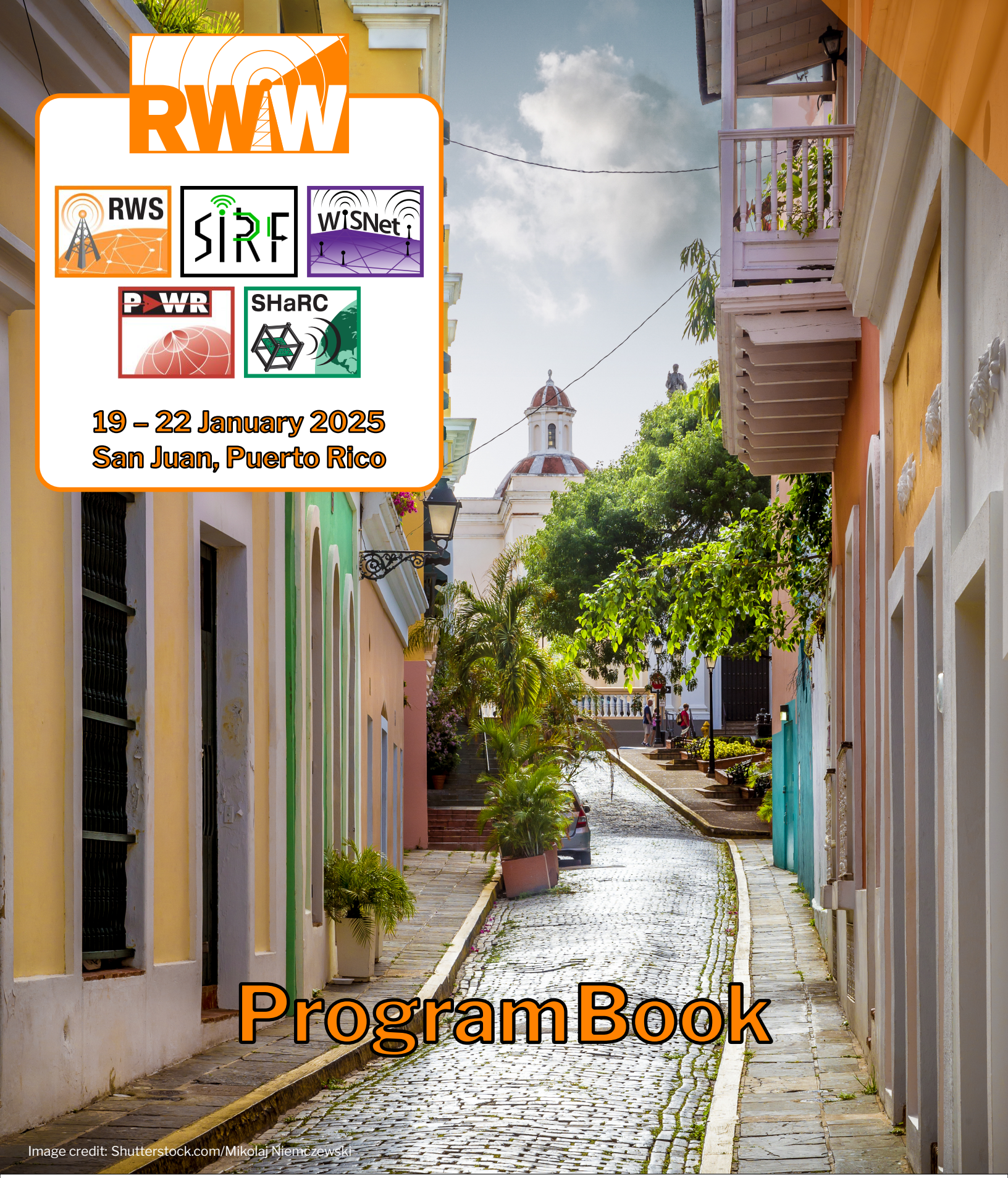
RWW

RWS | SiRF | WiSNet | PWR | SHaRC

19 – 22 January 2025
San Juan, Puerto Rico

Program Book



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IEEE | MTT-S IEEE Microwave Theory & Technology Society | AESS | IEEE AP-S Antennas and Propagation Society

