuseppe Pettarino¹, 'University of Rome'</td>
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<tr>
<td>15:00</td>
<td>EuMC28-4</td>
<td>An Efficient Two-Step Leapfrog HIE-FD'TO Method With More Relaxed Stability Condition</td>
<td>Anik Kumar Pandey¹, Alok Kumar Saxena¹, 'Indian Institute of Technology Kanpur'</td>
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<tr>
<td>15:20</td>
<td>EuMC28-5</td>
<td>An Optimized Six-Step LQD-FD'TO Method using the Artificial Anisotropy Parameters</td>
<td>Nikhil Kumar Saxena¹, 'Indian Institute of Technology Kanpur'</td>
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**INVITED KEYNOTE**

- Device and Circuit Design for Subnano-Watt Communication Systems in 5G/6G Applications
  - Chair: Dimitra Psychogiou², Co-Chair: Gregor Lasser², 'University of Technology Graz'
  - **Università degli studi dell’Aquila**, **Delft University of Technology**, **Ferdinand-Braun-Institut (FBH) gGmbH**, **CEA-LETI**, **Université de Bourgogne Franche-Comté**, **TNO**, **Frec|n|sys SASU**, **ENSTA Bretagne**, **Istituto Italiano di Tecnologia**, **Qorvo, Inc.**

**Special Session on Microwave and RF Technologies in India**

- Sir Jagadish Bose contributions to advances in RF/Microwaves Systems and Technologies in India
  - Chair: Ramesh Gupta¹, Shubham Koch², 'Indian Institute of Technology (IIT)'
**EuMC/EuRAD03-2**
Increased Coding Capacity of Chipless RFID Tags Using Radiation Pattern Diversity
Florian Requena¹, Nicolas Bartat¹, Darine Kaddour¹, Etienne Perret¹
¹LCIS

**EuMC/EuRAD03-3**
A Multicarrier Communication Method to Increase Radio Coverage for UHF RFID
Janne Walk¹, Martin Maderböck¹, Georg Saul¹, Manuel Freidli¹, Moritz Fischer¹, Thomas Ußmüller¹
University of Innsbruck, MC² - The Entrepreneurial School

**EuMC/EuRAD03-4**
Antenna Design for 5G-based Train-Centric Control System
Dong-In Lee¹, Sang-Jin Oh², In-June Hwang³
¹Korea Railroad Research Institute (KRRI), ²C to C tech, ³Korea Research Institute of Standards and Science (KRISS)

**EuMC/EuRAD03-5**
Analysis of onboard channel measurements for train communication scenarios in the context towards 6G enabling technologies
Johann Lichtblau¹, Karim El Kholy¹, Alexander Köfer¹
¹Friedrich-Alexander University of Erlangen-Nuremberg

**EuMC/EuRAD03-6**
A Standalone 5G Industrial Testbed Design Considerations for Industry 4.0
Ying Rao Wei¹, Ayi S Krishnamurthy¹, Ralph Wittmann¹, Antonia R. Zakhonets¹
Intel Deutschland GmbH, Intel Corporation

**EuMC/EuRAD03-7**
Multi-Hole Waveguide Directional Coupler Design via Brick-Based Microwave Design Methodology
Sefa Erdogdu¹, Anil Arici¹, Umut Bulus¹, Huseyin Aniktar²
¹Antenom Antenna Technologies, ²Tubitak Bilgem

**EuMC/EuRAD03-8**
Hybrid Mechanical/Electronic Steering Antenna: Concept, Design and First Mockup
Benoît Lesur¹, Anael Lohou¹, Fabien Peleau¹, Alain Karas¹, Romain Contreres²
¹Safran Data Systems, ²CNES

**EuMC/EuRAD03-9**
2D Virtual Array Techniques for MIMO Radar
Hironori Yamada¹, Satoshi Kato¹, Hideko Mori¹
¹Niigata University, Yamaha Corporation

**EuMC/EuRAD03-10**
Quasi-Monostatic Antenna Displacement in Radar Target Simulation
Axel Einseidler¹, Benjamin Nuss¹, Thomas Zwick¹
Karlsruhe Institute of Technology (KIT)

**EuMC/EuRAD03-11**
Human Interpretable Radar Through Deep Generative Models
Nir Dvorecki¹, Yuval Amizur¹, Leor Banin¹
Mobileye

**EuMC/EuRAD03-12**
Sensing Performance of Different Codes for Phase-Coded FMCW Radars
Utku Kumbul¹, Nikita Petrov², Ciems S. Vachter³, Alexander Yanovsky³
³Delphi University of Technology, ²NXP Semiconductors Eindhoven
## Amber 2
### EuMC/EuRAD02
**Novel Antennas for Space Applications**
- **Chair:** Piero Angeletti¹
- **Co-Chair:** Stefania Monni²
- ¹European Space Agency, ²TNO Defense, Security and Safety

### EuMC/EuRAD02-1
**Antennas for Space: Recent European Developments and Trends**
- Peter de Maagt¹, Salvatore Elshako¹, Natural Aylker¹, Piero Angeletti¹

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## Amber 3
### EuMC29
**Sensing in Biological Systems II**
- **Chair:** Kata Grenier³
- **Co-Chair:** Caterina Merla³
- ³LAAS-CNRS, TÉNÉA

### EuMC29-1
**Bioelectromagnetic Research Based on Lessons Learned, Reliable Techniques and Microscopic Models: the Challenge of 5G**
- Marco Libert³, Francesco Apolloni³

### EuMC29-2
**A Hybrid Correlation-Dicke Radiometer for Internal Body Thermometry**
- Joost Goedhuis³, Sander Santamaria-Boteb³, Robert Streeter³, Kelvin Hall³, Zoya Popovic³
- ³University of Colorado - Boulder

### EuMC29-3
**Towards Tumor Detection with a Microwave Ablator based on Dielectricometry**
- Martin Schultz¹, Markus Paravicini¹, Carolin Huesgen¹, Robin Neuder¹, Frank Hüben³, Thomas J. Vieg³, Bob Jakoby³
- ³TU Dortmund, Universitätsspintrum Frankfurt

### EuMC29-4
**System Considerations and Analog Baseband Design for an FMCW Radar-based Breast Cancer Detection**
- Martin Hanel¹, Vivian Tuvalu¹
- ¹Technical University of Braunschweig

### EuMC29-5
**Improvement of Breast Shape in a Female Whole-Body Model: A Numerical Evaluation of the Exposure to 2.45 GHz Plane Wave**
- Room Boin³, Morten Gjek¹, Semena Cigliano¹, Francesca Apolloni¹, Micaela Libert¹
- ¹Sapienza University of Rome, Italy

### EuMC30
**Substrate Integrated Waveguide and Multiplayer Techniques**
- **Chair:** Bart Nauwelaers⁴
- ⁴Univ. Bordeaux, Bordeaux INP, CNRS, IMS

### EuMC30-1
**Power Handling Capabilities of SIW and AFSIW Transmission Lines and Circuits**
- Anthony Ghiotto¹

### EuMC30-2
**Multilayer Universal Transitions Between Substrate Integrated Waveguides and Rectangular Waveguides**
- Omar Jamieson¹, Shahid Singh¹, Faizan Dad¹, Azar Paul¹, Daniel Boudre¹
- ¹Military Institute of Technology, ITTO, University of Westminster

### EuMC30-3
**A Vertical Transition between Substrate Integrated Waveguide and Multilayer Structures: the Challenge of 5G Base Stations**
- Anna Piacibello¹, Vittorio Camarota¹

### EuMC30-4
**A Comparative Study of Two Wideband 8x8 Butler Matrices for Millimeter-wave Bands**
- Mehdi Barmaki², Ali Akbarzadeh², Qianyu Pan³, Vahid Nabi³, Kianoush Rouhi³, David Wessel³

### EuMC30-5
**Substrate Integrated Coaxial Line based Branch Line Coupler with Broad Out of Band Rejection**
- Sajda Kristina Ribar¹, Antonio Delfante¹, grammar Skrinar³, Marcos Borti², Massimo Musco³
- ³Trentino Institute of Technology, ²University of Pavia

### EuMC31
**Power Amplifiers Performance Improvement Techniques**
- **Chair:** Kevin Morris¹
- ¹Military Technical Institute, ²IITD, ³University of Westminister

### EuMC31-1
**Doherty Power Amplifiers for Sub-6 GHz and Beyond-6 GHz: Challenges and Design Approaches**
- Anna Pastorelli¹, Vittoria Camarota¹

### EuMC31-2
**A 24-31 GHz 28 nm FD-SOI CMOS Balanced Power Amplifier Robust to 3:1 VSWR for 5G Application**
- ¹KU Leuven, ²INRS

### EuMC31-3
**Power Amplifier Design Using Interactive Multi-Objective Visualization**
- Stefan Vinsentivi⁴, Reyes Luces⁴, Jacob Krauw⁴, Alex Russell⁴, Seth Blackman⁴, Rini Baker⁴, Joseph Kasznat⁴, Zina Pospiesz⁴
- ¹University of Colorado, ²Polytechnique, ³University of Lyon, ⁴Univ. Bordeaux, ⁵INP, IMS

### EuMC31-4
**A 1.5-2.2 GHz Continuous Class-F Power Amplifier with Compact Harmonically Controlled Networks**
- Hans Tanaka¹, Shinji Sonea¹, Shinji Sonea¹
- ¹Keio University, ²Shibaura Institute of Technology

### EuMC31-5
**Combining Class J and Inverse Class F Continuous Modes for a Highly Efficient Broadband Power Amplifier**
- Frest Piri¹, Reza Moradi¹, Tommaso Cappello¹
- ¹University of Bordeaux
**Wednesday 16:40 – 18:20**

**Suite 1**

**EuMC32**

**Microwave Sensing Devices**

Chair: Ferran Martin

Co-Chair: Daniel Segovia-Vargas¹

¹Universitat Autònoma de Barcelona

16:40 - 17:00

**EuMC32-1**

**Recent Advances in Phase-variation Microwave Sensors**

Ferran Martin¹, Paris Wepe², LIjuan Su³, Muhter Jonathan⁴, Pan Cascanceta⁵

**INVITED KEYNOTE**

Universitat Autònoma de Barcelona

17:00 - 17:20

**EuMC32-2**

**A Generalized Noncontact Vital-Sign Sensing System Based on MIMO FMCW Radar Sensors**

Cheng Lao¹, Jin Lui², Yangping Li³

Beijing University of Posts and Telecommunications

17:20 - 17:40

**EuMC32-3**

**A Method to Retrieve the Output Variables in Reflective-Mode Phase-Variation Sensors**

Mahmoud Elgeziry¹, Ferran Paredes², Paris Wepe³, Hikma Costa¹, Sonsee Genovesi¹, Ferran Martin³

¹University of Pisa, University Autònoma de Barcelona

17:40 - 18:00

**EuMC32-4**

**Precise Active Sensor Design for Monitoring in Biological and Industrial Applications**

Sandra Santiago-Hesús¹, Daniel Segovia-Vargas¹, Adnan Amer-Martin¹, Vicente González-Pousada³

¹Universidad Carlos III de Madrid, Leganes, Madrid, Spain, ²Universidad Politécnica de Madrid

18:00 - 18:20

**EuMC32-5**

**Dual Band CSRR Fluidic Sensor with 3D Printed Channel**

Zolt Sóki¹

Óbuda University

**Amber 1**

**EuMW06**

**Inter-Society Technology Panel on Emerging Materials for Reshaping the MHz-Through-THz World: Fiction or Fact?**

Chair: Ke Wu

Co-Chair: Rafaat R. Mansour⁴, Rolf Jakoby⁵, J-C Chiao⁶

¹Polyteh. Montreal, ²Univ. Waterloo, ³TU Darmstadt, IMP, ⁴Southern Methodist Univ.

16:40 - 17:00

**EuMW06-1**

**Panelists**

Rafaat R. Mansour¹, Nian Sun², Jimenez-Saez Arquipé³, Michael Wittke⁴, Muhammad Saeed⁵, Mortaza Mohammadian⁴

¹University of Waterloo, ²Northeastern University, ³Technical University of Darmstadt, ⁴Georgia Institute of Technology, ⁵ALCAN Systems GmbH

**Amber 5**

**EuRAD03**

**Radar for Space Exploration and Remote Sensing**

Chair: Willem A. Hol

Co-Chair: Mikhail Cherniakov⁴

¹University of Birmingham

16:40 - 17:00

**EuRAD03-1**

**SAR Earth Observation for United Nations Sustainable Development Goals**

Paulo Sartorio¹, Fabio Dell’Acqua²

¹Università degli Studi di Pavia, ²Università degli Studi di Pavia

**EuRAD03-2**

**Long Baseline Radar Bistatic Measurements of Geostationary Satellites**

Gregory Heeger¹, Sarah Welch², Robert Morrison³, Ceas Basoiu⁴, Tiziana Pisu⁵

¹MIT Lincoln Laboratory, ²RKGON Netherlands Institute for Radio Astronomy, ³INAF Osservatorio Astronomico di Capodimonte

17:20 - 17:40

**EuRAD03-3**

**Robust UAV-Borne Fully Digital MIMO OFDM Radar for the Generation of a Digital Elevation Model**

Feike Kodder¹, Benedikt Schworer², Alexander Graftenth¹, Christian Waldschmidt³

¹Ulm University

18:00 - 18:20

**EuRAD03-4**

**Solid-State High-Power Amplifiers for Space Surveillance Radars**

Haimy Litt¹, Brian Simakauskas², Christopher Eckert³, Mohamed Abouzahra⁴

¹MIT Lincoln Laboratory, ²MIT Haystack Observatory

**EuRAD03-5**

**Development of the HUSIR Dual-Band Feed**

Roy Lee¹, Brian Simakauskas², Christopher Eckert³, Mohamed Abouzahra⁴

¹MIT Lincoln Laboratory, ²MIT Haystack Observatory
THURSDAY 09:00 – 10:40

Amber 1
EuMC33
Conceptual Progress in Antenna Design
Chair: Simone Genovesi¹
CoChair: Ivan E. Lager²
¹Università di Pisa, ²Delft University of Technology

09:00 – 09:20
EuMC33-1
Unconventional Antenna Arrays for 5G and Beyond mmWave Communication Systems
Flavien Roberts¹, Lucas Revington²
²University of Technology Sydney

09:20 – 09:40
EuMC33-2
Differential Split-Ring Resonator-Based Antenna at 140 GHz in Embedded Wafer Level Ball Grid Array Technology
Elizabeth Dekker¹, Akashita Bhutani¹, Lucas Centro de Oliveira¹, Theresa Antes¹, Thomas Zwick¹
Karlsruhe Institute of Technology (KIT)

09:40 – 10:00
EuMC33-3
Reconfigurable Switched Beam Filtenna based on Corner Cube Reflector and Combine SIW Resonator
Hossein Sarbandi Farahani¹, Behrooz Rezaee¹, Resonator
Hossein Sarbandi Farahani¹, Behrooz Rezaee¹, Resonator
Hossein Sarbandi Farahani¹, Behrooz Rezaee¹, Resonator

Amber 2
EuMC34
Novel Antennas for 5G and Beyond 5G Communication Systems
Chair: Zhongong Ying¹
CoChair: Marta Martínez-Vazquez²
¹Sony, ²Renesas Electronics Europe GmbH

10:00 – 10:20
EuMC34-1
Antenna Technologies for B5G and 6G Mobile System
Zhongong Ying¹
INVITED KEYNOTE

EuMC34-2
5G mmWave Dual-Orthogonal Polarized Antenna array
Medhat Sohaili¹, Ronny Hahn³
¹Technical University of Dresden, Germany, ³Technische Universität Dresden

10:20 – 10:40
EuMC34-3
Evolutionary Optimized Pixelated Antennas for 5G IoT Communication
Dominic Paur¹, Markus Unterladstaetter¹, Michael Reuther¹, Thomas Ußmüller¹
University of Innsbruck

EuMC34-4
A Dual-Band Millimeter Wave SRR Loaded Printed Monopole with Annular Slot MIMO Antenna for 5G Applications
Priyanka Mishra¹, Mohanrao Pratap Singh¹, Aditi Sharma¹, Kumar Varun Sinha¹, Saptarshi Ghosh¹
¹Indian Institute of Technology Indore, ²Indian Institute of Technology Kanpur

Amber 4
EuMC35
Integration and Miniaturization of Filter Components
Chair: Anthony Ugiotti¹
CoChair: Roberto Gómez García¹
¹University of Bordeaux, ²University of Alcalá

10:00 – 10:20
EuMC35-1
Passive Circuit Integration: Multi-Dimensional Evolution from Micro-Scale Components to Large-Scale Systems
Ko Wu¹
INVITED KEYNOTE

EuMC35-2
A 3D slow-wave transmission line approach for the design of Ka-band CMOS compact filters
Oliver Ouwens¹, Léa Broutières¹, Marc Muscat², Riccardo Parente³, Lituan Xin⁴, Philippe Ferrand¹
¹ON Semiconductor, ²IMEC NV, ³University of Lille, ⁴University of Bordeaux

10:20 – 10:40
EuMC35-3
A Compact Millimeter-Wave On-chip DGS-based Bandstop Filter with Two Transmission Poles in CMOS Technology
Samimuddin Kumar Chakrabarti¹, Radhakanth Chen¹, Aditi Gaur¹, Ramesh Kumar Pokharel¹
³University of Bordeaux

EuMC35-4
Miniaturized X-band High-Index Supercavity Resonator in Microstrip Technology
Zaheer Mansoor², Michael Gumienny³, Vahagn Kildishev¹, Vinicius Pestana³
²University of Bordeaux, ³Université Grenoble Alpes

Brown 1-2
EuMC36
Wireless Power Transmission Recent Advances
Chair: Diego Massetti¹
CoChair: Martino Aldrigo²
¹University of Bologna, ²IMT Bucharest

10:00 – 10:20
EuMC36-1
UHF RFID-based Wireless Power Transfer for Implantable Devices
Loris Riòki¹, Matteo Lurati¹, Tenno Birmingham²
¹University of Bologna

10:20 – 10:40
EuMC36-2
A New Wheel-Spoke Transmitter for Efficient WPT Based on Frequency Diversity
Enrico Fazzini¹, Alessandra Lazicanto¹, Diego Massetti¹
¹Università di Bologna

EuMC36-3
Design of Multiple-Transmitter WPT System with Angular Misalignment Estimation from Mutual Inductance Tracking
Seungjoon Kim¹, Jong-Wook Kim¹, Hyunjun Lee¹, Hyunsung Cho¹, Joa Moon², Jong-Won Yu²
¹Korea Advanced Institute of Science and Technology

EuMC36-4
Realization of a Passive UHF RFID Sensor Platform for the Detection of Damages on a Concrete Reinforcement
Davide Campi¹, Samir Wali², Monika Fischer², Thomas Ullmerser²
¹University of Innsbruck

EuMC36-5
Wireless Power Charging System with DC Combined 3-Dimensional Receiver
Pyo-Whan Lee¹, Jong-Wook Kim¹, Seungjoon Kim¹, Sang-Hyuck Kim¹, Kikun Lee¹, Jong-Won Yu²
¹Korea Advanced Institute of Science and Technology
THURSDAY 09:00 – 10:40

Suit 1

EuMW07
Special Session on Microwave Activities in North Africa
Chair: Ali Gharsallah¹
Co-Chair: Luigi Boccia²
¹University of Tunis El Manar, ²University of Calabria

09:00
EuMW07-1
Introduction
Ali Gharsallah¹
University of Tunis El Manar

09:10
EuMW07-2
Microwave Engineering for Biomedical Applications
Ali Gharsallah¹
University of Tunis El Manar

09:40
EuMW07-3
Modern RF circuits and Systems for Smart Cities
Ayman El-Tager¹
Military Technical College Cairo

10:10
EuMW07-4
Flexible RFID-UHF-Tag Sensors For Concentrations Measurement of Ethanol /Acetic-Acid Solutions and For Monitoring Vinegar Generation Process
Mohamed Essaaidi¹
Mohammed V-University of Rabat

Amber 5

EuRAD04
Gesture Recognition with Radar
Chair: Jungeaer Reinhard Wolfgang¹
Co-Chair: Marcene Harter²
¹Infineon, ²Offenburg University Of Applied Sciences

09:00
EuRAD04-1
Deep Learning Advances of Radar-based Gesture Sensing
Avik Santra¹
Invited Keynote
Infineon Technologies AG

09:20
EuRAD04-2
Spiking Neural Networks for Gesture Recognition Using Time Domain Radar Data
Ahmed Shaaban¹, Wolfgang Furtner², Robert Weigel³, Fabian Lurz³
¹Infineon Technologies AG, ²Infineon Technologies AG, ³Institute for Electronics Engineering, Friedrich-Alexander-Universitaet Erlangen-Nuernberg

09:40
EuRAD04-3
mm-Wave Radar Hand Shape Classification Using Deformable Transformers
Athmanarayanan Lakshmi Narayanan¹, Asma Kuriparambil Thekkumpate¹, Haoyang Wu¹, Jingyi Ma¹, Margaret Huang¹
¹Intel

10:00
EuRAD04-4
Joint Pedestrian Gesture Recognition and Orientation Estimation from Multistatic Radar Data
Nicola Kern¹, Ahmed Badr¹, Timo Grebner¹, Pirmin Schoeder¹, Christian Waldschmidt¹
¹Ulm University

10:20
EuRAD04-5
Towards Natural Virtual Mouse with mm-Wave Radar
Haoyang Wu¹, Xiankai Cai², Jingyi Ma¹, Xu Zhang¹
²Intel
EuRAD05-1
Mapping Error Reduction Methods for Polyphase Codes Generated by Quadrature Architectures
Bas van de Ven¹, Daan Rosenmuller¹, Erwin Janson², Kostas Dafnis³, Gorgios Rudolphiv, Marion K. Matters-Kannev
¹Eindhoven University of Technology (TU/e), ²NXP Semiconductors Eindhoven

EuRAD05-2
Theoretical Angular Resolution of Forward-Looking MIMO-SAR Systems
Adnan Al Baba¹, Sofie Pollin², Piet Wambacq¹, Hichem Sahli, André Bourdoux³
¹Vrije Universiteit Brussel and imec, ²KULeuven and imec, ³imec

EuRAD05-3
Doppler Tolerant and Detection Capable Discrete Frequency Coding Waveform Sets
Anjali Kadambi¹, Hrishik Sagar¹, Ravi Kadimatti¹
¹BITS-Pilani K K Birla Goa Campus

EuRAD05-4
W-band GB-SAR for 3D Imaging
Alessandra Benci¹, Tommaso Consoli¹, Lapo Miccinesi, Massimiliano Pieraccini
¹University of Florence

EuRAD05-5
3D SAR Imaging Radar System at Microwave Frequencies: Experimental Results
Rupesh Kumar¹, Arne Maouad Midhat¹, Vincent Fusco², Okan Yurduseven²
¹The Institute of Electronics, Communications and Information Technology (IETI), Queen’s University of Belfast

EuRAD05-6
Key Performance Indicators for System Analysis of MIMO Radars with Widely Separated Antennas
Gianluca Serafini, Salvatore Mamacco, Malik Muhammad Hossain Amir³, Antonio Malgeri, Paolo Ghezzi, Antonio Ragoni
Scuola Superiore Sant’Anna, Consiglio Nazionale delle Ricerche (CNR), Consorzio Nazionale Interuniversitario per le Telecomunicazioni (CNI)

EuRAD05-7
Improved TOA and Pulse Width Estimation for Wideband Signal in Electronic Warfare Systems
Jong-Hyeon Bang¹, Do-Hyun Park¹, Hyoung-Nam Kim¹
¹Pusan National University

EuRAD05-8
Time-domain Analysis of Ultra-Wideband Scattering Properties of Fruits
Jonas Gedschold¹, Tim Erich Wegner, Adam Kalisz, Reiner S. Thomä¹, Jörn Thielecke², Giovanni Del Galdo¹
¹TU Ilmenau, ²Friedrich-Alexander Universität Erlangen-Nürnberg

EuRAD05-9
Tailoring Radar-Based Patient Monitoring Models to Real-Life Needs using Utility Maximization
Louis Vincent De Sloover¹, Lorin Wenthem Brahimi², Gehrke Bhanavanuj¹, Tom Dhame, Ivo Couckuyt¹
¹Ghent University, imec, Ghent University

EuRAD05-10
SWALIS/KaRADOC Sensors: Calibration Procedure for Radar Systems for Hydrologic Remote Sensing Applications
Jean-Claude Kolou Koam², Stéphane Méric³, Jordi CHINAUD, Eric Patter¹, Guy Grunfelder, Gil PICOULT, Alain MALLET
¹TIEC, INSA Rennes, ²Centre National d’Études Spatiales (CNES), ³TIEC, Université de Rennes 1

EuRAD05-11
A Fast and Accurate Convolutional Neural Network for LPI Radar Waveform Recognition
Do-Hyun Park¹, Jong-Hyeon Bang¹, Ji-Hun Park¹, Hyoung-Nam Kim¹
¹Pusan National University

Exhibition Hall
EuRAD05
Posters
Chair: Debora Pastina¹
Co-Chair: Fabrizio Sant¹
¹University of Rome La Sapienza

Posters presenters will be ready around their stands by 10:40.
THURSDAY 11:20 – 13:00

Amber 1
EuMC37
Technological Advances for Integrated Antenna Design
Chair: Matthias Geissler¹
Co-Chair: Daniel Segovia-Vargas¹
¹IMST GmbH, ²University Carlos III de Madrid, Leganes, Madrid, Spain

11:20 – 11:40
EuMC37-1
Electromagnetic Simulations of mm-Wave and Sub-THz Antennas Embedded in Real Systems
Semenov Denis¹, Marta Ariza Camps¹, Enrico Volpi¹, Winfried Spenkel¹, Oliver Lutzka¹
INVITED KEYNOTE
IMST GmbH

Amber 2
EuMC38
Advances in Antennas for Sensing and Testing
Chair: Dirk Heberling¹
Co-Chair: Lars Jacob Foged¹
¹Institute of High Frequency Technology - RWTH Aachen, ²MVG

12:00 – 12:20
EuMC38-1
Recent Developments in Probe Array Technology for NF and FF Antenna Testing
Lars Jacob Foged¹, Francesco Saccani¹
INVITED KEYNOTE
MVG

Amber 4
EuMC39
Broadband Coupler and Divider Design Techniques
Chair: Ke Wu¹
Co-Chair: Alexander Köppl¹
¹Politecnico Montreal, ²Hamburg University of Technology

11:20 – 11:40
EuMC39-1
The Beauty of Miniaturization in Electronics: an Overview on Integrated Passive Device (IPD) Technology
Emmaus Maisonneuve

12:00 – 12:20
EuMC39-2
Circular Gysel Divider for the Frequency Range from 18 GHz to 26 GHz
Jürgen Güttinger¹, Christopher Beck¹, Marco Oczet¹, Robert Weigel¹, Fabian Loo¹
Tübingen-Alexander University Erlangen-Nuremberg (FAU), ³University of Technology, Hamburg

Brown 1-2
EuMC40
Near-field Wireless Power Transfer
Chair: Giuseppina Monti¹
Co-Chair: Jasmin Grosinger¹
¹University of Salento, ²Graz University of Technology

11:20 – 11:40
EuMC40-1
Analysis of Inductive Power Transfer Systems Using High Efficiency Oscillators
Alfredo Suarez Rodriguez³
INVITED KEYNOTE
Universitat de Lleida

12:00 – 12:20
EuMC40-2
Unchain Wireless Power – The Future of NFC Wireless Charging
Daniel Lopez Dou³, Oliver Kronschläger¹, Peter Thienert³, Ulrich Nett³
NEP Semiconductors
**EuMW08**

**Special Session EurAAP: Advanced Automotive Radars and Vehicle Technologies**

**Chair:** Ivan Russo<br>**Co-Chair:** Stefania Monni

1. **EuMW08-1** Improving the Detection Capability of Imaging MIMO Radars by Tx Beamforming<br>**Authors:** Dominik Schwarz, Ines Dorsch, André Dürr, Christian Waldschmidt

2. **EuMW08-2** High-Efficiency Injection-Molded Waveguide Horn Antenna Array for 76-81 GHz Automotive Radar Applications<br>**Authors:** Rejzammer, García-Rey, Mateos-Burgos-García, Francesco Metf

3. **EuMW08-3** A Semi-Virtual Long-Range Test Drive for Car2X with Virtual Traffic Simulator and its Application on Antenna Diversity<br>**Authors:** Anton Dobler, Stefan Lindenmeier

4. **EuMW08-4** On Antenna Mounting Position for 6G Vehicular Communications<br>**Authors:** Tan-Hong-Le Dam, Alejandro Niembro-Martín, Thierry Lacrevaz, Gregory Houzet, Camille Delfaut, Damien Paulet, Nadège Reverdy-Bruas, Quoc-Bao Duong, Tan-Phu Vuong

5. **EuMW08-5** On Antenna Mounting Position for 6G Vehicular Communications<br>**Authors:** Rasmus Møller, Joon Taghizamir, Monica Hesse, Umberto Spagnolini
THURSDAY 14:20 – 16:00

**Amber 2**

**EuMC42**
Advances in Antenna Arrays
Chair: Yang Hao
Co-Chair: Marianna Ishchian
Queen Mary University of London, Chalmers University of Technology

**EuMC42-1**
Challenges and Outlook for Radar Antenna Technologies
Piotr Kaminski, Alessandro Sarabi, Jue Beller, Eric Sandoz, Cristina Ionescu, Stefanas Mora
IKV - Institut für Mikrowellentechnik, KIT - Karlsruhe Institute of Technology

**EuMC42-2**
Direct Analytical Synthesis of Broadside Inline Antenna Arrays
Matteo Ulizio, Lorenzo Moscato, Steven Carcillo, Cristian Fraschetti
Politecnico di Milano, ISMEC - Microwetecnica, Università degli Studi di Milano

**EuMC42-3**
A G-band Horn and OMT Platelet Array
Mark McCullough, Jack Graham, Danielle George
The University of Manchester, The University of Nottingham

**EuMC42-4**
High Gain Omnidirectional Array Antenna Using SIW Technology
Ahmad Emadeddin, Saeideh Shad, B. L. G. Jonsson
Royal Institute of Technology (KTH), KTH - Royal Institute of Technology

**EuMC42-5**
Cavity PCB Process-Based Ka-Band Phased Array With Offset-Fed Aperture Coupled Patch Antenna
Park BH, Youngchul Cho, D. Hong Lee, Sang Myoung Ha, Chan-Hyoe Lee, Jang Min Yoo
Korea Advanced Institute of Science and Technology

**EuMC42-6**
A Full-Wave Dipole Array With15:20
Wideband Gain and Nonlinear Performance
Jafar Banar, Thomas Eriksson

**EuMC43**
Focussed Session Efficient Millimeter-wave Communications for Mobile Users
Chair: Elminie Meyer
Co-Chair: Ulf Johannsen
Eindhoven University of Technology

**EuMC43-1**
A W-band Low-Power Gilbert Cell Mixer with Image Rejection in 130-nm SiGe BiCMOS Technology
Katerina Sminova, Mehmet Kayran, Ahmet Cagri Ulusoy
KTH - Royal Institute of Technology, TPA - Lehrstuhl für Mikrowellenwerkstoffe

**EuMC43-2**
Demonstration of Flexible mmWave Digital Beamforming Transmitter using Sigma-Delta Radio-Fiber Link
Huizeng Fu, Zhengyang Shen, Chihe Wu, Filippos Pantzalis, Christian Fager
Chalmers University of Technology, Ericsson Research

**EuMC43-3**
Mutual Coupling Analysis of Open-Ended Ridge and Ridge Gap Waveguide Radiating Elements in an Infinite Array Environment
Yingtao Zhang, Armin Werner, Marianna Ishchian
Chalmers University of Technology

**EuMC43-4**
Effect of Phase Noise on the Distributed Massive MIMO Networks
Srinath Burra, Thomas Ericsson
Chalmers University of Technology

**EuMC43-5**
A mm-Wave Hybrid Stirring Technique for Over-the-Air Testing in Reverberation Chambers
Nazarne Ferdi, Atef Hamelou, Ainhoa Fernandez, Ulf Johannsen, A. Bart Smolders, Sander Branden
Eindhoven University of Technology, Ericsson Research, Ericsson AB

**EuMC44**
Energy Harvesting and Antennas Solutions for WPT
Chair: Jasmin Grossinger
Co-Chair: Nuno Borges Carvalho
Graz University of Technology, University of Aveiro / Instituto de Telecomunicacoes

**EuMC44-1**
WPT as an Enabler of Space Exploration
Nuno Borges Carvalho
Université Gustave Eiffel, Centre de Recherche en Informatique et Systèmes d’Information (CRIStAL)

**EuMC44-2**
Reflector-Based Power Output Maximization and Near-Field Detuning-Mitigation in Miniaturized Tightly-Coupled Flexible Rectenna Arrays
Abdelmajid Wahid, Steve Beverly
University of Southampton

**EuMC44-3**
Screen Printing of Flexible Dual-Band Antenna on a New Biocomposite Based on a Flax Fiber Laminate
Abdelemoin, Jean-Marc Florez, Sebastien Garet, Frank Kallfass, Anne-Claude Tart
IETR UMR6164, INSA Rennes, INSA Rennes, IEMN, UMR6164 - GRENoble INP

**EuMC44-4**
An Energy Harvester for a Battery-free Wireless Sensor System on a Marine Propulsion Shaft
Karthik Hwang, Young Lee
Mokpo National Maritime University

**EuMC44-5**
Dynamically Reconfigurable Broadband SP3T Switch Powered by WPT for Antenna Switching Applications
Saptarshi Ghosh, Yash Kumar, Aditi Sharma, Mondeep Saikia
University of South Australia, Deakin University, Deakin University

**EuMC45**
Metasurfaces
Chair: Ferran Martin
Co-Chair: Vahid Nayeri
Universitat Autonoma de Barcelona, Iran University of Science and Technology

**EuMC45-1**
Glide Symmetries and their Practical Implications in Periodic Structures
Oscar Quevedo-Teruel
IKI - Royal Institute of Technology

**EuMC45-2**
A Rasorber with a Selective in-Band Transmission Response between Wide Absorption Bands
Yash Kumar, Ioan Shurma, Nuno Borges Carvalho, Saptarshi Ghosh, Vahid Nayeri
University of South Australia, Deakin University, Universitat Autonoma de Barcelona

**EuMC45-3**
Broadband Radar Cross Section Reduction Using Generalized Phase-Polarization Cancellation
Ali Ghasemi, Mohammad Shirmohammadi-Kouh, Mohammad S eskandari, Vahid Nayeri
University of South Australia

**EuMC45-4**
Efficient Modeling of Nonlinear Graphene as a Surface Boundary Condition in the Finite-Difference Time-Domain Method
Fatemeh Mohammadi, Vahid Nayeri
Telecommunication Company of Iran, Iran University of Science and Technology

**EuMC45-5**
Resonances in the E-Polarized Terahertz Wave Scattering and Absorption by a Graphene Strip on Substrate Grating
Febi Widiastuti, Sami Khalil, Hamed V inay, Malin Lundgren, Christian Fager
Institute of Radio-Physics and Electronics NASU, Laboratory of Micro and Nano Optics, Institute of Radio-Physics and Electronics NASU

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**Amber 5**

**EuMC44**
Focussed Session Efficient Millimeter-wave Communications for Mobile Users
Chair: Elminie Meyer
Co-Chair: Ulf Johannsen
Eindhoven University of Technology

**EuMC44-1**
WPT as an Enabler of Space Exploration
Nuno Borges Carvalho
Université Gustave Eiffel, Centre de Recherche en Informatique et Systèmes d’Information (CRIStAL)

**EuMC44-2**
Reflector-Based Power Output Maximization and Near-Field Detuning-Mitigation in Miniaturized Tightly-Coupled Flexible Rectenna Arrays
Abdelmajid Wahid, Steve Beverly
University of Southampton

**EuMC44-3**
Screen Printing of Flexible Dual-Band Antenna on a New Biocomposite Based on a Flax Fiber Laminate
Abdelemoin, Jean-Marc Florez, Sebastien Garet, Frank Kallfass, Anne-Claude Tart
IETR UMR6164, INSA Rennes, INSA Rennes, IEMN, UMR6164 - GRENoble INP

**EuMC44-4**
An Energy Harvester for a Battery-free Wireless Sensor System on a Marine Propulsion Shaft
Karthik Hwang, Young Lee
Mokpo National Maritime University

**EuMC44-5**
Dynamically Reconfigurable Broadband SP3T Switch Powered by WPT for Antenna Switching Applications
Saptarshi Ghosh, Yash Kumar, Aditi Sharma, Mondeep Saikia
University of South Australia, Deakin University, Deakin University

**EuMC45**
Metasurfaces
Chair: Ferran Martin
Co-Chair: Vahid Nayeri
Universitat Autonoma de Barcelona, Iran University of Science and Technology

**EuMC45-1**
Glide Symmetries and their Practical Implications in Periodic Structures
Oscar Quevedo-Teruel
IKI - Royal Institute of Technology

**EuMC45-2**
A Rasorber with a Selective in-Band Transmission Response between Wide Absorption Bands
Yash Kumar, Ioan Shurma, Nuno Borges Carvalho, Saptarshi Ghosh, Vahid Nayeri
University of South Australia, Deakin University, Universitat Autonoma de Barcelona

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**Brown 1-2**

**EuMC45**
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Chair: Ferran Martin
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Febi Widiastuti, Sami Khalil, Hamed V inay, Malin Lundgren, Christian Fager
Institute of Radio-Physics and Electronics NASU, Laboratory of Micro and Nano Optics, Institute of Radio-Physics and Electronics NASU
THURSDAY 14:20 – 16:00

Amber 1

EuRAD06
Radar-communication Waveforms and MIMO Applications
Chair: Gaspare Galati¹
Co-Chair: David Mata-Moya¹
¹Tor Vergata University, University of Alcalá

EuRAD06-1
Detection and Cognitive Beam-forming in Massive MIMO Radars
Maria Sabrina Greco¹
INVITED KEYNOTE
University of Rome