GREETINGS FROM THE GENERAL CHAIR OF RADIO & WIRELESS WEEK 2025

General Chair
Holger Maune

Welcome to the 20th IEEE Radio & Wireless Week (RWW) in San Juan, Purto Rico. This year is a very festive year for the IEEE Radio & Wireless Week (RWW); We do not only celebrate the 20th edition of the IEEE Radio & Wireless Week as you know it today and 25 years of IEEE Topical Meetings on Silicon Monolithic Integrated Circuits in RF Systems (SiRF) but this is also the first time RWW moves out of the mainland USA. Last year's RWW was hosted in San Antonio, Texas, which is the 7th largest city in the USA. It was founded as a Spanish mission and colonial outpost in 1718, in 1731 the city became the first chartered civil settlement in what is now present-day Texas. In 2025, we will move to a much smaller city but with a much more ancient history. Our 2025 location, San Juan in the Commonwealth of Puerto Rico, was founded by Spanish colonists in 1521, who called it Ciudad de Puerto Rico, which makes it the second oldest European-established capital city in the Americas.

As the chair and cochair of this exceptional IEEE Radio & Wireless Week (RWW), we warmly welcome you to join this exciting event the week of 19-22 January 2025 in San Juan in the Commonwealth of Puerto Rico. Over the years, RWW has become an icon of "January family reunion" for the wireless and microwave community from all over the world to meet friends and to create new connections.

The conference venue — Sheraton Puerto Rico — is in walking distance to Old San Juan, a UNESCO World Heritage Site with well-preserved Spanish colonial architecture, forts, and historic sites. The city's history dates to the 16th century, and exploring its cobblestone streets can be like stepping back in time. There will be the ideal connection of old historic places with the latest radio and wireless technologies.

IEEE Radio & Wireless Week hosts five conferences which build the kernel of the week: • the IEEE Topical Conference on Power Amplifiers for Wireless and Radio Applications (PAWR), • the Topical Meeting on Silicon Monolithic Integrated Circuits in RF Systems (SiRF), • the IEEE Topical Conference on Wireless Sensors and Sensor Networks (WiSNet), • the IEEE Space Hardware and Radio Conference (SHaRC), and • the Radio and Wireless Symposium (RWS) This complementary structure with topic-related conferences covers all timely topics of radio wireless technologies, from theory to practical implementation, from integrated chips to large-scale systems, from kilohertz to terahertz, and from communication to sensing and space applications. PAWR, SiRF, WiSNet, and SHaRC have their focus days, while RWS sessions flow from Monday through Wednesday. Besides this, the Automatic Radio Frequency Techniques Group (ARFTG) is again co-locating their conference with RWW. ARFTG is a technical organization interested in all aspects of RF and microwave test and measurement. The ARFTG symposium is known as the premier event focused on RF, microwave, and millimeterwave measurements, calibration, and measurement uncertainty. More information about ARFTG and its symposia can be found at www.arftg.org. Another highlight is the co-located Internet of Things (IoT) summit, one of the very successful collaborations of RWW with other communities, such as the IEEE Communications Society, IEEE Council on Electronic Design Automation, IEEE Circuits and Systems Society, IEEE Reliability Society, IEEE Signal Processing Society, IEEE Power & Energy Society, IEEE Power Electronics Society, and IEEE Solid-State Circuits Society. In 2025, the IEEE MTT-S Latin America Microwave Conference (LAMC) will be co-located with RWW for the first time. After three days of intensive RWW technical sessions, you can stay at the venue for two more days of microwave theory and technology. One of the objectives of the IEEE MTT-S Latin America Microwave Conference is to encourage technological, scientific, and academic development in Latin American countries. After prior editions of the biannual conference took place in Puerto Vallarta, México (2016), Arequipa, Peru (2018), Cali, Colombia (2021, virtual), San Jose, Costa Rica (2023), LAMC'25 will be collocated with RWW. One of the central events will be the plenary session on Tuesday morning with three invited speakers giving keynote talks. We are delighted that John Cressler and Hermann Schumacher will provide an overview of 25 years of Silicon Monolithic Integrated Circuits for RF and its bright future. The second talk on the convergence of advanced models and measurements for virtual prototyping success will be provided by Larry Dunleavy from Modelithics Incorporated. The plenary session will also host the award ceremony with the announcement of the Student Paper Competition awards. Starting from Sunday afternoon, 19 January 2025, workshops on diverse topics will address the latest trends in radio and wireless. More short courses will be offered on Wednesday before the conclusion of the RWW.

RWW 2025 features plenty of social–technical events for friendly professional networking. For example, a reception in the exhibition hall on Monday evening offers exhibitors and all the attendees full-flavored snacks while they chat in a relaxed atmosphere. Subsequently, we will offer a panel discussion on state-of-the-art wireless technologies. Besides this reception, there will be many more opportunities to gather, meet in a relaxed atmosphere, and network. The MTT-S Space Night hosted on Tuesday will offer again an interactive panel for discussion of space related topics. The Women in Microwaves (WIM) and Young Professional (YP) Committees will again organize an outstanding panel session of female role models and a workshop on social skill development. All conference attendees are invited to these events. Each year, the MTT-S appoints a new class of Distinguished Microwave Lecturers (DMLs), who are internationally recognized experts and technical leaders in their fields within the Society. The 2025 Class of MTT-S DMLs will present their talks during a dedicated track on Monday, which is a perfect opportunity to get a comprehensive overview of popular MTT-S fields.

As you can see, RWW'25 is densely packed with activities between sessions and other events. We hope you will find some time to enjoy Puerto Rico and especially Old San Juan. This year we will not only provide you with technical input and social interaction, also your fitness will be strengthened in early morning sport sessions at the pool side. In the lunch break, you can relax in our 20-minutes Lunchtime Stretch. We invite you to visit our conference website at www.radiowirelessweek.org and register to participate in various activities of RWW 2025. We will also be pleased to communicate with you directly about any thoughts or questions. RWW makes every effort to support researchers and practitioners in radio and wireless technologies. With our joint efforts, we look forward to a strong program and a wonderful event for professional interactions during RWW 2025 in Puerto Rico.

RWW2025 General Chair,
Holger Maune, Otto-von-Guericke University Magdeburg

Welcome Messages

Technical Program Chair's Welcome Message

TPC Chair
Roberto Gomez-Garcia

Dear colleagues, RWW and ARFTG participants, it is a great pleasure to welcome you on the behalf of the technical program committee to another edition of the famous radio wireless week! Our committee put together a very attractive program to ensure fruitful exchange and establish collaboration links between scientific community, industry and academia, young professionals, and radio enthusiasts. More than 180 papers from academia and industry from more than 20 countries worldwide were thoroughly reviewed to assure high standards of scientific publishing and over 30 technical sessions are open this year.

Given the success from past years, specific panel sessions, workshops or hands-on activities and summits are held again in addition to the focused technical sessions, bringing the main players together to share the latest results from wide spectrum of RF fields in an interactive way.

Beside the technical program, please check the timing for social events, networking and light receptions that are the unique opportunities for technical exchange, dissemination of your research outcomes and promotion of radio-wireless technologies and techniques worldwide!

RWW is also an important platform for the technical and professional development of young professionals and students. Based on the initial evaluation by the TPC, a group of finalists were selected to participate in the student paper competition, which will feature both elevator pitch presentations and interactive forum discussions. Don't miss out on the opportunity to meet our bright young researchers! The best student papers will be recognized during the plenary session.