14:20 – 14:40

EuRAD06-2
Comparison of Radar Receivers for OFDM and OTFS waveforms
Alior Compani Serrani¹, Nicola Petrov², Maria-Gorzynska-Nowak³, Alexander Yourassy⁴
²Fraunhofer IAF, ³NXP Semiconductors Eindhoven, ⁴TU Delft

14:40 – 15:00

EuRAD06-3
Doppler Tolerant and Detection Capable Polyphase Good Code Sets Based on Linear FM Waveforms
Anjali Kadambi¹, Ravi Kadimatti¹
BITS-Pilani K K Birla Goa Campus

15:00 – 15:20

EuRAD06-4
Waveform Design for Range-ILS Minimization with Spectral Compatibility in MIMO Radars
Ehsan Raei¹, Mohammad Ali-Akbari-Hashemi², Ehsan Shokufeh M.R.
²SnT - Interdisciplinary Centre for Security, Reliability and Trust, University of Luxembourg

15:20 – 15:40

EuRAD06-5
Fast Direction of Arrival Estimation based on Space and Frequency Multiple Division Access
Cecilia Celotti¹, Stefano Madella¹, Marco Faccio², Giuseppe Peluso¹, Monica Rigoli³
¹University of Florence, ²University of Rome, ³University of Florence

Amber 4

EuRAD07
Passive Radar
Chair: Pietro Guccione¹
Co-Chair: Krzysztof Kulpa²
¹Aresys s.r.l., ²Warsaw University of Technology

EuRAD07-1
Passive Radar Imaging in SAR and ISAR Mode
Krzysztof Kulpa¹, Damian Gromek¹, Mariusz Bączyk¹, Piotr Sacharski¹
INVITED KEYNOTE
Warsaw University of Technology

15:40 – 16:00

EuRAD07-2
An apodization approach for passive GMTI Radar with Non-Uniform Linear Arrays
Andrés Queiroz¹, Laurao Paula Bracchi¹, Fabiola Colone¹, Pierfrancesco Lombardo¹
¹University of Alcalá

EuRAD07-3
Planar Array and spatial filtering techniques for improving DVB-S based passive radar coverage
Nimno del Rey-Murrie³, Maria Pilar Zarate-Anaya³, David Mata-Moya³, Isabel Almodovar-Hernandez³, Javier Rosado-Sanz³
³University of Alcalá

EuRAD07-4
Performance Prediction of the Loaded Reciprocal Filter for OFDM-based Passive Radar
Javier Trujillo Rodriguez¹, Fabiola Colone¹, Pierfrancesco Lombardo¹
¹Sapienza University of Rome, Italy

EuRAD07-5
Passive Space Object Observation using LOFAR Radio Telescope and Software-defined Radio Receiver
Kamil Jedrzejewski¹, Mateusz Malanowski¹, Pawel Krzyżowski¹, Piotr Krzyżowki¹, Piotr Szczepański¹
Warsaw University of Technology, Polish Academy of Science, Space Research Centre
# THURSDAY 16:40 – 18:20

**Brown 1-2**

**EuMC46**  
EuMC Closing Session  
Chair: Alessandra Costanzo¹  
Co-Chairs: Luca D’Antonio², Marco Pasian³  
¹University of Bologna, ²JMA Wireless, ³University of Pavia

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Speaker</th>
<th>Location</th>
<th>Organization</th>
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</thead>
<tbody>
<tr>
<td>16:40</td>
<td>Session Welcome</td>
<td>Alessandra Costanzo, EuMC Chair</td>
<td>Brown 1-2</td>
<td>EuMC Chair</td>
</tr>
<tr>
<td>16:50</td>
<td></td>
<td>Luca D’Antonio, EuMC Co-Chair</td>
<td>Brown 1-2</td>
<td>EuMC Co-Chair</td>
</tr>
<tr>
<td>16:50</td>
<td></td>
<td>Marco Pasian, EuMC TPC Chair</td>
<td>Brown 1-2</td>
<td>EuMC TPC Chair</td>
</tr>
<tr>
<td>16:50</td>
<td>New Trends and Advances in Wireless Communications - The Paradigm of the Smart Electromagnetic Environment</td>
<td>Andrea Massa</td>
<td>ELEDIA Research Center, University of Trento, Italy</td>
<td>ELEDIA Research Center, University of Trento, Italy</td>
</tr>
<tr>
<td>17:20</td>
<td>Meeting the Challenges of Connectivity Technologies for Today and Tomorrow</td>
<td>Frederic Gianesello</td>
<td>STMicroelectronics, France</td>
<td>STMicroelectronics, France</td>
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<tr>
<td>17:50</td>
<td>Awards Ceremony</td>
<td>Giuseppe Macchiarella</td>
<td>EuMW 2022 Awards Chair</td>
<td>EuMW 2022 Awards Chair</td>
</tr>
<tr>
<td>18:10</td>
<td>EuMC Prize</td>
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<td>EuMC Prize</td>
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<tr>
<td>18:10</td>
<td>EuMC Young Engineer Prizes</td>
<td></td>
<td></td>
<td>EuMC Young Engineer Prizes</td>
</tr>
<tr>
<td>18:10</td>
<td>Closing Remarks</td>
<td>Luca Perregrini</td>
<td>EuMW 2022 General Chair</td>
<td>EuMW 2022 General Chair</td>
</tr>
<tr>
<td>18:20</td>
<td>Invitation to EuMW 2023</td>
<td>Thomas Zwick</td>
<td></td>
<td>EuMW 2023 General Chair</td>
</tr>
</tbody>
</table>

Due to the exponential growth of mobile data traffic expected in the next few years, we are witnessing a wide and multi-disciplinary debate about the next generation wireless standard, after the 5G. Indeed, future wireless services, such as those for autonomous vehicles, real-time remote health care, and intelligent industrial automation, just to mention a few, will require higher capacity, lower latency and higher reliability, while minimizing complexity and power consumption. Base-station (BTS) antennas and user terminals, previously considered the key players for fostering the radio access, will be overcome. New solutions to spatially distribute the radiated power, taking advantage of wave scattering phenomena in multi-path propagation environment, traditionally considered obstructions for the EM propagation, are exploited in such a way that the EM environment itself plays a key-enabling role to achieve such challenging objectives. Holistic wireless network are implemented, where the environment is the degree-of-freedom (DoF) for the wireless planning and system design. Smart EM environments are created, realizing artificial “smart skins” deployed/integrated in buildings walls to tailor the EM propagation in complex urban scenarios. The objects are used as they are, by opportunistically benefiting of their scattering capabilities, to tailor the best EM field distribution in the regions of interest. This talk reviews these technological trends, with theoretical deepening, discussing the complex task of planning heterogeneous electromagnetic scenarios (i.e., BTS, IAB nodes, smart repeaters, RIS, EM Skins, etc...) to achieve user requirements with cost-effective integrated solutions.

With connectivity at the heart of the industrial transformation and our day-to-day lives (as seen during the COVID-19 pandemic), the current deployment of 5G networks and the preliminary definition of the upcoming 6G technology will play a key role not just in the evolution of wireless communications but also in the advancement of businesses and society. We will start by reviewing associated wireless business challenges and trends, illustrating through commercially available chipset solutions how silicon has enabled 5G deployment. Then, we will look at the preliminary requirements for 6G networks and go over ST’s current silicon technology roadmap to highlight how we aim to help companies address future connectivity challenges through our technology portfolio.
THURSDAY 16:40 – 18:20

Amber 1

**EuRAD08**
Positioning Techniques for Sensor Motion Compensation and Indoor Localization
Chair: Laurent Forno-Ferri¹
Co-Chair: Stefano Tedaldini¹
¹ISAE-SUPAERO, "Politecnico di Milano

**Amber 2**

**EuRAD09**
Advanced Signal Processing Concepts for Automotive Radar
Chair: Martin Vossiek¹
Co-Chair: Marina Gashinova²
¹Friedrich-Alexander University Erlangen-Nuremberg, ²University of Birmingham

**Amber 3**

**EuRAD10**
Automotive Radar III
Chair: André Bourdoux¹
Co-Chair: Alessio Filippi²
¹ imec, Leuven, ²NXP Semiconductors

**Amber 4**

**EuRAD11**
Human Activities with Radar
Chair: Nils Pohl¹
Co-Chair: Kevin Chetty²
¹ Ruhr University Bochum, ²University College London

16:40 - 17:00

**EuRAD08-1**
Localization in Smart Radio Environments
David Clouter¹
INvITED KEYNOTE
University of Birmingham

**EuRAD09-1**
Automotive Radar – Modern Trends and Challenges in Signal Processing
Marina Gashinova
INvITED KEYNOTE
University of Birmingham

**EuRAD10-1**
Digitally Modulated Radars for Automotive Applications
Mario Bourdoux¹, Marc Basavias²
¹ imec, Leuven, ²NXP Semiconductors

17:00 - 17:20

**EuRAD08-2**
Precise Indoor Positioning with a Dodecahedron Sequential Rotation Antenna Array Designed for Space Division Multiple Access
Giovanni Collot¹, Serrano Matese¹, Marco Piccinini¹, Giuseppe Orlandi¹
¹University of Florence

**EuRAD09-2**
Automotive Object Detection on Highly Compressed Range-Beam Doppler Radar Data
Michael Mayer¹, Shen Terekho¹, Sein Terekho¹
¹University of Duisburg-Essen

**EuRAD10-2**
6D Self-Calibration of the Position and Orientation of Radar Sensors in a Radar Network
Timo Greter¹, Matthias Linder¹, Nicola Kerm¹, Perren Schüler¹, Christian Waldschmidt¹
¹Ulm University

17:20 - 17:40

**EuRAD08-3**
High Accuracy Position Calculation of a Hovering UAV Using a Rotating Radar
Philipp Neckel², Patrick Walter¹, Renhold Hershel³, Nils Pohl¹
¹Fraunhofer FHR, ²Ruhr-University Bochum

**EuRAD09-3**
Complex-Valued Neural Networks for Millimeter Wave FMCW Radar Angle Estimations
Kevin Kastr¹, Jonas Dauquy¹, Jöven Lopez-Rambo³, Alois Knoll², Robert Weber³
²Fraunhofer FHR, ³University of Duisburg-Essen

**EuRAD10-3**
Automotive Radar Parameter Estimation for Cognitive Interference Mitigation
Ahmad Ahmad Perkasi¹, Taherben Kansaid³, Mihail Chernikov¹, Marina Gashinova²
¹University of Birmingham, ²University of Duisburg-Essen

17:40 - 18:00

**EuRAD08-4**
Motion Compensation for Body-frame Doppler Estimation of Radar Sensors on Multi-rotor UAV Platforms
Seonghwan Hong¹, Tanmoy Yu¹, Sangseok Nam¹
¹Seoul National University

**EuRAD09-4**
Analysis of a Machine Learning Based Virtual Array Augmentation Technique for Automotive Radar
Maureen Eschbaumer¹, Simon Achatz¹, Sascha Babi¹
¹Infrarad Technologies AG

**EuRAD10-4**
High Bandwidth and Low Phase Noise Architecture for Multi-Mode 60/77 GHz FMCW Radars
Karthik Subburaj¹, Sanjib Ray¹, Snekreos Samat³, And Man¹, Brian Grell¹, Karthik Ramasubramanian¹
³University of Birmingham, ²Texas Instruments

18:00 - 18:20

**EuRAD08-5**
Optimized DBSCAN with Improved Static clutter removal for High Resolution Automotive Radars
Santhana Raj¹, Dipanjan Ghosh¹
¹PathPartner Technology Pvt Ltd

**EuRAD09-5**
Range-Angle Coupling Compensation in Frequency Domain Interleaved OFDM MIMO Systems
Arturo Salazar¹, André Bourdoux¹, Mauricio Guzman³, Helmen Suh¹, Satte Thaller²
¹IMEC and KU Leuven, ²IMEC, ³IMEC and Ghent University, ¹IMEC and Vrije Universiteit Brussel

**EuRAD10-5**
A 94 GHz Antenna On-Silicon Interposer With Parasitic Elements for Bandwidth Improvement
Juan C. Garcia Santos¹, Bart Vandenbosch¹, Siddharta Seth¹, Borugaj Majeed², Eugenio Novoednov¹, Bha Ocker¹
¹KU Leuven, ²IMEC

**EuRAD11-1**
Radar Approaches for Sequential Human Activity Classification
Francois Fararet¹, Nicolas Kione¹, Romy Gerhard Spoerri², Alexander Farnab³
¹ISAE-SUPAERO, ²Politecnico di Milano

**EuRAD11-2**
Quantifying Uncertainty in Real Time with Split BIRNN for Radar Human Activity Recognition
Lars Wüthrich-Braunstein¹, Gerhard Biemans¹, Ivo Coucke⁴, Tom Dhaim⁵, Dirk Deprez⁶
¹KU Leuven, ²IMEC

**EuRAD11-3**
MIMO Differential Radar Using Null Point Beams for Vital Sign Detection in the Presence of Body Motions
Kawon Han¹, SongCheol Hong¹
RAFIS

**EuRAD11-4**
Contact-Free Pedestrian Tracking Using Massive MIMO-OFDM Communication System
Chenglong Li¹, Shiren Debad¹, Yang Miao¹, Enric Torner², Alexander Farnab³, Ivo Coucke⁴
¹KU Leuven, ²IMEC

**EuRAD11-5**
A Compact Harmonic Radar System at 61/122 GHz ISM Band For Physiological Joint Angle Estimation
Alexander Schröder¹, Patrick Knebel³, Stefan Harms¹, Katharina Müller¹, Francisco God Floy¹, Falk Heidrich¹, Constantin Mayer², Marcus Jäger³
¹Fraunhofer FHR, ²Fraunhofer FHR, ³University of Duisburg-Essen

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FRIDAY 09:00 – 10:40

Amber 1

EuRAD12
Signal Processing and Machine Learning for Radar Applications
Chair: Francesco Fierani
Co-Chair: Mohammed Jalangi
TU Delft, University of Birmingham, UK

EuRAD12-1
Neural Network Architecture for Classification and Typing of Air Targets
Massimo LoMuzza, Luca Toninanni, Pasqualino Ferrara, Maria Lannunia, Gabriele Germano, Bruno Parisi, Marco Angeli, Alfonsos Farina
INVITED KEYNOTE
Leonardo SPA

EuRAD12-2
Low-latency Convolutional Neural Network for Automatic Classification of Unknown Drone Types
Bachir L. Alnouf, Jonathan Grey, Stephen Harman, Milan Neumann

EuRAD12-3
Unknown Object Recognition Using the Manifold Structure of Class Distributions
Ryota Yatake, Masahiro Shiraishi
Metropolitan Electric Corporation

EuRAD12-4
Fast and resource-efficient CNNs for Radar Interference Mitigation on Embedded Hardware
Michael Hirschmüller, Johann Rokx, Frane Perkovic, Paul Messerschmitt
Signal Processing and Speech Communication Laboratory, Graz University of Technology, Austria, Infineon Technologies Austria AG, Graz, Austria

EuRAD12-5
An Iterative Channel Imbalance Online Calibration Technique for Automotive Radar
Simon Achatz, Moayad Jammal, M. Michael Eschbaumer, Fabian Rasch, Elmar Tomschnig, Andre Roger
Infineon Technologies AG, PT. Infineon Technologies Indonesia

Amber 2

EuRAD13
Radar Imaging
Chair: Jacc de Wit
Co-Chair: Michael Antoniou
TNO, University of Birmingham

EuRAD13-1
Radar Imaging for Land Monitoring, Science, and Safety
Stefano Tabetti, Andrea Monti Guarnieri, Claudio Maria Parli
INVITED KEYNOTE
Politecnico di Milano

EuRAD13-2
Tomographic Processing of Bistatic Airborne SAR Data from the TomoSense Campaign
Stefano Tabetti, Mauro Marotti Alessandrini
Politecnico di Milano

EuRAD13-3
3D SAR imaging using bistatic opposite side acquisitions, the bizonza concept
Laurent Ferri-Fedrigi, Stefano Tabetti, Ray Alosi, Lino Moise, Nadia Mouri
GAS SURADY, Politecnico di Milano, Università de Rennes 1, Technical Politechnique Militiare d’Alger, Université de Rennes 1

Amber 3

EuRAD14
mm-Wave and Imaging Radar
Chair: Mayazurra Ruggiano
Co-Chair: Nils Pohl
Thales Nederland B.V., Ruhr University Bochum

EuRAD14-1
Recent Advances in Short-range Radar Cross-range Resolution Improvement
Alexander Yarovoy
INVITED KEYNOTE
Ruhr University Bochum

EuRAD14-2
A 77-81 GHz FMCW MIMO Radar with Linear Virtual Array Enabling 3D Target Localization by Use of Frequency-Steered TX Antennas
Patrick Ruckstuhl, Alexander Urrti, Lukas Pfister, Nils Pohl
Ruhr University Bochum

EuRAD14-3
Millimeter-Wave Imaging Using Dielectric Lens for Security Application
Are Setareh, Atsuhisa Yamawaki, Nanako Yonemoto, Hiroshi Nakano, Hideto Muzata
Me University, Japan, National Institute of Maritime, Port, and Aviation Technology, Minita Technology Inc.