Let me finish this welcome message with the famous quote of Edward Everett Hale, suitable not only to RWW newcomers – "Coming together is a beginning, keeping together is progress, working together is success!". Enjoy your time at RWW and in San Antonio!

RWW2025 Technical Program Chair,
Roberto Gomez-Garciaa, University of Alcala

RWW 2025 STEERING COMMITTEE

General Chair:
Holger Maune, Otto-von-Guericke-Universität Magdeburg

General Co-Chair:
Václav Valenta, European Space Agency

Technical Program Chair:
Roberto Gomez-Garcia, University of Alcala

Finance Chair:
Markus Gardill, Brandenburg University of Technology

Topical Conferences

PAWR Co-Chairs:
John Dooley, Maynooth University
Gregor Lasser, Chalmers University

WiSNet Co-Chairs:
Paolo Mezzanotte, University of Perugia
Fabian Lurz, Otto-von-Guericke-Universität Magdeburg

SHaRC Co-Chairs:
Jan Budroweit, German Aerospace Center
Eduardo Rojas, Embry-Riddle Aeronautical University

SiRF Chair:
Mehmet Kaynak, Texas Instruments

Distinguished Microwave Lecturers Chair:
Markus Gardill, Brandenburg University of Technology

Workshops Co-Chairs:
Jan Budroweit, German Space Agency
Pushkar Bajirao Kulkarni, Qualcomm

Technical Lectures:
Juan A. Becerra, Universidad de Sevilla

IoT Summit Liaison:
Charlie Jackson, Northrop Grumman
Jasmin Grosinger, Graz University of Technology

Women in Engineering Chair:
Jasmin Grossinger, Graz University of Technology

Student Paper Contest Co-Chairs:
Ken Kolodziej, MIT Lincoln Laboratory
Davi V.Q. Rodrigues, UT El Paso

Student Initiative Co-Chairs
Michael Chung-Tse Wu, Rutgers University
Davi V.Q. Rodrigues, UT El Paso

University Demo Chair:
Mario Pauli, Karlsruhe Institute of Technology

Young Professionals Chair:
Davi V.Q. Rodrigues, UT El Paso

Publications Chair:
Thomas Kurin, Otto-von-Guericke-Universität Magdeburg

Publicity Co-Chairs:
Glauco Fontgalland, Universidade Federal de Campina Grande Venkata Vanukuru, GlobalFoundries
Eduardo Rojas-Nastrucci, Embry-Riddle Aeronautical University

Microwave Magazine Special Issue Editor:
Hamhee Jeon, qorvo

MTT Transactions Mini Special Issue Editors:
Roberto Gomez-Garcia, University of Alcala

Exhibition/Sponsorships Chair:
Susie Horn, SMH Consulting

RWW Executive Committee Chair:
Robert Caverly, Villanova University

Conference Management:
Elsie Vega, IEEE MCE

Visa Letters:
Elsie Vega, IEEE MCE

Webmasters:
Min Hua, Raysilica
Joel Arzola, Raytheon Technologies

At Large (Advisors):
Changzhi Li, Texas Tech University
Alexander Koelpin, Hamburg University of Technology
Kevin Chuang, Analog Devices
Nuno Borges Carvalho, Universidade de Aveiro

Conference Information

REGISTRATION HOURS:

Registration will be open during the following times in the San Juan Foyer 2nd Level:

- Sunday, 19 January 2025 7:00 -- 18:00
- Monday, 20 January 2025 7:00 -- 18:00
- Tuesday, 21 January 2025 7:00 -- 18:00
- Wednesday, 22 January 2025 7:00 -- 12:00

EXHIBIT HOURS:

The joint RWW/ARFTG Exhibition area will be open during the following times:

- Monday, 20 January 2025 13:00 -- 19:00
- Tuesday, 21 January 2025 9:00 -- 17:00

Please refer to the conference website at http://www.radiowirelessweek.org/exhibits for the latest information and details on how to become a sponsor and exhibit at RWW.

SOCIAL EVENTS, NETWORKING, AND LITE RECEPTIONS:

- Sunday 19 January 2025 before the WiM event in San Juan 6-8
- Joint RWW/ARFTG Welcome Reception Monday, 22 January 2025 17:30 – 18:30 Location: Exhibit Hall – Miramar Ballroom
- Tuesday 23 January 2025 at 17:30 before the MTT-S Space Night event in San Juan 4-5

EXHIBITORS & SPONSORS

RWW Topical Conferences

RADIO AND WIRELESS SYMPOSIUM (RWS)

RWS2025 Chair
Holger Maune, Otto-von-Guericke-Universität Magdeburg

RWS2025 Co-Chair
Václav Valenta, European Space Agency

RWS2025 Technical Program Committee

High-speed and Broadband Wireless Technologies:
Upkar Dhaliwal, Jing Wang, Kev Chuang, Muh-Dey Wei, Jennifer Kitchen

Emerging Wireless Technologies & Novel Engineered Materials:
Suresh Venkatesh, Spyridon Pavlidis, Alessandro Cidronali, Yang Yang, Syed Abdullah Nauroze, Sangkil Kim, Hyun Kyu Chung, Ahmad Hoorfar, Nosrati Mehdi, Luigi Boccia, Hjalti Sigmarsson

Wireless System Architecture and Propagation Channel Modeling:
Aly Fathy, Ugo Dias, Paulo Ferreira, Chenming Zhou, Marco Dietz, Maria J. Madero-Ayora

Wireless Digital Signal Processing and Artificial Intelligence:
Eiji Okamoto, Kenneth Kolodziej, Markus Gardill, Nuno Carvalho, Pushkar Kulkarni, Rui Ma, Arnaldo Oliveira

Applications to Bio-Medical, Environmental, and Internet of Things:
Jenshan Lin, Mohammad-Reza Tofighi, Changzhan Gu, Hong Hong, Syed Islam, Dieff Vital, Robert Caverly, Daniel Rodriguez, Chia-Chan Chang

Antenna Technologies, MIMO and Multi-Antenna Communications:
Wasif Khan, Edward Niehenke, Holger Maune, You Zou, Dariush Mirshekar, Jose-Maria Munoz-Ferreras, Jiang Zhu

Passive Components & Packaging:
Yu-Chen Wu, Bayaner Arigong, Roberto Gomez-Garcia, Dimitra Psychogiou, Shahrokh Saeedi, Li Yang, Pedro Cheong, Sai-Wai Wong, Tzyy-Sheng Horng, Jong Gwan Yook

MM-Wave to THz Systems & Applications:
Xinwei Wang, Glauco Fontgalland, Wooyeol Choi, Minoru Fujishima, Hiroshi Okazaki, Xuan Ding, David Delrio, Sergio Pacheco Yu-Teng Chang, Renato Negra, Moon-Kyu Cho, Emery Chen, Yu Ye, Xin Wang

POWER AMPLIFIERS FOR RADIO AND WIRELESS APPLICATIONS (PAWR)

Power amplifiers for radio and wireless applications (PAWR) are often the most critical component of RF/microwave communications systems and consequently the focus of intense research to achieve increased linearity and power efficiency. New forms of power amplification are being developed to meet the needs of the wireless communication equipment industry and the world's demand for greater information transmission. PAWR 2025 will feature tracks on RF/microwave Power Amplifiers:

- High Power/Wideband Active Devices
- Power Amplifiers for Mobile, Avionics and Space
- Modeling and Characterization
- Advanced Circuit Design and Topologies
- Green Power Amplifier Technology
- Integration Technology
- Packaging and Reliability
- Linearization and Efficiency Enhancement Techniques
- Applications, Novel Architectures and System Analysis

PAWR2025 Chair
John Dooley, Maynooth University
PAWR2025 Co-Chair
Gregor Lasser, Chalmers University