Amber 4

EuRAD15
Radar Phenomenology and Calibration
Chair: Stéphane Meric
Co-Chair: Alexander Köpfin
IETR UMR6164, INSA Rennes, Hamburg University of Technology

EuRAD15-1
Traveling Wave Josephson Parameter Amplifiers (TWJPAs) technology with application to Microwave Quantum Radar
Patricia Leven, Alla Fariana
University of Palermo, Leonardo SPA
INVITED KEYNOTE
University of Palermo, Leonardo SPA

EuRAD15-2
An Iterative Phase Shifters Online Calibration Technique for Automotive Radar Systems
Mayazurra Ruggiano, Oliver Lang, Sha Frensch Nachagha, Farhan Bin Khalid, Simon Achatz, André Roger, Mario Huer
Infineon Technologies AG, WU University Linz, PTLE, Infineon Technologies Indonesia

EuRAD15-3
Effects of Bistatic Operation in Harmonic Radar
Anastasia Lavrenko
University of Twente

EuRAD15-4
A Broadband Test Environment Concept for FMCW Radars based on Overmoded Waveguides
Manuel Funk, Christoph Dahl, Jan Barsnesk, Tor Ulf Hølter, Christian Schub
Ruhr University Bochum

EuRAD15-5
Design of a High Linear, Frequency Selective VHF-Receiver with Low Phase Noise for a Passive Radar System
Hans Hofeleck, Stefan Erdl, Robert Wiegert, Fabian Lurz
Friedrich-Alexander University Erlangen-Nürnberg (FAU), Hamburg University of Technology (TUHH)
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<th>Authors</th>
<th>Institute</th>
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<tr>
<td>11:20</td>
<td>Amber 1</td>
<td>EuRAD16: Focused Session Automotive Radars Above 100 GHz</td>
<td>Chair: André Bourdoux¹, Co-Chair: Alessio Filippi¹</td>
<td>imec, Leuven, NXP Semiconductors</td>
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<tr>
<td>11:20</td>
<td>Amber 2</td>
<td>EuRAD17: Array Techniques and Direction Finding</td>
<td>Chair: Michael Antoniou¹, Co-Chair: Pierfrancesco Lombardo¹</td>
<td>University of Rome, University of Rome</td>
</tr>
<tr>
<td>11:40</td>
<td>Amber 3</td>
<td>EuRAD18: mm-Wave and Broadband Radar Subsystems</td>
<td>Chair: Stephen Harmon¹, Co-Chair: Mohammed Jahange²</td>
<td>Aveillant Ltd, University of Birmingham, UK</td>
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<tr>
<td>11:40</td>
<td>Amber 4</td>
<td>EuRAD19: Radar Modules and Systems</td>
<td>Chair: Nils Pohl¹, Co-Chair: Jan Wessel²</td>
<td>Ruhr University Bochum, Fraunhofer FHR</td>
</tr>
<tr>
<td>12:20</td>
<td>Amber 1</td>
<td>EuRAD16-1: Spectrum for Automotive Radar in the 140 GHz Band in Europe</td>
<td>Alessio Filippi¹, Vincent Martinez¹, Massimiliano Mattei¹</td>
<td>NXP Semiconductors</td>
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<tr>
<td>12:20</td>
<td>Amber 2</td>
<td>EuRAD17-1: From Phased Arrays, through Digital Beamforming, to Fully Digital Arrays for Radar</td>
<td>Clara Antoni¹</td>
<td>imec, Leuven, NXP Semiconductors</td>
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<tr>
<td>12:20</td>
<td>Amber 3</td>
<td>EuRAD18-1: Wide Band Antenna Systems for Space-based Radar</td>
<td>Pasquale Capone¹</td>
<td>imec, Leuven, NXP Semiconductors</td>
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<tr>
<td>12:20</td>
<td>Amber 4</td>
<td>EuRAD19-1: 126-182 GHz D-Band Radar: Hardware and Applications</td>
<td>Timo Jangsch¹, Senan Klippert¹, Jan Barnekov¹</td>
<td>Robert Bosch GmbH</td>
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<tr>
<td>12:20</td>
<td>Amber 1</td>
<td>EuRAD16-2: Comparative Study of Automotive MIMO Radar Measurements in W-Band and D-Band</td>
<td>Jonas Wagner¹, Christoph Dahl¹, Ronja Hofert¹, Jan Barnekow¹</td>
<td>Ruhr University Bochum</td>
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<td>12:20</td>
<td>Amber 2</td>
<td>EuRAD17-2: Circular Convolutional Learned ISTA for Automotive Radar DDA Estimation</td>
<td>Hyun Koo¹, Satchai Ravindran¹, Ryan Wu¹, Jan Li¹, Raed van Sloun¹</td>
<td>Eindhoven University of Technology, NXP Semiconductors, USA</td>
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<tr>
<td>12:20</td>
<td>Amber 3</td>
<td>EuRAD18-2: A Low Phase Noise 77 GHz Frequency Synthesizer for Long Range Radar</td>
<td>Stephan Knott¹, Myesra Bulaomination¹, Saeed Farid¹, Man-Michael Menefee¹, Helko Gustav-Kucz¹, Christoph Schmitt¹</td>
<td>Fraunhofer Institute, University of Paderborn, Volkswagen-Achegongforschung</td>
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<tr>
<td>12:20</td>
<td>Amber 4</td>
<td>EuRAD19-2: 77 GHz 4x4 TDM MIMO Radar with an Extended Unambiguous Velocity Range</td>
<td>Jürgen Hecht¹, Martin Frei¹, Tobias Schmid¹</td>
<td>Robert Bosch GmbH</td>
</tr>
<tr>
<td>12:20</td>
<td>Amber 1</td>
<td>EuRAD16-3: Sub-THz Radar Imagery for Automotive Application</td>
<td>Liam Clarke¹, Marcoo Lustrova³</td>
<td>University of Birmingham</td>
</tr>
<tr>
<td>12:20</td>
<td>Amber 3</td>
<td>EuRAD18-3: mm-wave Antennas for Direction Finding RADAR</td>
<td>Miguel Piovesan-Guizzi¹, Alessandro Gil-Martinez¹, Francesco Salmenriva¹, José Luis Gómez-Izquierdo¹</td>
<td>Technical University of Cartagena, 4Media</td>
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<tr>
<td>12:20</td>
<td>Amber 4</td>
<td>EuRAD19-3: High-Performance Miniaturized Quad T/R Module for X-band Low-Profile AESA</td>
<td>Emilie Koc¹, Niran Edward¹, FIKAR ALTUNOSA¹</td>
<td>Anach Air Forces, Turkey</td>
</tr>
<tr>
<td>12:20</td>
<td>Amber 1</td>
<td>EuRAD16-4: Synthetic Aperture Terahertz Imaging with an Optoelectronic FMCW Radar</td>
<td>Andreas Krepl¹, Oliva Meisner-Ademb¹, Lari Larikäsmäki¹, Lauri Lehtimäki¹, Lauri Maasikainen¹, Björn Gullichs¹, Taban Friedrich¹</td>
<td>Fraunhofer ITWM, Fraunhofer Heinrich Hertz Institute</td>
</tr>
<tr>
<td>12:20</td>
<td>Amber 2</td>
<td>EuRAD17-4: Using Widely Separated MIMO Antennas for UAV Radar Direction-of-Arrival Estimation</td>
<td>Max Schwarze¹, Sbi Germanhaus¹, Jan Hetzer¹, Peter Adam Hotten¹</td>
<td>University of Applied Sciences (HADO), Christian-Albrechts-Universität zu Kiel</td>
</tr>
<tr>
<td>12:20</td>
<td>Amber 3</td>
<td>EuRAD18-4: Algorithmic Radar, a Novel Low-Power Architecture for High-Accuracy PMCW Radar</td>
<td>Corine van Poyenbos⁴, Thomas E.N. Bos¹, Yuki Vidaljovic¹, Christian Fager¹, Rob Maaskant¹, Peter Bahls¹</td>
<td>Eindhoven University of Technology, Chalmers University of Technology</td>
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<td>12:20</td>
<td>Amber 4</td>
<td>EuRAD19-4: An S Band Tile of 16 T/R Modules for Fully Digital Array (DAR Technology)</td>
<td>Francesco Marani¹, Marco Di Battista¹, Bruno Buscaino¹</td>
<td>Virtualabs s.r.l.</td>
</tr>
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<td>12:20</td>
<td>Amber 1</td>
<td>EuRAD16-5: Radar Cross Section Characterization of the Car In-Cabin Environment at Sub-THz Frequencies</td>
<td>Victor Petersen¹², Saeed Jafari¹², Simon Jafari¹²</td>
<td>microwave electronics laboratory, Delft University of Technology</td>
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<tr>
<td>12:20</td>
<td>Amber 2</td>
<td>EuRAD17-5: Improved Direction Finding Accuracy for A Limited Number of Antenna Elements with Harmonic Characteristic Analysis</td>
<td>Shyam Yav⁵, Francesco Ferrari⁵, Alexander Vraney⁵</td>
<td>imec, Leuven, NXP Semiconductors</td>
</tr>
<tr>
<td>12:20</td>
<td>Amber 3</td>
<td>EuRAD18-5: Concepts for SAR Systems with Photonic Beamforming</td>
<td>Jörg Hennig¹, Siegfried Huber¹, Gerhard Krieger¹</td>
<td>Deutsches Zentrum für Luft- und Raumfahrt</td>
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<td>12:20</td>
<td>Amber 4</td>
<td>EuRAD19-5: Circularly Polarized Phased Array System with Pattern Optimization Algorithm for Low Side Lobe Level and Scanning Axial Ratio</td>
<td>Jang-Hee Kim¹, Jong-Soo Lee¹, Seo Kim¹, Song Hyuck Han¹, Kim Won-Ye¹, Jong Shin-Ye¹</td>
<td>Korea Advanced Institute of Science and Technology</td>
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</table>
## Brown 1

### EuRAD20

**EuRAD Closing Session**

**Chair:** Debora Pastina¹

**Co-Chair:** Fabiola Colone¹

¹University of Rome La Sapienza

### 14:20 – 15:40

<table>
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<tr>
<th>Time</th>
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<th>Speaker/Institution</th>
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<tr>
<td>14:20</td>
<td>Session Welcome</td>
<td>Debora Pastina, EuRAD TPC Chair</td>
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<td></td>
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<td>Fabiola Colone, EuRAD TPC Chair</td>
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<tr>
<td>14:30</td>
<td>Space Based Radar architectures and technologies from very high spatial resolution to constellation for high revisit: status and perspectives</td>
<td>Giampiero Di Paolo, Thales Alenia Space</td>
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<td>15:10</td>
<td>Awards Ceremony</td>
<td>Giuseppe Macchiarella, EuMW 2022 Awards Chair</td>
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<td>EuRAD Prize</td>
<td>EuRAD Prize</td>
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<td>EuRAD Young Engineer Prize</td>
<td>EuRAD Young Engineer Prize</td>
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<tr>
<td>15:20</td>
<td>Closing Remarks</td>
<td>Pierfrancesco Lombardo, EuMIC 2022 Chair</td>
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<tr>
<td>15:40</td>
<td>Invitation to EuRAD 2023</td>
<td>Christian Waldschmidt, University of Ulm</td>
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**In the last decade,** radar observation from space has experienced an extraordinary evolution, which has led to conceive and develop constellations embarking radar instruments of heterogeneous capabilities and characteristics. High-end radar satellites keep on improving their observation performance, thanks to the implementation of novel observation techniques and by employing space qualified technologies at the state of the art, while radar constellations of small satellites have recently entered the observation market, drastically improving the figures of revisit time, and opening new trade-off spaces in terms of cost, performance, reliability and non-standard technological paradigms. Each class of solution offers peculiar potentialities and requires for specific measures to be taken at each level of design.

This key note offers an outline of the variety of architectural and technological solutions envisaged by Thales Alenia Space in order to design Space Based Radars, spanning from multi-mode instruments which embrace a wide range of performance of resolution and swath within the framework of a single satellite, addressing then instruments which are devoted to very high resolution measurements, and in conclusion extending the overview to the solutions to be hosted on-board small satellites, which privilege design aspects related to miniaturization and high integration of the radar functions.
Welcome of Workshop / Short Course Chairs

We are very pleased to offer to the EuMW 2022 delegates a wide range of workshops and short courses. Workshops and short courses have traditionally been a distinctive feature of the European Microwave Week, providing a comprehensive overview of emerging topics in microwave systems and representing one of the most important interlinks between academia and industry. This event in Milan is peculiar in the EuMW history since it takes place after two years of Covid pandemic, and because 2022 is the year of the two EuMWs, as London 2021 was postponed in 2022. Because of the short period of time between Milan and London EuMW we faced a challenge and an effort was made to provide an engaging workshop/short courses program that would convince attendees to join EuMW in Milan after London. Our goal, we believe, was achieved by offering a short course about Fundamentals of Microwave Power Amplifier (PA) Design and 30 workshops in the most interesting fields within the microwave scope, reflecting the areas of all the three conferences taking place during the week (EuMC, EuMIC, EuRAD). Workshop topics include emergent topics such as quantum computing, with two different workshops focused on the Cryogenic RF-mmW Technology, metrology and other emerging microwave techniques for quantum computing. Several workshops tackle 6G communication systems from different perspectives, including both architecture and system aspects as well as all its main technological challenges, from semiconductor to integration technologies. Specific attention is also dedicated to radars, automotive and space-related aspects, also including the access-to-space topic. A significant attention is also devoted to healthcare and biomedical applications with four dedicated workshops tackling also the last advancements on topics such as dosimetry and microdosimetry for the estimation of the exposure of human bodies to the EM radiation, new sensors for medical applications, nanoparticles in medicine and also the innovative use of radars in this discipline. A number of workshops is also dedicated to foundational topics such as filters, arrays and innovative manufacturing techniques.

We would like to express our deep gratitude to all workshop organizers, presenters and authors for their effort during all stages of the conference. To better orient the attendees, each workshop and the short course are individually endorsed by one or more conferences of the EuMW. Nevertheless, they are accessible to any attendee interested in broadening their understanding of microwave and RF systems and devices, independently from the conference they registered.

Each session will be a unique event where discussion and interaction between participants will be highly promoted thus fostering networking opportunities and interactions.

EuMIC and EuRAD workshops are concentrated on Sunday and Friday, respectively. EuMC workshops are spread on Sunday, Monday and Friday. Slides for the workshops and short courses will be available to download from the conference’s websites approximately two weeks before the conference. No hard copies of the slides will be provided. Instructions for the download process will be provided to the registered participants near the conference.

CRISTIANO TOMASSONI
Workshop & Short course Chair
University of Perugia, IT

LUIGI BOCCIA
Workshop & Short course Co-Chair
University of Calabria, IT
SUNDAY 09:00 – 18:20

Fundamentals of Microwave PA Design

Chair: Paolo Colantonio¹
¹University of Roma Tor Vergata (Italy)
Room: Amber 1

This short course aims to provide a comprehensive overview of all aspects related to the design of microwave power amplifier design. It is an introductory course, dedicated to 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. Advances in semiconductor amplifiers and their applications will also be covered.

Starting from the fundamental concepts on semiconductor devices and their modelling development, 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 from 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 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

Semiconductor devices and modelling for PAs
Iltcho Angelov¹
¹Chalmers University (Sweden)

PA basic concepts
Franco Giannini¹
¹University of Roma Tor Vergata (Italy)

Design and model oriented Load Pull techniques
Marco Perna¹
¹Politecnico di Torino (Italy)

The Doherty Power Amplifier
Paolo Colantonio¹
¹University of Roma Tor Vergata (Italy)

Load Modulated PAs
Steve Cripps¹
¹Cardiff University (UK)

X-parameters high-power PAs modeling for System Level Analysis
Alessandro Colonna¹
¹University of Florence (Italy)

Linear and Nonlinear Stability Analysis of Power Amplifiers
Giorgio Leuzzi¹
¹University of L’Aquila (Italy)

Linearization techniques overview
Pere L. Gibert¹
¹Universitat Politècnica de Catalunya (UPC-Barcelona Tech.)
Carrier frequencies > 100GHz are attractive for next generation radar and 6G cellular systems due to the large amount of available spectrum in the D and H-bands that can be leveraged for high resolution sensing and high data rate communications. The integration of sensing and wireless communications will be foundational to 6G, with the goal of creating a network-as-sensor with physical and situational awareness. Operation at these high mmWave frequencies comes with many challenges, though, particularly in the demands placed on technology performance, integration and cost for the phased array front end. Losses on and off chip are very high. Transistor performance is significantly worse, with challenges in achieving acceptable gain, Pout, and PAE for the PA, acceptable gain and NF for the LNA and low insertion loss for the switch. Thermal management and antenna/FEM/transceiver integration will be particularly demanding due to the constraints of the lattice spacing at these frequencies. This workshop will review initiatives in 6G and imaging radar at 140GHz and discuss recent results in systems, circuits, semiconductor and packaging research and development.

**PROGRAMME**

**Overview of hardware challenges towards 6G radios**
- Aarno Pärssinen¹
  - University of Oulu

**Integrated Communication and Sensing providing a 6th Sense to beyond-5G and 6G Systems**
- Thorsten Wild¹
  - Nokia

**Imaging Radar**
- Brian Ginsburg¹
  - Texas Instruments

**Towards multi-function 6G/radar front-ends at 140 GHz**
- Ilja Ocket¹
  - IMEC

**Advanced digitally modulated mm-wave radar transceivers at 140GHz and 300GHz in SOI CMOS technology**
- Vadim Issakov²
  - TU Braunschweig

**SOI and SiGe for 6G**
- Ned Cahoon¹
  - GlobalFoundries

**Circuits and Technologies for Applications above 100 GHz**
- James Buckwalter¹
  - University of California - Santa Barbara

**Antenna-in-Package Solutions for 6G**
- Ivan Ndip¹
  - Fraunhofer IZM
The advent of 5G has brought deploying flexible waveforms, numerology and frame design strategies together with increased bandwidth signals that operate from handsets to large-array transmitter architectures with RF impairments that need to be properly addressed with advanced digital predistortion (DPD) solutions. These solutions differ depending on the targeted applications. For mobile-terminated for example, the computational complexity introduced by the DPD solution is of crucial importance. Therefore, low-complexity solutions are required to address challenges such as compensating for the load-mismatch distortion (due to variation of the antenna impedance) or to compensate for the nonlinear distortion arising in envelope tracking power amplifiers (incorporated in mobile terminals to avoid wasting excessive power resources when handling high PAPR).

On the other hand, in transmitters with multiple antennas (e.g., with massive MIMO architectures) and multiple power amplifiers, the output power of each PA will be significantly reduced compared to that in the existing high-power base stations, which leaves limited headroom for digital predistortion in terms of power and cost budget. New digital compensation solutions for linear and nonlinear distortion compensation of ultra-wideband or multi-band 5G systems will be required. In addition, due to multiple antennas and PAs are used in MIMO transceivers, characterization and compensation of coupling effects between the antenna array and the PAs must be addressed.

In this workshop, we will discuss the requirement of wireless transmitters for 5G and beyond and related modelling and system design challenges that we are facing. Particular emphasis will be given to mobile terminals, MIMO system architectures, digital compensation model selection, and model order reduction techniques. System characterisation, theoretical analysis, experimental test and hardware/software system implementation issues will also be discussed. The speakers are from the mixed of academia and industry.

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**Digital Front-end (DFE) Techniques for Compact Uplink: State-of-the-arts, Potentials, and Future Trends**

Yan Guo¹
Huawei Technologies

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**Recent Advances in Digital Predistortion and Postdistortion based Nonlinear Distortion Mitigation**

Mikko Valkama¹, Lauri Anttila¹
Tampere University of Applied Sciences

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**Model Complexity Reduction and Performance Improvement for DPD in Low Power Applications**

Anding Zhu¹
University College Dublin

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**Sparse digital predistortion: from a priori pruning to coefficient selection techniques**

Juan A. Becerra-Gonzalez¹, Maria J. Madero-Ayora¹
Universidad de Sevilla

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**Flexible, power efficient DPD in indoor and outdoor RUs**

Hennar Fathi²
*Alena*
This workshop focuses on GaN millimeter-wave power amplifier MMIC implementations. In a part of the Ka band (27-31GHz) dedicated to 5G communications, there are a number of GaN technologies, on both SiC and Si substrates, which have shown high efficiencies and watt-level output powers from MMIC PAs. At higher millimeter-wave frequencies, the gate lengths are below 100nm, and power amplifiers that cover the entire W band have been demonstrated with double-digit efficiencies. The morning part of the workshop is dedicated to Ka-band PAs, while the afternoon will cover MMICs demonstrated above 35GHz.
New On-Chip and Scalable RF Packaging Solutions with Integrated Antennas for 5G mmWave and 6G Applications

Chair: Marcel Wieland¹
Co-Chair: Ivan Ndip²
¹Globalfoundries, ²Fraunhofer IZM

Room: Amber 5

The on-going commercialization of 5G focuses on sub-6 GHz 5G-systems. Although some 5G mmWave devices are already in market, R&D of miniaturized, scalable, cost-effective and energy-efficient 5G mmWave systems which operate in the 24-29 GHz and 37-40 GHz bands is still underway. These systems are expected to enable peak data-rates up to 20 Gbps and latency of about 1ms. Unlike 5G, 6G is envisioned to operate above 100 GHz, e.g., in D-band, and would enable data-rates up to about 1 Tbps as well as latency of approximately 100 μs. Such extremely high data-rates and low latency, combined with novel artificial intelligence techniques, will enable new applications that would transform our lives, economy and society. However, the development of these 5G mmWave and 6G THz-systems is challenging, partly because of very high channel losses, which have severe impact on signal-to-noise ratio and throughput. To overcome these challenges, new mmWave/THz MIMO and beamforming-architectures as well as new on-chip, packaging, integrated-antenna and frontend-module (FEM)-integration solutions are required.