PAWR2025 Technical Program Committee

Modeling and Characterization:
Ehsan Azad, Jose Pedro, Patrick Roblin, Kefel Wu, Fiipe Barradas, David Runton, Vittorio Camarchia, Antonio Raffo, Franco Ramirez, Stephen Maas
Advanced Circuit Design and Topologies:
Vittorio Camarchia, Paolo Colantonio, Nathalie Deltimple, Roberto Quaglia, Chao Lu, Hamhee Jeon, Xiaohu Fang, Bumman Kim, Paolo Enrico de Falco, Francesc Purroy, Xinyu Zhou, Anna Piacibello, Frederick Raab
Applications, Novel Architectures and System Analysis:
Florinel Balteanu, Alireza Shamsafar, Robert Caverly, Ming Ji, Marco Pirola, Chang-Ho Lee, Pravin Premakanthan, Murat Eron, Mustazar Iqbal, J. Apolinar Reynoso-Hernandez, Justine McCormack
Linearization and Efficiency Enhancement Techniques: Kevin Chuang, Pere L. Gilabert, Armando Cova, Rocco Giofrè, Chenhao Chu, Christian Fager, Juan Becerra, Chao Yu, Falin Liu, Pedro Cabral, Taylor Barton, John Dooley

WIRELESS SENSORS AND SENSOR NETWORKS (WiSNet)

Wireless sensors and wireless sensor networks are crucial components for manufacturing, structural health, security monitoring, environmental monitoring, smart agriculture, transportation, commercial applications, localization, tracking systems and other important and emerging applications. WiSNet2025 is intended to stimulate discussion and foster innovation on these components and applications.

WiSNet2025 Chair
Paolo Mezzanotte, University of Perugia

WiSNet2025 Co-Chair
Fabian Lurz, Otto-von-Guericke-Universität Magdeburg

WiSNet2025 Technical Program Committee

Wireless Sensors for IoT Applications:
Hendrik Rogier, Tuami Lasri, Paolo Mezzanotte, Manos Tentzeris, Federico Alimenti, Spyridon Daskalakis

Wireless Sensors for Radar, Positioning, Tracking, and Imaging:
Fabian Michler, Mario Pauli, Chung-Tse Michael Wu, Alessandra Costanzo, Alexander Koelpin, Nils Pohl, Changzhi Li, Zahir Alsulaimawi, Benedict Scheiner, Rahul Khanna, Reinhard Feger, Maurizio Bozzi

Wireless Sensors Technologies, Circuits and Systems:
Christophe Loyez, Kamal Samanta, Avik Santra, Georg Fischer, Wang Wang, Serioja Tatu, Guoan Wang

Wireless Sensor Networks, Communication and Artificial Intelligence:
Luciano Tarricone, Davi Rodrigues, Emanuele Cardillo, Jennifer Williams, Valentina Palazzi, Fabian Lurz

RWW Topical Conferences

SPACE HARDWARE AND RADIO CONFERENCE (SHaRC)

The IEEE Space Hardware and Radio Conference (IEEE SHaRC) addresses new concepts, novel implementations, as well as emerging applications for space-based hardware for communications, earth observation, and other novel disruptive services. To meet recent needs, there has been a renaissance of interest and investment in space- and suborbital- based systems especially for high-data-rate communications networks. These new global satellite networks are disruptive, rely on new system and subsystem design paradigms, and are an enabler for many novel applications. The IEEE Space Hardware and Radio Conference provides a forum for discussions on this new frontier.