In this workshop, experts from industry and academia will present novel system-architectures, on-chip and scalable Antenna-in-Package solutions for 5G mmWave and 6G. Key challenges and various RF system-integration approaches (monolithic/heterogeneous-integration...) for the development of 5GmmWave/6G frontend-modules as well as chip-package co-optimization and multi-physics techniques will be presented. Recent results of some national/international 5GmmWave/6G projects such as SERENA (5G-mmWave EU-Project), mmWave-IPCEI (Important Project of Common European Interest) and 6G Kom (first 6G D-band-module project funded by German Federal Ministry of Education & Research) will also be discussed.

**PROGRAMME**

**Workshop Introduction**

Marcel Wieland¹
⁠¹Globalfoundries

**Architectural Challenges for 5G mm-wave and 6G sub mm-wave Radio Base Stations**

Kristoffer Andersson¹
⁠¹Ericsson

**Technology and Chip-design Considerations for 5G/B5G Beamforming Solutions**

Daniele Dal Maistro¹, Franz Dielacher¹
⁠¹Infineon Technologies

**Transceiver Frontends in BiCMOS Technology for 6G Communications**

Detmar Kissinger¹
⁠¹University of Ulm

**RF System-Integration Approaches and Integrated Antennas for 5G mmWave and 6G**

Ivan Ndip²
Fraunhofer IZM

**Scalable AiP Modules and Chip-Package-Co-Optimization for 5GmmWave/B5G**

Selaka Bulumulla¹
⁠¹Globalfoundries

**Design Challenges of mm-wave Front-Ends and Antennas for 5G and beyond**

Vadim Issakov¹
⁠¹Braunschweig University of Technology

**Package Design Trade-offs for 100Gbps 6G/THz Wireless Communication Links**

Ulrich Fleiter¹
⁠¹University of Wuppertal

**Prediction of 5G/B5G transmitter characteristics using a comprehensive multi-physical simulation framework**

Christian Fager¹
⁠¹Chalmers University

**Summary of Workshop**

Marcel Wieland¹
⁠¹Global Foundries
RF and mmW reliable ICs: characterization, test and security challenges

Chair: Marc Margalef-Rovira¹
Co-Chair: Manuel J. Barragan²

¹IEMN, Lille, France, ²TIMA, Grenoble, France

Room: Amber 5

Safety critical applications have stringent reliability requirements that should cover many different failing scenarios, ranging from fabrication defects to environmental conditions or malicious third-party attacks. Widely speaking, assuring reliability across the lifetime operation of an integrated circuit requires to address the combined challenges of technology characterization, testability (both in the production line and during operation in the field), and security threats. In this workshop, four expert speakers will be invited to share state-of-the-art approaches to address these challenges in the context of RF and mmW integrated circuits.

PROGRAMME

Tutorial: Machine learning techniques for RF test applications
Gildas Léger¹
¹IMSE-CNM, Seville, Spain

Low-cost production test of ZigBee transmitters on standard digital Automated Test Equipment
Florence Azaïs¹
¹LIRMM, Montpellier, France

RF characterization of active and passive devices integrated in advanced CMOS technology
José Lugo¹
¹CEA, Grenoble, France

Hardware security and trust for RF Transceivers
Haralampos Stratigopoulos¹
¹LIP6, Paris, France
SUNDAY 09:00 – 18:20

Technological needs for future SatCom connectivity

Chair: Alessandro Fonte¹
Co-Chairs: Luigi Boccia², Matteo Oldoni³
¹SIAE Microelettronica, ²Università della Calabria, ³Politecnico di Milano
Room: Suite 1

Nowadays satellite communications systems comprise a wide range of solutions by providing services in plenty of areas. The satellites operate in several frequency bands and more recently Ku and Ka bands, on both portable and vehicle-mounted terminals, as well as some stationary terminals and cellular backhaul services. Satellites are also widely used for low-speed supervisory control and data acquisition applications, and they can also be used in case of mobile infrastructure failures. The integration of the satellite and terrestrial system is already a trend, and this will continue with the development of interoperability standards to allow the two domains to interconnect efficiently. Looking ahead to the near future, there is a trend towards distributed and more powerful SatCom links that will bring capacities from 100 Gbps up to 1 Terabit. Onboard signal processing will also be taken into account: it will enable better connectivity and flexibility to meet evolving traffic patterns and demands (i.e. adaptive beam training and jump, interference management...). Moreover, following the recent innovative use of different orbits, new non-GEO systems should be connected using all-optical technology, whether between satellites or from satellite to ground. This workshop will cover these different aspects of satellite communications systems exploiting the expertise of relevant actors in the SatCom community. The topics covered by the workshop include different areas within the space-oriented trends, infrastructures, and technologies like:

• novel applications and future needs for high-throughput Earth-to-satellite and intersatellite connectivity
• innovative RF and microwave systems and modules for SatCom applications
• cutting-edge microwave and mm-wave devices and system designs for satellite and ground segment environments
• measurement and characterization systems (instruments, integrated environments...) for high TRL device and subsystems characterization

PROGRAMME

Highly integrated and compact solutions for RF Systems
Christian Arnold¹
¹TESAT

Ongoing AESA works for Ka-band SatCom services
Benoît Lesur¹
¹Safran Data Systems

SatCom Antennas for Small Airplanes
Roberto Pezzoli¹
¹Piaggio Aerospace

In-Flight Electronically Steerable Antennas in GSO and NGSO Scenarios
Manuel J. Gonzalez¹
¹TTI

Coping with interference between 5G terrestrial and satellite networks
Fabrizio De Paolis¹
¹ESA

Research In Outer Space: Facilitating access to space supporting scientific and technological advancement
Eleonora Gigli²
²D’Orbit

Future challenges in aeronautics and the role of SatCom
Volker Ziegler¹
¹Airbus

Small Satellites and Compact User Terminals for non-GEO communication
Marzia Migliorelli¹
¹SITAEL
During the past decade, quantum computing has grown from a field known mostly for generating scientific papers to one that is poised to reshape computing as we know it. But despite the significant progress made in the last decade in the science and engineering of quantum computation systems, several challenges remain to be overcome before quantum computation can become practically usable. Today’s most prominent candidate for implementing large-scale systems, the superconducting qubit platform, operates in the microwave regime at very low temperatures, typically at tens of milli-kelvin and is controlled and readout via conventional microwave electronics operating at room temperature. The advancement of quantum computing implies a significant increase of high frequency cabling and components operating at such cryogenic temperatures putting stringent requirements on heat-load, space, and signal integrity under these extreme conditions. The engineering challenges of realizing such practical large-scale systems present quantum microwave engineers with opportunities in cryogenic microwave modeling, design, measurement, and characterization of cryogenic semiconductor and superconductor devices, circuits, and systems. This workshop will review emerging microwave techniques and technologies for quantum computing including design and characterization of superconducting qubit circuits, cryogenic CMOS circuits and systems, low-temperature microwave measurement and calibration techniques.

**PROGRAMME**

**Quantum Computing with Micro-waves**

Joseph Bardin¹
¹University of Massachusetts Amherst & Google Quantum AI

**Characterisation of Microwave Devices at Cryogenic Temperatures for Quantum Computing**

Manoj Stanley¹
¹National Physical Laboratory, UK

**Cryogenic Microwave Modeling and Characterization for Quantum Applications**

Alireza Boaventura
¹University of Colorado, Boulder, US

**Cryogenic device characterization for quantum computing systems**

Suren Singh¹
¹Keysight Technologies

**De-embedding and calibration in high loss environments**

Jon Martens¹
¹Anritsu

**Cryo-CMOS Circuits and Systems for Quantum computing**

Fábio Sebastiano¹
¹TU Delft

**Engineering the microwave to infrared noise photon flux for superconducting quantum systems**

Sergey Danilin¹
¹University of Glasgow
SUNDAY 09:00 – 18:20

mmWave Front Ends: Challenges and Advances
Chair: Hua Wang¹
Co-Chairs: Ned Cahoon², Shafiullah Syed³
¹ETH Zurich, ²GlobalFoundries
Room: Suite 3

mmWave applications have entered the main stream and will become increasingly important to our daily lives as the enabler for high data rate low latency 5G communications, imaging radar for autonomous driving and broadband satellite connections to the internet from anywhere on the planet. Operation at mmWave frequencies comes with challenges, though, particularly in the demands placed on technology performance, integration and cost at the front end of the mmWave radio. The low efficiency of power amplifiers at mmWave frequencies are a key bottleneck in current generation system performance, cost and power consumption for 5G and radar, and noise figure and loss at the front end impacts the size and cost of satcom user terminals. This workshop will cover the application requirements, semiconductor technologies and circuit performance for state-of-the-art mmWave front ends and will discuss the challenges and advances needed for the next generation.

PROGRAMME

State of the art and challenges of mm-Wave PAs and LNAs
Hua Wang¹
¹ETH Zurich

Enabling Technologies for Low-Cost mmWave SATCOM Terminals
Harish Krishnaswamy¹
¹Mixcomm / Sivers

Challenges and system level considerations for 77GHz FMCW automotive radar
Vadim Isakov¹
¹TU Braunschweig

mmWave SOI PAs for 5G
Shafiullah Syed³
³GlobalFoundries

Advanced SiGe: from mmWave to sub-THz
Ned Cahoon²
²GlobalFoundries

CMOS Trends and Challenges for mmW Applications
Peter Baumgartner¹
¹Intel

Antenna in Module
Hideki Ueda¹
¹Murata
WORKSHOPS AND SHORT COURSES

SUNDAY 09:00 – 13:00

Advances in Nonlinear Component Modeling and Digital Predistortion under Modulated Signal Conditions

Chair: Nizar Messaoudi¹
Co-Chair: Jan Verspecht¹
¹Keysight Technologies
Room: Suite 4

Wireless communication is undergoing a period of major transformation, requiring extraordinarily high data rates and low latency capabilities. Large scale multiple-antenna (LSMA) radio systems will be a key technology to meet the requirements of future wireless networks. The realization of viable LSMA radio hardware is very challenging, especially at the transmitter side where the trade-off between linearity and efficiency is of critical importance. Specifically, the power amplifiers (PAs) suffer from non-negligible non-linearity that significantly degrades their output signal quality when driven at peak power, where their efficiency is at its highest. This issue is exacerbated when the PAs are driven with wide bandwidth modulated signals. Hence, the deployment of linearization techniques such as digital predistortion (DPD) is essential to maximize the trade-off between their linearity and efficiency.

This workshop will highlight advances in the field to address the numerous challenges related to creating reliable behavioral models under modulated signals to enable robust PA designs that are suited for LMSA radio architectures. The workshop will also highlight advances in inverse modeling required for DPD development to address these increasingly complex architectures.

PROGRAMME

RF component testing under wideband modulated signals with a vector network analyzer
Jean-Pierre Teyssier¹
¹Keysight Technologies

Building a GaN-on-SiC Technology Ecosystem Through Systematic and Accurate Modelling of the Constituent Device Building Block
Bassim Noori¹
¹Wolfspeed

Advances in modelling and inverse modelling based on Modulation Distortion measurements
Jan Verspecht¹
¹Keysight Technologies

Measurement-driven Wideband Active Array Emulation using a Network Analyzer
Gian-Piero Gibiino¹, Alberto Maria Angelotti¹
¹University of Bologna

Recent Advancements in Digital Predistortion for Millimeter-wave Beamforming Transmitters
Slim Boumaiza¹
¹University of Waterloo
SUNDAY 14:20 – 18:20

Electromagnetic Waves in Daily Life: Research Insights from Young Professionals

Chair: Giacomo Paolini¹
Co-Chair: Francesca Benassi¹
¹University of Bologna
Room: Suite 4

This workshop aims to introduce innovative research results coming from Young Professionals engineers concerning microwave systems for biomedical and industrial applications. In particular, wireless power transfer and energy harvesting techniques are examined, with the employment of new flexible and wearable (i.e., polymers, or paper- and fabric-based) materials for epidermal and implantable devices.

For what concerns the industrial environment, a series of solutions for battery-less sensor nodes for predictive maintenance purposes is presented; in fact, following this approach, it is possible to eliminate the use of bulky batteries, avoiding their continuous replacement in machineries. Moreover, RFID technologies in UHF band in mobile and aerial robotics are analyzed for solving the problems of traceability of goods in large stores or warehouses.

Finally, near-field focusing applications exploiting electromagnetic fields with limited diffraction and limited dispersion will be investigated; in fact, thanks to the leaky-wave approach, it is possible to design metasurface-based devices capable of focusing energy in the near-field region at microwave frequencies.

PROGRAMME

WPT and Energy Harvesting Solutions for Biomedical and Industrial Applications
Francesca Benassi¹, Giacomo Paolini¹
¹University of Bologna, Italy

Microwave-Enabled Green Sensing using Smart Materials and Flexible Electronics
Mahmoud Wagih¹
¹University of Southampton, UK

Epidermal and Implantable sensors: from research to PoC
Carolina Miozzi¹
¹Radio6ense and University of Roma – Tor Vergata, Italy

A Multifunctional Smart Bandage Using Electrochemical Sensing for Real-Time Monitoring of Chronic Wound Healing
Dieff Vital¹
¹The University of Illinois Chicago, USA

Energy-Autonomous Wireless Sensing for Preventive Maintenance
Valentina Palazzi¹
¹Università di Perugia, Italy

RFID with ground and aerial robotics: tag localization for logistics and retail
Andrea Motroni¹
¹Università di Pisa, Italy

Microwave Generation of Localized Waves Through Leaky Waves
Walter Fuscaldo¹
¹CNR-IMM, Consiglio Nazionale delle Ricerche, Rome, Italy

Safety Risk Evaluation of Patients with Medical Implants: The Significance of Diverse Human Anatomical Models
Lena Kranold¹
¹IT’IS Foundation
Additive Manufacturing (AM) technologies have the potential to change how future microwave and millimeter-wave products for Space are designed, integrated, tested and operated. This technology is already considered a strategic technology approach for space applications. Indeed, AM technologies enable the design of novel RF layouts that are optimized for performance, mass, and envelope, while also massively reducing the design/manufacturing/assembly cycle/costs and providing an environmental-friendly alternative to conventional machining. AM is also considered a key enabling technology for miniaturization of complex small systems with integration of different functionalities (RF, thermal and mechanical).

The assessment and exploitation of AM approaches for RF hardware has already started, for which different process chains are being considered in terms of material, processing, and post-processing. Meanwhile, new RF modeling and optimization tools are being developed that are better suited for exploiting the augmented degree of freedom provided by AM technologies w.r.t conventional machining.

This workshop will present the state-of-the-art concerning the application of AM technologies to the manufacturing of microwave and mm-wave components with contributions from companies, universities, and research centers.

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**SUNDAY 09:00 – 18:20**

Additive Manufacturing Technologies for Microwave and Millimeter-Wave Applications

Chair: Vittorio Tornielli di Crestvolant
Co-Chairs: Giuseppe Addamo, Oscar Antonio Peverini

Room: Suite 5

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**PROGRAMME**

**Progress in Additive Manufacturing of RF components by SWISSto12**
Antoine Calleau¹

**Recent Advances in Ceramic Additive Manufacturing for RF Filter Design and Implementation**
Patrick Boe¹

**Additive Manufacturing of Complex Shaped Monolithic Ceramic Microwave Filters**
Julia Rabitsch¹

**3D Printed Materials for New RF Devices and Metamaterials**
Will Whittow¹

**Density-based Topology Optimization Methodology for RF Components Manufactured by AM**
Pascal De Vincenzo²

**Additive Manufacturing for the Prototyping of Tunable Filters with Single Command**
Aurélien Périgaud²

**Ceramic Resonators Made in Additive Manufacturing for New Generation Microwave Filters**
Luca Pelliccia¹

**Sinter-based Additive Manufacturing Technologies: Possibilities and Challenges for Microwave Applications**
Kay Reuter¹

**Additive Manufacturing of Feed Systems for Active Satellite Antennas**
Michael Kilian¹

**Development of Complex Antenna-Feed Chains through AM**
Oscar Antonio Peverini²

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¹Swissto12 SA
²Department of Electrical and Information Engineering, Kiel University
³Lithoz GmbH
⁴Loughborough University
⁵Open Engineering
⁶Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM, Branch Lab Dresden
⁷Airbus Defence and Space GmbH
⁸CNR-IEIIT
Recent Advances in Topologies, Technologies and Practical Realizations of Microwave Sensors dedicated to biomedical applications

Chair: Benjamin Potelon¹
Co-Chair: Enrique Bronchalo²
¹Lab-STICC, ²Miguel Hernández University of Elche

Room: Amber 4

The fast-growing emergence of IoT, together with the increased ability for systems to process high volumes of data (AI, Machine Learning, Big data...) has opened the way and enhanced the needs for a new generation of sensors. Indeed, the constant seek for continuous, live data has appealed a new paradigm where coping with a high volume of data is no longer a problem as long as those data are reliable. In this context, microwave sensors can usually exhibit interesting features such as non-invasiveness, continuous measuring, and of course the ability to track structural, chemical, mechanical or physical properties specifically linked to RF waves. This workshop proposes to focus on the recent advances on the design of microwave sensors from the topological, technological and practical realizations aspects, together with a particular attention on biomedical applications.

PROGRAMME

Dielectric spectroscopy of liquids with microstructures in suspension using microfluidic sensors in reflection and transmission modes
Elodie Richalot¹
¹Univ. Gustave Eiffel, ESYCOM

Microwave dielectric spectroscopy applied to living materials and beings
Katia Grenier¹
¹LAAS-CNRS

Recent Advances in Planar Microwave Sensors for Sensitivity Enhancement
Ferran Martín¹
¹CIMITEC, Universitat Autònoma de Barcelona

Microwave resonating sensors: addressing the sensitivity and selectivity challenges
Carlos Gabriel Juan¹
¹Miguel Hernández University of Elche/Lab-STICC

Real-time CARS microspectroscopy combined to ultra-short pulsed electric field exposure to monitor water molecule changes during the occurrence of electroporation
Caterina Merla¹
¹ENEA, Italy

Monday 26th September 2022
Cryogenic electronics will have a strong impact on our society through applications as Quantum Computing but also, space communication, and high performance computing. Quantum computers, have the potential to radically advance our computational capability and are predicted to strongly impact fields such as medicine, chemistry, science and finance by allowing to solve computational problems that cannot readily be solved by classical computers. The hardware implementations of quantum computers rely on various quantum bit (Qubit) technologies, such as superconducting qubits, spin qubits and Majorana fermions. All of these Qubits require cryogenic temperatures (<1K) to operate efficiently, and need, and restitute Analog-RF signals for their manipulation, and results respectively. Thus, there is a need for cryogenic electronics with a large array of functionalities, operating under extremely low noise conditions with limited power budgets as close as possible from the Qubit. Achieving this will require enhanced understanding of existing transistor technologies, 3D integrated systems and novel nano-electronic devices employing unique low-temperature effects. With these new devices, new ultra-low noise, ultralow power, and wide-band circuits and systems are emerging, preparing the next computing revolution. In this Workshop we will explore state of art status of Quantum computing applications and their associated technology and circuits analog-RF platforms.

**PROGRAMME**

**Overview of high-frequency electronics for superconducting quantum computing**

Cezar Zota¹

IBM

**Spin Qubit Quantum computing and needed readout electronics**

Maud Vinet¹

¹CEA

**Integrating quantum read/write, control electronics at cryo**

Elena Blokhina¹

¹Univ. College of Dublin

**Modelling of FDSOI devices for cryo-CMOS applications**

Christian Erc⁴

⁴EPFL

**Cryogenic behavior of InGaAs Nanowires for RF and mmW, and associated circuits for Quantum computing and other cryogenic applications**

Lars Erik Wernersson¹

¹Univ. of Lund

**Horse Ridge: a Cryogenic SoC for Spin Qubit Control Implemented in Intel FinFET Technology to Enable Scalable Quantum Computers**

Fahe Sebastian⁴

⁴Delft University of Technology

**Cryogenic SiGe Analog-RF circuits for Quantum Computing**

Joseph Bardin⁴

⁴University of Massachusetts Amherst & Google Quantum AI

**Cryogenic InGaAs HEMTs for RF and mmW: Associated Technologies and Circuits for Quantum Computing and Other Cryogenic Applications**

Fabio Thome⁴

⁴Fraunhofer IAF
Reconfigurable radiofrequency circuits based on ferroelectric materials

Chair: Simone Trovarello¹
Co-Chairs: Mircea Dragoman¹, Luca Pierantoni"¹
¹University of Bologna, ²IMT Bucharest, ³Università Politecnica delle Marche
Room: Suite 1

Ferroelectric based-devices, developed in recent years to satisfy the growing demand for reconfigurable agility in current wireless communications systems, provide benefits in terms of high power handling, continuous tuning, switching rates, and a broad frequency range. Radar, the Internet of Things, and future wireless communication rely on the tunability of high-frequency components.

In this workshop, we will present the main state-of-the-art solutions based on ferroelectric materials, which include devices such as energy harvesters, low-power detectors, radiofrequency (RF) filters, antenna arrays, and so on.

The use of devices made using ferroelectric materials have significant advantages over traditional tunable devices based on semiconductors. Ferroelectric devices have considerably superior tuning capability to semiconductor-based competitors, moreover ferroelectric devices do not present forward bias conduction, a problem that becomes very present in semiconductor solutions when the input signal has high power. One of the main goals of the workshop will also be to provide a detailed analysis of the properties, design rules, electromagnetic simulations of ferroelectric materials, and nonlinear modeling procedures, with particular attention to nanoscale solutions also compatible with modern CMOS technologies.

This workshop is organized in the framework of the ongoing European Project H2020 FETPROACT-EIC-05-2019 “NANO-EH”, GA No. 951761 (“Nanomaterials Enabling Smart Energy Harvesting For Next-Generation Internet-of-Things”). Some of the recent results of the project will be discussed in the talks.

PROGRAMME

High-frequency devices using HfO2 ferroelectrics
Mircea Dragoman¹
²IMT Bucharest

Progress in Tunable RF Circuits based on Ferroelectric Materials
Patrícia Bouça²
¹University of Aveiro

New paradigms for microwave energy harvesting based on 2D materials and nanoscale ferroelectrics
Martino Aldrigo¹
²IMT Bucharest

First-principle modeling and simulation of ferroelectric systems and devices
Emiliano Laudadio¹
³UNIPVM

Non-linear modelling for tunable radiofrequency devices based on ferroelectric materials
Simone Trovarelli¹, Alessandra Di Florio Di Renzo², Diego Mazetti², Alexandra Costanzo³
¹Alma Mater Studiorum - University of Bologna

Nanomaterial enabling smart energy harvesting
Mircea Modreanu¹
²UCC-Tyndall
MONDAY 09:00 – 18:20

Space-Based Solar Power

Chair: Nuno Borges Carvalho¹
Co-Chair: Naoki Shinohara²

¹Instituto de Telecomunicacoes – Universidade de Aveiro Portugal, ²Kyoto University, Japan

Room: Amber 7

The need for energy resources is growing everywhere, either on earth, but also as alternatives for the moon and Mars exploration.

In this workshop, several speakers from around the globe will be talking about Space-Based Solar Power as an alternative to clean energy on earth and also as an alternative to power up rovers and space stations on the moon.

The speakers will also address their latest developments in this area and will present several real experiments to the audience.

PROGRAMME

Moon Based Solar Power Mule
Nuno Borges Carvalho¹
¹Instituto de Telecomunicacoes – Universidade de Aveiro Portugal

Magnetron Phased Array for Space-based Solar Power
Naoki Shinohara²
²Kyoto University, Japan

Development of Wireless Power Transfer (WPT) Systems for Lunar Rover Explorations and Flying Objects on Mars
Matteo Madi³
³Sirin Orbital Systems AG, Switzerland

System Study of Solar Power Satellite consisting of Integrated Modules of Power Generation and Transmission functions
Koji Tanaka¹
¹Japan Aerospace Exploration Agency/Institute of Space and Astronautical Science, Japan

Software Retro-directive Microwave Power Beam Steering for MPT Applications
Shi-Wei Dong¹
¹National Key Laboratory of Science and Technology on Space Microwave, China Academy of Space Technology, China

Inter-satellite Power Support System with WPT
Ahmet Baris Gok¹, Diego Masotti¹, Alessandra Costanzo¹
¹Alma Mater Studiorum – Università di Bologna

RF and Millimeter wave technologies for wireless planetary ancillary power delivery
Hooman Kazemi¹
¹Raytheon, USA
MONDAY 09:00 – 18:20

Substrate Integration Technologies for High-Density Hybrid and Monolithic Integrated Circuits, Antennas and Systems

Chair: Anthony Ghiotto¹
Co-Chair: Ke Wu²
¹Bordeaux INP, ²Ecole Polytechnique Montreal
Room: Amber 8

Higher integration of microwave and millimeter-wave electronics is one of the main research trends in our community. This workshop proposes an overview of actual efforts to achieve highly compact high-density hybrid and monolithic integrated circuits, antennas and systems.

PROGRAMME

Additively manufactured 3D/4D substrate-integrated modules for 5G+ smart skin and smart manufacturing applications
Manos M. Tentzeris¹
¹Georgia Tech

Air-Filled Substrate Integrated Waveguide: Design Freedom Enhancement and Future Roadmap
Nhu-Huan Nguyen¹
¹Grenoble INP

Design and performance of millimeter-wave substrate integrated waveguides in hybrid technologies
Jordan Cerci¹, Emmanuel Poppens¹
¹Univ. Grenoble Alpes

Novel Substrate-Integrated-Waveguide Antenna systems for Beyond 5G and Internet of Everything Communications
Karel Yance Kapuaaz¹, Hendrik Rogier¹
¹Universiteit Gent

SIW Components for Highly Integrated K/Ka-Band SatCom Arrays
Anton Segerschenon¹, Arne F. Jacob¹
¹Technische Universität Hamburg

RF Plasma Circuits and Antennas
Thomas Jones¹, Dimitrios Peroulis¹
¹Purdue University

SIW -based Reconfigurable Component for Millimeter-wave Applications: State of the Art, Developments, Limitations and Challenges
Karrar Naj Al Khanjar¹, Tarek Djerafi¹
¹INRS

Photo-Induced Substrate-Integrated Waveguides based on Pillar-Array Structures for Tunable and Reconfigurable Terahertz Devices
Le Liu¹
¹University of Notre Dame

Co-Design of Wafer-Level Packaged Internally Matched Power Amplifier and Substrate Integrated Waveguide Filtering Matching Networks
Girehri Chaodhury¹, Youngki Jeong¹
¹Jeonbuk National University, South Korea

Microwave and Millimeter-Wave Substrate-Integrated-Waveguides for Antennas and Sensors Applications
Sungjun Lim¹
¹Chung-Ang University
Reconfigurable intelligent surfaces for smart electromagnetic environment: an integrated vision towards industrial applications

Chair: Alessio Monti¹
Co-Chair: Filiberto Bilotti¹
¹Roma Tre University
Room: Suite 6

The development of the next-generation of wireless systems is bringing renewed attention to the physical layer of the communication link. Indeed, the extreme low-latency requirements expected by these systems cannot be satisfied relying only upon the extreme virtualization of the hardware functions. In this framework, reconfigurable intelligent surfaces (RISs) have been emerged as a potential key enabling technology (KET) for beyond-5G communications. RISs are artificial surfaces textured on a sub-wavelength scale and able to control the propagation characteristics of the impinging field in unprecedented ways. One of the most important features exhibited by RISs is the reconfigurability, i.e., the possibility to modify their macroscopic behavior in real-time depending on the instantaneous characteristics of the communication channel. As a consequence, RISs have the potential to transform the external environment - which have been so far considered as a source of detrimental effects for the efficiency and robustness of communication systems - into an active element of the wireless link and to dramatically improve the overall system performances.

Despite these potentialities, RIS-aided communication systems are still far from being a reality because of the involved technical challenges that may be overcome only through an integrated effort of different scientific and engineering communities. In this context, the proposed workshop is intended to provide an updated perspective about the use of RISs for smart electromagnetic environments (SMEs), with a particular emphasis on the transferring of the scientific outcomes in industrial applications. For this purpose, the workshop includes contributions from leading scientists of electromagnetics, metamaterials and communications communities as well as the involvement of relevant stakeholders of the telco industry.

PROGRAMME

From physics to RIS: concepts and applications
Geoffroy Lerosey¹
¹Greenerwave (France)

RIS deployment in 5G ecosystems and beyond – Network level implementation scenarios and current technological state of the art
Claudio Massagrande¹
¹Huawei Milan Research Lab (Italy)

Information metasurfaces for wireless communication: information modulation and direction finding
Tie Jun Cui¹
¹Southeast University (China)

Recent advances and perspectives on space-time-coding digital metasurfaces
Vincenzo Galdi¹
¹University of Sannio (Italy)

Trade-Off Optimality in RISs towards an Industrial Implementation of the Smart Electromagnetic Environments
Andrea Massa¹
¹University of Trento (Italy)

Modeling and optimization of metasurfaces for communication and sensing
Stefano Tomasin¹
¹University of Padova (Italy)

Self-configuring MU-MIMO communications using metasurfaces
Giovide Guaraní¹
¹University of Bologna (Italy)

Nonlinear/EM co-design of real-time reconfigurable metasurfaces embedding switchable nanomaterials
Shobit Agarwal¹, Simone Trovarello¹, Alessandra Di Florio Di Renzo¹, Diego Masotti¹, Alessandra Costanzo¹
¹Alma Mater Studiorum - Università di Bologna
Recent developments in millimetre-wave measurement: S-parameters and material properties

Chair: Xiaobang Shang¹
Co-Chair: Nick Ridler¹
¹National Physical Laboratory, UK
Room: Suite 2

This full-day workshop aims to cover the latest developments in two types of millimetre-wave (mmWave) measurement: S-parameters (in waveguide and on-wafer), and dielectric material characterisation (i.e. complex permittivity). This workshop comprises 10 talks – four of which are related to S-parameters and the rest are about dielectric measurement. The presenters are from different scientific backgrounds (i.e. metrology institutes, instrumentation manufacturers, and end-users in industry and academia), and therefore will provide different perspectives on these topics.

For S-parameter measurement, the talks will be focused on new silicon micromachined waveguide calibration standards, investigations into on-wafer calibration and verification methods, and a bespoke automated on-wafer probe station with nanometre positioning accuracy. The discussions about dielectric measurements will be devoted to three types of measurement technique: free-space quasi-optical methods, resonator-based methods, and an improved waveguide-based transmission line method. The attendees are expected to learn more about the state-of-the-art in mmWave measurement techniques and gain insight into future developments from experts in this field.

PROGRAMME

Calibration methods for on-wafer measurement at mmWave frequencies – a brief review
Xiaobang Shang¹, Nick Ridler¹
¹National Physical Laboratory, UK

Nanorobotics automated on-wafer probing station for millimeter-wave coplanar waveguide (CPW) S-parameters measurement
Kamel Haddad²
²University of Lille, France

Advances in leakage corrections for on-wafer S-parameter measurements
Cheng Li³
³University of Glasgow, UK

Silicon micromachined waveguide components for terahertz metrology
James Campion¹
¹TeraSi AB, Sweden

Quasi-optic measurement of S parameters and permittivity from 75-750 GHz
Roger Appleby¹, Michal Mrnka², Elena Tsara³, Richard Wylde⁴
¹Millimetre wave Consulting Ltd., UK, ²University of Exeter, UK, ³European Space Agency, The Netherlands, ⁴Thomas Keating Ltd., UK

Measuring dielectric properties in millimetre-wave frequencies with the material characterisation kit (MCK)
Alexandros I. Dimitriadis¹, Antoine Calleau¹, Sven Ohnme²
¹Swissto12 SA, Switzerland

Free-space characterization in the millimeter and sub-millimeter wave ranges: application to solid and non-solid dielectric material properties
Alain Pedron¹, Daniel Boureau¹
¹IMT Atlantique, France

Material measurement and parameter extraction, error analysis and uncertainties
Alexia Kazemipour¹
¹METAS, Switzerland

Complex permittivity and conductivity measurement techniques at millimeter-wave bands over 100 GHz for beyond-5G/6G applications
Yuuki Kato¹
¹National Institute of Advanced Industrial Science and Technology (AIST), Japan

Waveguide characterization of dielectric slabs and thin conductive films at millimeter-wave frequencies
Xuchen Wang¹, Sergiy Tretyakov¹
¹Aalto University, Finland
New techniques and foundations for microwave and mm-wave RF filtering devices for emerging communication systems

Chair: Photos Vryonides¹
Co-Chair: Dimitra Psychogiou²
¹Frederick University, ²University College Cork and Tyndall National Institute

Recent trends towards the development of RF front-ends architectures for the next generation communication systems as well as emerging space applications create new demands in the field of microwave and mm-wave filtering devices as key enabling technologies extending to the area of RF filtering components with tuning and multifunctional capabilities. The aim of this workshop is to host recent research findings in the area of microwave and mm-wave passive devices such as the development of highly sophisticated tunable filters with minimum number of tuning elements, high performance wideband bandpass filters based on ceramic materials in additive-manufacturing technology, and high-performance ceramic-loaded filters for satellite applications. Miniaturization techniques will also be presented for different technologies and applications. Moreover state-of-the-art substrate integrated waveguide filters and multiplexers and the expected benefits from their integration over GHz and THz in connection with broadband and multiband operations will be discussed. Key aspects of the AFSIW technology will also be presented demonstrating the latest development of filtering functions targeting space applications.

PROGRAMME

PCM-Based Reconfigurable Filters
Raafat R. Mansour¹
¹University of Waterloo

High-Performance Stepped-Impedance Bandpass Filters for Microwave and Millimeter-wave Applications
Abdul Sami¹, Iván Arregui¹, Txema Lopetegi¹, Fernando Teberio¹, Petronilo Martín-Iglesias¹, Miguel A. G. Lasso¹
¹Public University of Navarre (UPNA), ²European Space Agency

Millimeter-wave technology filters trends and integration of filtering capabilities in a dual-polarized antenna for 5G applications
Renato Lombardi¹
¹Huawei Technologies

Recent advances in compact and high-performance ceramic-loaded filters for satellite applications
Luca Pelliccia¹
¹RF Microtech

Substrate Integrated Waveguide Multiband Bandpass Filters and Multiplexers: State-of-the-art and future outlook
Kang Zhou¹, Ke Wu¹
¹Ecole Polytechnique Montreal

Emerging reflectionless RF filtering technologies
Dimitra Psychogiou¹, Roberto Gomez-Garcia¹
¹University College Cork and Tyndall National Institute, ²University of Alcalá

Toward New-Space Integrated SWAP-C Filtering Functions Exploiting the AFSIW Technological Platform
Anthony Ghiotto¹
¹Bordeaux INP

Miniaturized filters
Cristiano Tomassoni¹
¹University of Perugia
Recent advancements and applications of nanoscience are revolutionizing the fields of biology and medicine and in recent years there has been a growing interest in nanomedicine, where nanotechnologies are applied to biomedical applications. Nanomedicine holds great potential to improve and/or develop rapid and portable diagnostic and therapeutic technologies; more efficient drug delivery and targeting, as well as personalized nanomedicine where a drug is administered to a patient based on their genetic profile. This has been explored through the combination of electromagnetic (EM) fields and nanoscience, since EM fields at low frequencies can interact with biological systems up to a molecular level. In this regard, there have been significant advances, all contributing towards the transformative role of nanomedicine in the 21st century.

Taking a multidisciplinary approach, this workshop will include researchers from the field of nanotechnology, nanoscience and electromagnetics to address various technological aspects related to the use of nanotechnologies for more effective and improved EM therapeutic and diagnostic technologies. Topics related to the nanoparticles and/or nanosystems preparation as drug delivery carriers and EM fields transducers and their EM characterization, the non-invasive application of EM fields, and finally the cell manipulation and characterization will be discussed, providing the audience with up-to-date knowledge in this field. The workshop will take a multidisciplinarity approach to present these topics by providing experimental and numerical studies, and will give an extensive overview covering the main key-points for cutting edge technologies in this area.

**PROGRAMME**

**Plasmonic and Magnetic nanoparticles for biomedical applications**

Thanh Nguyen¹

¹University College London, UK

Nanoparticles for sensing and treating tumors using Microwave devices

Maria Thanou¹

¹King’s College London, UK

**Theranostic Magnetic Scaffolds: Advances and Challenges**

Matteo Bruno Lodi¹

¹Department of Electrical and Electronic Engineering, University of Cagliari

**Remotely-triggered cancer therapy: The role of smart nanoparticles**

Gianni Ciofani¹

¹Istituto Italiano di Tecnologia, Smart Bio-Interfaces

**Some materials’ science challenges to overcome towards successful application of magnetic nanoparticle hyperthermia in medicine**

David Serrantes¹

¹Applied Physics Department, University of Santiago de Compostela,

Cell/tissue targeting with nanoparticles. The hidden issues of receptor binding

Nicola Tirelli¹

¹Division of Pharmacy and Optometry, School of Health Science, University of Manchester, United Kingdom & Laboratory of Polymers and Biomaterials, Fondazione Istituto Italiano di Tecnologia, Genova, Italy
RF Reliability Status and Challenges for 5G mmWave and 6G Applications

In this workshop, the current status of reliability methods as well as the challenges faced for the reliability assessment and qualification for 5G and 6G mmW applications will be examined. Each of the material systems will be discussed for each of the major technology solutions being offered for 5G-6G: GaN, SiGe and Silicon CMOS RF (including SOI). While some of the underlying degradation mechanisms will be common, each material system will have its own properties, unique failure mode and reliability risks, as well as limitations on operating temperature as they will have different self-heating profiles. A careful review and consideration for the performance / reliability balance will be given for each of the technology solutions (GaN, SiGe, Si CMOS-RF). One of the major goals will be to provide a practical overview of the key reliability mechanisms and methodologies for reliability characterization. We will also discuss the challenges faced by reliability engineers when assessing the reliability of 5G-6G/mmWave/RF applications.
Staring radar is experiencing a resurgence in development, following the advent of high-power parallel processing capabilities, exciting the scientific development of radar capabilities not achievable using scanning radar and spawning the appearance of production staring radars employed for specific important roles.

Staring radars (sometimes called Holographic, or more recently coined Ubiquitous) unique attribute, when compared to scanning radar, is that they can provide persistent, uninterrupted surveillance, enabling rapid decision making, rigorous classification and avoids conflicting demands for truly multi-purpose operation.

This workshop will bring together contributions by many of the developers and influencers of this generation of Ubiquitous radars for those wanting to learn and appreciate the differentiators and capabilities of this type of radar and act as a collaboration platform for scientists and engineers working or aspiring to work in this field. It will also act as a showcase of the potential application areas of this technology both current and future.

FRIDAY 14:20 – 18:20

Ubiquitous Radar

Chair: Stephen Harman¹
¹Aveillant Ltd
Room: Amber 1

PROGRAMME

Introduction to staring radar principles and applications
Stephen Harman¹
¹Aveillant Ltd

A high fidelity staring radar testbed for urban surveillance
Mohammed Jahangir¹
¹University of Birmingham, UK

Miniature Ku-Band Ubiquitous radar
Aled Catherall¹
¹Plextek Ltd

Passive ubiquitous radar
Steffen Lutz¹
¹Hensoldt

The Omega 360 Ubiquitous radar
Renato Merko¹
¹Fincantieri NexTech
**FRIDAY 14:20 – 18:20**

Future individual mobility based on automotive radar sensors and more ...

**Chair:** Marlene Harter¹  
**Co-Chairs:** Holger H. Meinel⁷, Andreas Himmler³  
¹Offenburg University of Applied Sciences, Germany, ⁷Independent Consultant, ³dSPACE GmbH  
**Room:** Amber 2

Autonomous Driving (AD) and – time-wise in between Advanced Driver Assistance Systems (ADAS) – are one of the major driving forces – besides e-mobility - within the automotive industry of today for the future. Just recently Mercedes-Benz introduced the first Level 4 series production car – this year’s S-class. These days the various HMI-approaches in existing cars are totally corporate ID dependent; every OEM takes this as a truly competitive edge against the others – that is a major problem and cannot be the final solution ...

Furthermore – available space for electronics in the car of the future – “smart headlight” might give an answer to that problem. And – not to forget – all of this has to be safe – in-depth but still easy to implement measurement solutions are necessary. These subjects and the realization possibilities should be discussed in this workshop.

**PROGRAMME**

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<th>Topic</th>
<th>Presenter(s)</th>
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<tbody>
<tr>
<td>Automotive radar sensors – future development trends</td>
<td>Holger H. Meinel¹</td>
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<tr>
<td>Advanced modulation techniques for radar interference mitigation</td>
<td>Alexander Yarovoy¹</td>
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<td>Vehicle-in-the-loop testing of safety-critical ADAS functions:</td>
<td>Jörg Neumann¹</td>
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<td>Comprehensive tests of radar sensors become real</td>
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<td>Smart Headlight – Sensor-Integrated Headlight for Automated Driving</td>
<td>Thomas Gollmann¹</td>
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<td>Vehicle-in-the-loop testing of safety-critical ADAS functions:</td>
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<td>Testing of the RF system Radar under real-time requirements:</td>
<td>Andreas Himmler³</td>
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<td>Cybersecurity threats and risks in advanced driver assistance systems</td>
<td>Roland Flax²</td>
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WF3
EuMC

FRIDAY 14:20 – 18:20

Design and optimization of mmWave wideband radios for 5G and Satcom

Chair: Giorgia Zucchelli¹
Co-Chairs: Cecile Masse², Fabrício Dourado³
¹MathWorks B.V., ²Otava Inc., ³Rohde & Schwarz GmbH & Co. KG
Room: Amber 3

With mmWave spectrum opening up to support increased capacity and new wireless applications, radio designers are facing non-trivial challenges while managing tight R&D cycles. 5GNR infrastructure as well as broadband satellite communications equipment must meet specifications with acceptable margin over very large instantaneous bandwidths. These radio systems are often multi-channel active antenna arrays and deal with various hardware impairments, requiring complex digital signal processing algorithms for calibration, RF channel corrections, crest factor reduction, and beamforming. All these design challenges can’t typically be addressed without a complete end-to-end system prototype. This workshop introduces a methodology to combine RF hardware measurements with behavioral models for accelerating the design, optimization, and testing of mmWave wideband radios before the entire system is prototyped and productized. We will start with a high-level description of a typical radio based on a wideband transceiver capable of processing large instantaneous bandwidths. We will then identify system-level optimization techniques, based on hardware characterization and behavioral models for key components, such as the beamforming antenna front-end.

The methodology demonstrated in this workshop covers both transmitter and receiver wideband design, combining hardware testing and analysis with behavioral models of the front-end beamformer and the antenna array. We will introduce signal processing techniques to mitigate signal distortion via innovative measurement capabilities. Finally, we will present methods for optimizing beamforming algorithms based on practical implementation constraints. Using hardware and software examples we will tradeoff design parameters to achieve acceptable ACLR, EVM, and other metrics for very wide OFDM waveforms for 5GNR or standard-agnostic.

PROGRAMME

Using RF measurements to develop accurate radio models for system simulation
Giorgia Zucchelli¹
¹MathWorks B.V.

Co-Design techniques for wideband phased-array radios
Cecile Masse²
²Otava Inc.

Tackling difficult challenges measuring modern wideband digital-to-mmWave radios
Fabrício Dourado³
³Rohde & Schwarz GmbH & Co. KG
FRIDAY 14:20 – 18:20

Exploiting Symmetries and Higher Symmetries in Classical Electromagnetism for Design and Modelling of Antennas, Filters, Metamaterials, and Metasurfaces

Chair: Jan Kracek¹
Co-Chair: Martin Petek²

¹Czech Technical University in Prague, ²Politecnico di Torino

Room: Amber 4

The topic of symmetries and higher symmetries in classical electromagnetism is discussed. Theoretical and application aspects of the topic are presented. The paradigm of symmetries is an emerging technique that allows to substantially enhance the properties of state-of-the-art structures for guiding and radiation of electromagnetic waves. Particularly, the workshop is focused on:

- Method of moments for calculating dispersion diagrams of electromagnetic periodic structures using a novel Green’s function for treating higher symmetries.
- Single/dual beam steering based on an array composed of two composite right-left-handed leaky wave antennas with two-phased feeding ports designed using SIW technology.
- Band-stop and common-mode suppression microwave filters using periodically loaded microstrip lines and incorporating glide symmetry into the periodic configuration.
- Solution of Maxwell equations using homotopy and cohomotopy operators, and their association with Clifford algebras providing local inversion of exterior derivative, co-derivative, and Dirac-Kahler operator.
- Concept of parity, time-reversal, duality symmetry for radiating electromagnetic structures represented by an open-ended waveguide supporting edge mode.

The workshop is supported by the COST Action CA18223 Future Communications With Higher-symmetric Engineered Artificial Materials – SyMat (https://symat-cost.eu) of the European Cooperation in Science and Technology (https://www.cost.eu).

PROGRAMME

Method-of-moment modelling for higher symmetries
Martin Petek¹
¹Politecnico di Torino

Single/dual beam scanning provided by an array composed of two SIW leaky wave antennas
Jan Macháč¹
¹Czech Technical University in Prague

The use of glide symmetry in the implementation of printed band-stop and common-mode microwave filters
Francisco Medina¹
¹Universidad de Sevilla

Maxwell equations in differential forms – the use of homotopy operator
Radosław Antoni Kycia¹
¹Masaryk University, Cracow University of Technology

Parity, time-reversal, duality symmetric radiating electromagnetic structures
Jan Kracek¹
¹Czech Technical University in Prague
The workshop focuses on advanced techniques and applications for passive radars. It is 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 passive radar fundamentals, discussion of different illuminators, and detection in passive radar systems.

One macro-area will address the exploitation of PCL on moving platforms for GMTI and for imaging purposes.

One macro-area will be devoted to advanced signal processing architectures that enable the improvement of PCL detection capabilities, namely the exploitation of polarimetric information and of long coherent integration intervals.

One additional macro-area will be devoted to satellite-based passive radars, highlighting the opportunities, applications, and challenges offered by such vast class of illuminators. The overview of new future potential illuminators of opportunity concludes with an overview of terrestrial infrastructures such as 5G/6G. Finally, a dedicated lecture will be devoted to the hardware architecture definition of software defined based passive radar systems.

For each 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, 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 and to understand the current limitations and future perspectives of passive radar sensing.

**PROGRAMME**

**Introduction to passive radars**

Krzysztof Kulpa¹

¹Warsaw University of Technology, Poland

**Multi-channel PCL for GMTI**

Philipp Markiton¹

¹Fraunhofer FHR, Germany

**PCL for SAR**

Damian Gromek¹

¹Warsaw University of Technology, Poland

**Long coherent processing and integration intervals in PCL**

Dominik Bok¹

¹Fraunhofer FHR, Germany

**Polarimetric PCL**

Francesca Filippini¹

¹University of Rome “La Sapienza”, Italy

**Potentials & challenges of DVB-S based PCL**

Diego Cristallini²

²Fraunhofer FHR, Germany

**Passive Radar Techniques based on broadband communication LEO satellite constellations**

Rodrigo Blazquez-Garcia¹

¹Fraunhofer FHR, Germany

**GNSS based PCL for imaging applications**

Fabrizio Santi¹

¹University of Rome “La Sapienza”, Italy

**Space surveillance with PCL (Part I)**

Anna Lisa Saverino¹

¹CNIT-RaSS National Lab, Italy

**Space surveillance with PCL (Part II)**

Konrad Jedrzejewski¹

¹Warsaw University of Technology, Poland

**5G as illuminators of opportunity for PCL: potentials and challenges**

Piotr Samczyński¹

¹Warsaw University of Technology, Poland

**Hardware architecture for SDR based PCL**

Amerigo Capria¹

¹CNIT-RaSS National Lab, Italy
While radar is already established in automotive, aerospace and defense, new applications in biological and medical applications promise to bring new solutions. This workshop addresses various medical applications like in the field of vital sign detection and other emerging topics like blood pressure determination, gait analysis and tissue imaging. Especially the topic vital sign detection will be presented in several ways to further analyze the data for driver monitoring, cardiovascular diagnostics and to analyze spoofing techniques. Additionally, new applications for biological material sensing, tissue imaging and monitoring for food and agricultural processing will be presented. Finally, one talk will address the opposite way to enhanced radar operation by using bioinspired methods.

**Programme**

### Blood Pressure Determination with Wearable Millimeter-Wave Device
- **Oliver Shay**
  - Blumio Inc

### Radar Sensor Monitoring in Food and Agricultural Processing
- **Benjamin Littau**
  - TRILITEC GmbH

### Driver Monitoring System with mmW sensors
- **Francisco Salmerón**
  - A4Radar

### Millimeter Wave and Sub-THz ICs for Biological Material and Vital Signs Sensing
- **Mohamed H. Eissa**
  - IHP Microelectronics GmbH

### Microwave Interferometry for Cardiovascular Diagnostics
- **Alexander Köpsen**
  - Hamburg University of Technology

### Portable Simulator and Spoofing Devices for Biomedical Radar
- **Changhui Li**
  - Texas Tech University, Lubbock, TX, USA

### Enhancing radar angular performance by mimicking a flies hearing system
- **Ines Dorsch**
  - Ulm University, Microwave Engineering

### Gait Analysis with Millimetre-wave Radar and Harmonic Tags
- **Patrick Kemplets**
  - Ruhr-University Bochum

### Integrated THz-Nearfield Sensors for Microscopic Tissue Imaging and Profilometry
- **Philipp Hilger**
  - University of Wuppertal
FRIDAY 09:00 – 13:00

Dosimetry and microdosimetry applied to emerging wireless technologies: from human to cell level

Chair: Maxim Zhadobov¹
Co-Chair: Micol Colella²
¹CNRS, IETR, ²Sapienza University of Rome
Room: Brown 1

In the fast-evolving world with increasingly smart environments relying on object-to-object and object-to-human communications, pervasive emergence of novel wireless technologies results in saturation of the environmental electromagnetic spectrum. Breakthrough in wireless technologies has revolutionized various aspects of our life, from healthcare to communications and mobility. Among the novel technologies are the wireless power transfer, Internet of Things (IoT) and augmented reality, remote sensing and detection of movements, to list just a few. More diverse, complex and heterogeneous exposure scenarios, both indoor and outdoor, are continuously raising public concerns regarding possible biological and health consequences posing new research questions and challenges to the scientific community. In this context, a large body of literature proposes dosimetric approaches to accurately quantify the human exposure in such smart and complex environments, as well as methodologies to explore the biological consequences at the cellular level.

This workshop will update on the state-of-the-art and recent advances in EM dosimetry, from the human level (deterministic vs stochastic dosimetry, multi-scale biological tissue models, etc.) down to cells (novel exposure systems, advanced modelling strategies). Finally, human dosimetry will be extended to investigation of the electromagnetic field in insect. The half-day workshop will be concluded by a panel session which will give to the speakers and attendees the opportunity for an interactive discussion.

PROGRAMME

EMF exposure assessment in 5G scenario by deterministic and stochastic approaches
Marta Parazzini¹
¹IEIIT, CNR Milan

Millimeter wave dosimetry at the level of skin substructures
Zain Haider¹
¹University of Rennes

5th generation of telecommunication networks (5G): towards innovative exposure systems for cellular biological experiments at 3.5 GHz
Rosa Driacchea¹
¹XLIM Research Institute, University of Limoges

3D microdosimetric studies as a way to evaluate the emerging RF EM fields interaction with cells and intracellular organelles
Laura Caramazza¹
¹Sapienza University of Rome

Numerical Radio-Frequency Dosimetry of Insects in Developmental Stages
Arno Thielens¹
¹University of Ghent
Integrated Communication and Sensing (ISAC) has been widely recognized as one of the key features of future 6G systems, being a very promising area of study that presents many opportunities and challenges. The ISAC goal is to seamlessly integrate communication and sensing functionalities into a single system, sharing hardware, frequency, time, space and/or power resources.

With the evolution of 4G to 5G, the spectrum allocations have expanded towards larger bands in the millimeter wave region (30-100 GHz). This trend will continue, and contiguous spectrum portions in excess of few GHz in the sub-Terahertz region (>100 GHz) will likely be available as some of the frequency bands for 6G deployments. In this context, ISAC has the potential to revolutionize the current concept of communication systems, representing an unprecedented paradigm shift, as witnessed by the recent study item introduced for 3GPP Rel. 18, whose focus is a network-centric sensing considering current 5G architecture as the baseline.

ISAC use cases include augmenting the communication network with sensing capabilities to improve the performance, for resilient beam and blockage management, as well as exciting use cases where sensing the environment is the primary task, for instance high-resolution environment imaging for safety-critical autonomous driving, Internet of Things, drone surveillance, etc.

**PROGRAMME**

**System-Level Analysis of Joint Sensing and Communication based on 5G New Radio**
Andrea Giorgetti¹
¹Università di Bologna

**High-accuracy joint communication and sensing at mm-wave frequencies**
Joerg Widmer¹
¹IMDEA Networks

**Tools for sensor-aided communication and communication-aided sensing: signal processing, machine learning, or both?**
Nuria González-Prelcic¹
¹North Carolina State University

**Dual-Function Radar Communication System with Communication and Radar Performance Tradeoff**
Atina Petropulu¹
¹Rutgers University

**AI-Enabled Multi-Modal Sensing Aided Communications**
Ahmed Alkhateeb¹
¹Arizona State University

**The Multi-functional Wireless Network of 6G and Beyond: New Signaling, Synergies and Tradeoffs**
Christos Masouros¹
¹University College London

**Integrated Sensing and Communications (ISAC): Towards Dual-functional Networks for 6G and Beyond**
Fan Liu¹
¹Southern University of Science and Technology

**Communication-centric Integrated Sensing and Communication toward 6G: Use Cases and Open Points**
Umberto Spagnolini¹
¹Politecnico di Milano
Passive and Reconfigurable/Active Electromagnetic ElectroMagnetic Skins (including smart skins and reconfigurable intelligent surfaces), have emerged in the last few years as a fundamental technology for the implementation of the Smart EM Environment (SEME) vision in 5G and 6G scenarios. The growing interest on such technologies from the academic and industrial viewpoint is motivated by the fundamental promise of the SEME vision, that is the possibility to manipulate the wireless response of complex environments according to the wireless system needs, hence revolutionizing the way communication systems are designed and conceived. However, several challenges still need to be addressed from the methodological and practical viewpoint to enable the application of such concepts in practical scenarios. Within this framework, the objective of the workshop is to provide a review of the most recent advances and research trends in this field, specifically focusing on transdisciplinary contributions regarding technologies, synthesis and control methodologies, small- and large-scale simulation tools, planning strategies, and implementations in practical scenarios.

**PROGRAMME**

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<tr>
<th>Session</th>
<th>Title</th>
<th>Speaker(s)</th>
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<td>WF9</td>
<td>Reconfigurable Intelligent Surfaces for Wireless Communications</td>
<td>Marco Di Renzo¹</td>
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<td></td>
<td>Static and Reconfigurable EM Skins for Smart Electromagnetic Environments – Current Trends and Perspectives</td>
<td>Giacomo Oliveri¹, Marco Di Renzo²</td>
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<td>Fast, ray-based macroscopic modelling of reconfigurable metasurfaces</td>
<td>Vittorio Degli Esposti¹</td>
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<td>Towards a Heterogeneous Smart Electromagnetic Environment for Millimeter-Wave Communications: An Industrial Viewpoint</td>
<td>Christian Mazzaferro¹, Marco Di Renzo²</td>
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<td>Autonomous and Self-configuring MetaSurfaces: An Unfolding Revolution</td>
<td>Vincenzo Scialapporte¹, Marco Di Renzo²</td>
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<td>RIS Technology and Standardization Activities at ETSI</td>
<td>Arman Sheikhfard³, ETSI</td>
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<td>RIS: new deployment opportunities and challenges</td>
<td>Dinh-Thuy Pham-Huy³, ORANGE</td>
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<td></td>
<td>Metasurfaces 3.0 as a key enabling technology for Smart Antennas 2.0</td>
<td>Filiberto Bilotti¹, Roma Tre University</td>
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¹ELEDIA Research Center (ELEDIA@UNITN) University of Trento, ²CNRS & CentraleSupelec - Paris-Saclay University
TECHNICAL WORKSHOPS

This series of seminars highlights the high potentialities of the ANSYS numerical tools and how they can play a strategic role in the modern designer’s working practice. The seminars touch different topics, such as the new capabilities of modern numerical tools to more efficiently model RF devices, as well as new approaches based on Machine Learning and Metamodel. How to take into account with high accuracy the chip and its package coupling and interaction or the effects of thermo-electro-mechanical stress on RF circuit performance will be demonstrated. The benefits of using numerical modeling to implement a virtual testing environment to assess the survivability as well as the relationship between component and system-level modeling both for space applications will be explored. Finally, different approaches to handle electromagnetic issues, ranging from electromagnetic environmental effects in aerospace, or EMI/EMC issues on PCBs, or the assessment of human exposure to radiation will be deeply investigated.

TUESDAY, 27TH SEPTEMBER, 2022

10:00 – 11:00  The Right Time to Simulate is NOW! A journey in the new simulation technologies for RF Applications
Domenico Loricchio

11:30 – 12:30  Application of Machine Learning to EMI problems in Aerospace and Defense Industry
Giancarlo Guida

14:30 – 15:30  RFIC fully coupled Chip-Package co-extraction
Marco Occhiali

16:00 – 17:00  Multiphysic Simulation Approach for 5G Filter Design
Alberto Di Maria

WEDNESDAY, 28TH SEPTEMBER, 2022

10:00 – 11:00  Survivability of RF Devices to Space Weather: Radiation hardening and Charging effects
Giancarlo Guida

11:30 – 12:30  Signal & Power Integrity and EMC analysis of Telecommunication PCBs
Flavio Calvano

14:30 – 15:30  From Component to Mission: Simulation as must-have for aerospace & defense industry (HFSS & STK)
Domenico Loricchio

16:00 – 17:00  Leverage the Power of Automation with PyAEDT: A free fall in the new python library for Ansys Electronics Desktop
Alberto Di Maria

THURSDAY, 29TH SEPTEMBER, 2022

10:00 – 11:00  Signal & Power Integrity and EMC analysis of Telecommunication PCBs
Marco Occhiali

11:30 – 12:30  Electromagnetic Environmental Effects in Aerospace and Defense Industry
Giancarlo Guida

14:30 – 15:30  Back to School: Take your Ansys usage to the next level with Ansys Electronics Desktop Student
Domenico Loricchio

16:00 – 17:00  Human Exposure to 5G Radiation: Challenges and opportunities from numerical simulations
Domenico Loricchio
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<td>Amber 3</td>
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<tr>
<td>Amber 4</td>
<td>WS4 New On-Chip and Scalable RF Packaging Solutions with Integrated Antennas for 5G mmWave and 6G Applications</td>
<td>WS5 RF and mmW reliable ICs: characterization, test and security challenges</td>
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<td>Amber 5</td>
<td>Tom Brazil Doctoral school of Microwaves Practical Workshop: Build a Frequency-Modulated Continuous Wave Radar in 1-day</td>
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<td>Suite 1</td>
<td>WS6 Technological needs for future SatCom connectivity</td>
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<td>Suite 2</td>
<td>WS7 Microwave Design and Metrology for Quantum Computing</td>
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<td>Suite 3</td>
<td>WS8 mmWave Front Ends: Challenges and Advances</td>
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<tr>
<td>Suite 5</td>
<td>WS11 Additive Manufacturing Technologies for Microwave and Millimeter-Wave Applications</td>
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# MONDAY OVERVIEW

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<td>Amber 1</td>
<td>EuMIC01 Multiphysics Modelling Techniques for Advanced Devices and Circuits</td>
<td>EuMIC05 SiGe mmWave Components &amp; Sub-systems</td>
<td>EuMIC09 Components &amp; Technologies for mmWave Applications</td>
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<td>Amber 2</td>
<td>EuMIC02 Millimeter-wave Integrated Circuits</td>
<td>EuMIC06 LNAs for Wireless Communications</td>
<td>EuMIC10 Millimeter-wave LNAs</td>
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<td>Amber 3</td>
<td>EuMIC03 Advanced Microwave Components</td>
<td>EuMIC07 Advanced Active Gallium Nitride Devices</td>
<td>EuMIC11 Focussed session GaN Device Modelling</td>
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<td>Amber 4</td>
<td>WM1 Recent Advances in Topologies, Technologies and Practical Realizations of Microwave Sensors dedicated to biomedical applications</td>
<td>EuMIC08 GaN Integrated Power Amplifiers</td>
<td>EuMIC12 Integrated Power Amplifiers for Broadband Communications</td>
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<td>Amber 5</td>
<td>WM2 Cryogenic RF-mmW Technology and circuit platforms: a path toward Quantum Computing</td>
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<td>Amber 6</td>
<td>Doctoral school Microwave for Emerging Medical Technologies</td>
<td>WM4 Space-Based Solar Power</td>
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<td>Amber 7</td>
<td>WM4 Space-Based Solar Power</td>
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<td>Amber 8</td>
<td>WM5 Substrate Integration Technologies for High-Density Hybrid and Monolithic Integrated Circuits, Antennas and Systems</td>
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<tr>
<td>Brown 1-2</td>
<td>Automotive Forum</td>
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<tr>
<td>Brown 3</td>
<td>EuMIC04 EuMIC Opening Session</td>
<td>IEEE Young Professionals Event</td>
<td>3 Minute Thesis</td>
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<td>Suite 1</td>
<td>WM3 Reconfigurable radiofrequency circuits based on ferroelectric materials</td>
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<tr>
<td>Suite 2</td>
<td>WM7 Recent developments in millimetre-wave measurement: S-parameters and material properties</td>
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<tr>
<td>Suite 3</td>
<td>WM8 New techniques and foundations for microwave and mm-wave RF filtering devices for emerging communication systems</td>
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<tr>
<td>Suite 4</td>
<td>WM9 Nanoparticles in medicine: from diagnosis to treatment</td>
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<tr>
<td>Suite 5</td>
<td>WM10 RF Reliability Status and Challenges for 5G mmWave and 6G Applications</td>
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<tr>
<td>Suite 6</td>
<td>WM6 Reconfigurable intelligent surfaces for smart electromagnetic environment: an integrated vision towards industrial applications</td>
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# TUESDAY OVERVIEW

## Room | 09:00 – 10:40 | 11:20 – 13:00 | 14:20 – 16:00 | 16:40 – 18:20
--- | --- | --- | --- | ---
Amber 1 | EuMIC13 Highly Integrated mmWave Systems | EuMIC16 22nm CMOS Building Blocks | EuMC05 Focussed session Sustainable Microwave Electronics |  
Amber 2 | EuMIC/EuMC01 Receivers | EuMIC17 Frequency and Signal Generation | EuMC06 Focussed session Microwave Systems for Cryosphere Monitoring |  
Amber 3 | EuMC01 Microwave Through Terahertz Measurement Techniques | EuMIC18 Transmitters and Switches | EuMC07 Permittivity Measurement Techniques |  
Amber 4 | EuMIC14 Focussed session Beyond Millimeter-wave Integrated Technologies for Wireless Communications | EuMC04 Non-planar Filters I | EuMC08 Non-planar Filters II |  
Amber 5 | EuMC02 Novel Transceiver Concepts | EuMIC/EuMC02 Wireless Systems for Mobile Communication and Radar | EuMC09 Oscillators and Phase Shifters |  
Amber 6 | Doctoral school Microwave for Emerging Medical Technologies | Doctoral school Microwave for Emerging Medical Technologies |  |  
Amber 7 |  |  | Ansys Workshop |  
Amber 8 |  |  |  | Career Platform Special Session  
Brown 1-2 | EuMC03 Focussed session Advances in Terahertz Technologies for Communication and Sensor Applications | EuMW02 Special Session in Memoriam of Prof. Vittorio Rizzoli | EuMIC19 EuMIC Closing Session |  
Suite 2 |  |  | EuMC/EuMC03 THz Communication Systems in D and H bands: from Circuits to System-level | EuMC10 Devices for Sub-THz Front-ends  
Space 3-4 | EuMW01 EuMW/EuMC Opening Session |  |  |  
Exhibition Hall | EuMC15 Posters | EuMC/EuMC04 Posters |  |  
Main Hallway |  |  | Career Platform Recruitment Space |  

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*EuMC, EuMIC, EuRAD, Students, EuMW, Exhibitors*
## WEDNESDAY OVERVIEW

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<tr>
<td>Amber 1</td>
<td>EuMC11 Interconnects and Packaging</td>
<td>EuMC18 Interconnects and Packaging for Sub-millimeter Wave Applications</td>
<td>EuMC23 Additive Manufacturing for Microwave Components</td>
<td>EuMW06 Inter-Society Technology Panel on Emerging Materials for Reshaping the MHz-Through-THz World: Fiction or Fact?</td>
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<td>Amber 2</td>
<td>EuMC12 Multiport, Reconfigurable and Beamsteering Antennas</td>
<td>EuMC19 Antenna and Array Characterization Techniques</td>
<td>EuMC24 Novel Array Topologies and Beamsteering Techniques</td>
<td>EuMC/EuRAD02 Novel Antennas for Space Applications</td>
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<tr>
<td>Amber 3</td>
<td>EuMC13 Imaging for Biomedical Applications</td>
<td>EuMW04 Inter-Society Technology Panel on Biomedical Waves - The Next Breakthrough</td>
<td>EuMC25 Sensing in Biological Systems I</td>
<td>EuMC29 Sensing in Biological Systems II</td>
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<td>Amber 4</td>
<td>EuMC14 Non-planar Passive Components</td>
<td>EuMC20 Multi-Functional and Multi-Band Planar Filtering Devices</td>
<td>EuMC26 Advanced Filters in Compact Realizations</td>
<td>EuMC30 Substrate Integrated Waveguide and Multilayer Techniques</td>
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<tr>
<td>Amber 5</td>
<td>EuMW03 Special Session on Emerging RF Technologies in Asia Pacific Countries</td>
<td>EuRAD02 Automotive Radar I</td>
<td>EuMC/EuRAD01 Automotive Radar II</td>
<td>EuRAD03 Radar for Space Exploration and Remote Sensing</td>
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<td>Amber 7</td>
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<td>Brown 1-2</td>
<td>EuMC15 Load Modulated Power Amplifiers</td>
<td>EuMC21 Power Amplifiers Linearization Techniques</td>
<td>EuMC27 Integration of Power Amplifiers</td>
<td>EuMC31 Power Amplifiers Performance Improvement Techniques</td>
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<tr>
<td>Brown 3</td>
<td>EuRAD01 EuRAD Opening Session</td>
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<td>Defence, Security and Space Forum</td>
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<tr>
<td>Suite 1</td>
<td>EuMC16 Advances in Electromagnetic Modeling and Analytical Methods</td>
<td>EuMC22 Simulation-Oriented Characterization of Microwave Devices</td>
<td>EuMC28 Developments in Electromagnetic Computational Techniques</td>
<td>EuMC32 Microwave Sensing Devices</td>
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<td>EuMW05 Special Session on Microwave and RF Technologies in India</td>
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<tr>
<td>Exhibition Hall</td>
<td>EuMC17 Posters</td>
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<td>EuMC/EuRAD03 Posters</td>
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<tr>
<td>Main Hallway</td>
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<td>Career Platform Recruitment Space</td>
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### THURSDAY OVERVIEW

<table>
<thead>
<tr>
<th>Room</th>
<th>09:00 – 10:40</th>
<th>11:20 – 13:00</th>
<th>14:20 – 16:00</th>
<th>16:40 – 18:20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amber 1</td>
<td>EuMC33: Conceptual Progress in Antenna Design</td>
<td>EuMC37: Technological Advances for Integrated Antenna Design</td>
<td>EuRAD06: Radar-communication Waveforms and MIMO Applications</td>
<td>EuRAD08: Positioning Techniques for Sensor Motion Compensation and Indoor Localization</td>
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<tr>
<td>Amber 7</td>
<td>Ansys Workshop</td>
<td>Ansys Workshop</td>
<td>Ansys Workshop</td>
<td>Ansys Workshop</td>
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<tr>
<td>Suite 1</td>
<td>EuMW07: Special Session on Microwave Activities in North Africa</td>
<td>EuMC41: Metasurfaces and Applications</td>
<td>EuMC45: Metasurfaces</td>
<td>EuMC46: EuMC Closing Session</td>
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<tr>
<td>Exhibition Hall</td>
<td>EuRAD05: Posters</td>
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## FRIDAY OVERVIEW

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<th>09:00 – 10:40</th>
<th>11:20 – 13:00</th>
<th>14:20 – 16:00</th>
<th>16:40 – 18:20</th>
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<tbody>
<tr>
<td>Amber 1</td>
<td>EuRAD12</td>
<td>EuRAD16</td>
<td>WF1</td>
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<tr>
<td></td>
<td>Signal Processing and Machine Learning for Radar Applications</td>
<td>Focussed session Automotive Radars Above 100 GHz</td>
<td>Ubiquitous Radar</td>
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<tr>
<td>Amber 2</td>
<td>EuRAD13</td>
<td>EuRAD17</td>
<td>WF2</td>
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<tr>
<td></td>
<td>Radar Imaging</td>
<td>Array Techniques and Direction Finding</td>
<td>Future individual mobility based on automotive radar sensors and more ..</td>
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<td>Amber 3</td>
<td>EuRAD14</td>
<td>EuRAD18</td>
<td>WF3</td>
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<td></td>
<td>mm-Wave and Imaging Radar</td>
<td>mm-Wave and Broadband Radar Subsystems</td>
<td>Design and optimization of mmWave wideband radios for 5G and Satcom</td>
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<td>Amber 4</td>
<td>EuRAD15</td>
<td>EuRAD19</td>
<td>WF4</td>
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<td></td>
<td>Radar Phenomenology and Calibration</td>
<td>Radar Modules and Systems</td>
<td>Exploiting Symmetries and Higher Symmetries in Classical Electromagnetics for Design and Modelling of Antennas, Filters, Metamaterials, and Metasurfaces</td>
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<td>Amber 5</td>
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<td>Applications for advanced passive radar systems</td>
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<td>Amber 6</td>
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<td>Radar for Medical and Biological Applications and Bioinspired Radar</td>
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<td>Brown 1-2</td>
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<td>WF7</td>
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<td></td>
<td></td>
<td>Dosimetry and microdosimetry applied to emerging wireless technologies: from human to cell level</td>
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<tr>
<td>Suite 1</td>
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<td>WF8</td>
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<td>Integrated Sensing and Communications for 6G Systems</td>
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<tr>
<td>Suite 2</td>
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<td></td>
<td>Reconfigurable Intelligent Surfaces and Smart Skins for B5G/6G Communications: Recent Advances, Current Trends and Vision</td>
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</table>
Venue Overview

MICRO SOUTH WING LEVEL 0

MICRO SOUTH WING LEVEL +1
MICO SOUTH WING LEVEL +2

MICO SOUTH WING LEVEL +2 MEZZANINE
Exhibitor List

A
AT Microwave · ABS Technics BV · Active Technologies srl · Advanced Microelectronics Development · AGC · AGC Multi Material Europe SA · Alfa Microonde srl · ALPHA · ALPHAD · ALTM · AML · AMPS · AMPLI · ANSYS · ANSYS ITALIA · AntennaX · APItech · ARESYS SRL · Artch House Books · Artedas Europe · Artedas France · Artedas Italia · Advam · ATEM · AZCOM Technology srl · Cadence Design Systems SRL · CADFEM Germany GmbH · CEA Leti · Celte S.p.A. · Chengdu Sampling Master Electronic Technology Corp · CITC · CEM · CoilsCraft · Copper Mountain Technologies · CPE Italia · CPA · CPI TMD Technologies Ltd · D Dassault Systèmes · Dalicap Technology Co. Ltd · DICONEX · Ditom Microwave Inc · dSPACE GmbH · DISTEK STRUMENTI & MISURE SRL · DSPM TLC srl · Electro Rent Ltd · Electrotexniki Industries, Inc · ELECTRON MEC S.R.L. (must be removed) · Electronic Specifier Ltd · Electrovac AG · ELECTRONICA Spa · Elite RF · EPX Microwave Inc · ETL Systems Ltd · EuMA · European Microwave Week 2023 · Flirtonic · Flann Microwave Ltd · Focus Microwaves Group · FormFactor · Fraunhofer IAS · Fraunhofer SHR · Gallium Semiconductor · Gallium Semiconductor · Netherlands BV · Gapwaves · Golden Devices GmbH · HanHua Semiconductors · Huber + Suhner AG · Huawei Technologies Italia srl · Hytem · iCana · IEEE MTT-S International Microwave Symposium · IEMN · IHP GmbH · IMST GmbH · Inspower Co., Ltd · Intech Microwaves Srl · Integra Technologies Inc · Isola GmbH · ITF Co., Ltd · Jiangsu Zdecl Microwave Technology Co., Ltd · JQL Technologies Corporation · Junkosha Inc · Keysight Technologies Italy · Knowles Precision Devices · KOSTECSYS Co., Ltd · KRYTAR · KYOCERA Europe GmbH · Leanfa Srl · Linwave Technology Ltd · LPKF Laser & Electronics AG · MACOM · Maury Microwave & AMCAD Engineering · Mercury Systems · Mician GmbH · Micro Systems Technologies Management AG (MST) · MICROPAC S.R.L · MICOREL · Microwave Applications Group · Microwave Factory Co., Ltd · MicrowaveFilters & TVC SRL · Microwave Journal · MIWEKO · Mouser Electronics · MPG Instruments srl · MPI Corporation · MTC Microwave Technology Corporation · MTR S.R.L. · Mwave Design · Nano Dimension · Norden Millimeter · OKTAL Synthetic Environment · OML Inc. · OMMIC · Optenni Ltd · Optiprint AG · Pasquali Microwave Systems SRL · PISPO · Propagation Ideas & Solutions GmbH · Plexa Manufacturing Hungary kft · PM Industries Inc. · PMP · POLOMARCON.IT Spa · QP Microwave · Qualcomm Inc. · QWED Sp. z.o.o · Radar Systems Technology Inc. · RADIALL · Radiarc Technologies · Rakon · RF Lambda USA · RF Microtech srl · RFW M Italia · RGM Space · Richardson RFPD Italy SRL · Rogers BV · Rogers Corporation · Rohde & Schwarz GmbH & Co KG · Rosenberger Hochfrequenztechnik GmbH & Co KG · RUPPtronik · SARAS Technology Ltd. · Schott AG · Sematron Italia S.R.L. · Sensorex Co., Ltd · SIGLENT MICROELETTRONICA S.p.A. · Siglent Technologies Germany GmbH · SINCORON SRL · Smiths Interconnect · Sonnet Software · Southwest Microwave · SpaceForest sp. z.o.o. · Special-Ind Spa · SPHEREA · SPINNER GmbH · Sumitomo Electric Device Innovations · Sumitomo Electric Electric Ltd · SuperApex · SYLATECH · Synopsis Corporation Group · Synopsis Technologies · Syntony · TA Taiwan Union Technology Corporation · TECNISCO Ltd · Tech Comm Inc. · Teledyne e2v · Semiconductors · Thales Alenia Space · The MathWorks srl · TICRA · TMYTEK · TNO · Defence, Safety and Security · TriaSys Technologies Corporation · Trilight Microwave Europe AB · Varioprint AG · Ventec International Group · VIA Electronic GmbH · Virginia Diodes Inc. · WAVEPIA Co., Ltd · Werlatone · WIN Semiconductors Corp. · Wolfspeed Inc. · Würth Elektronik Italia s.r.l. · WUPATEC · XLIM · YTECH

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