SHARC2025 Chair
Jan Budroweit, German Aerospace Center

SHARC2025 Co-Chair
Eduardo Rojas, Embry-Riddle Aeronautical University

SHARC2025 Technical Program Committee

Systems, Hardware, and Electronics for Space:
Maximilian Scardelletti, Ricky Sturdivant, Steven C. Reising, Rudy Emrick, Thomas Ussmueller, Charles Jackson, Jasmin Grosinger, Vaclav Valenta, Ramesh Gupta, James McSpadden, Goutam Chattopadhyay, Zizung Yoon, Markus Gardill, Eng Nuno Carvalho, Steven Rosenau

SILICON MONOLITHIC INTEGRATED CIRCUITS IN RF SYSTEMS (SIRF)

SiRF2025 will mark the 25th topical meeting on SiRF, with a renewed emphasis on promoting a dialogue between IC designers and researchers promoting non-standard technologies, exploiting the maturity of Silicon processes, but addressing the challenges of tomorrow. The three days of SiRF2025 will chronicle recent advances in our dynamic field, and provide the platform for developing new ideas, and candid exchange, facilitated by SiRF's single-session format.

SIRF2025 Chair
Mehmet Kaynak, Texas Instruments

SIRF2025 TPC Chair
Ickhyun Song, Hanyang University

SIRF2025 TPC Co-Chair
Austin Chen, Infinera

SIRF2025 Publicity Chair
Chung-Tse Michael Wu, National Taiwan University

SIRF2025 Executive Committee
Yi-Jan Emery Chen, Julio Costa, Vadim Issakov, Mehmet Kaynak, Chien-Nan Kuo, Donald Lie, Venkata Koushik Malladi, Monte Miller, Sergio Pacheco, Nils Pohl, Hasan Sharifi, Ahmet Cagri Ulusoy, Václav Valenta, Roee Ben-Yishay, Saeed Zeinolabedinzadeh

SIRF2025 Technical Program Committee

RF, Millimeter-wave and THz Integrated Circuit Front Ends:
Austin Chen, Vadim Issakov, Amit Jha, Chien-Nan Kuo, Roee Ben Yishay, To-Po Wang, Hualiang Zhang, Pujan Kumar Chowdhury Mishu, Hai Yu, Ickhyun Song, Ahmet Cagri Ulusoy, Shanthi Bhagavatheeswaran, Robert Schmid, Christopher Coen, Michael Oakley

Wireline Communication Circuits and Silicon-Photonics Integrated Circuits:
Juergen Hasch, Robert Schmid, Saeed Zeinolabedinzadeh, Xiuyou Han, Aleks Dyskin, Junning Jiang, Hasan Sharifi, Ankur Guha Roy

Devices, Passives, Materials, Modeling, and Measurement:
Jean-Pierre Raskin, Venkata Koushik Malladi, Pierre Blondy, Vikas Shilimkar, Robert Schmid, Xun Gong, Mehmet Kaynak, Xi Zhu

IEEE INTERNET OF THINGS (IoT) SUMMIT

The 8th IEEE IoT Vertical and Topical Summit at RWW2025 is devoted to the Artificial Intelligence (AI) and Machine Learning (AI/ML) Technologies. The summit is cosponsored by the multi-Society IEEE IoT Technical Community and the IEEE Microwave Theory and Technology Society. The theme for this years IoT Summit is: "The Impact of Artificial Intelligence on Wireless IoT Systems: From Design to Application." The use of AI/ML has affected almost all aspects of IoT across verticals. This includes the complete life cycle from the glimmer of an idea to its exploration, proof of concept demonstrations, eventual development, deployment, operation, maintenance and upgrades, and eventual retirement. Wireless systems play a crucial role as a key enabler: (1) as the essential infrastructure layer for connectivity in IoT systems; and (2) as sensors and sensor networks that provide the data that subsequently drive control, management, operation, and planning functions in IoT applications. Existing and emerging AI/ML capabilities affect the way we design, build, and operate wireless systems and, at the same time, promise new and much greater levels of "intelligence" and performance for IoT solutions and applications. The IoT Summit will address where AI/ML technologies play a key role in the IoT ecosystem and concentrate on three verticals: (1) Manufacturing; (2) Automotive; and (3) Agriculture.

IoT Summit Co-Chairs:
Charlie Jackson,
Incoming Director IEEE Division IV
Adam Drobot, OpenTechWorks Inc.

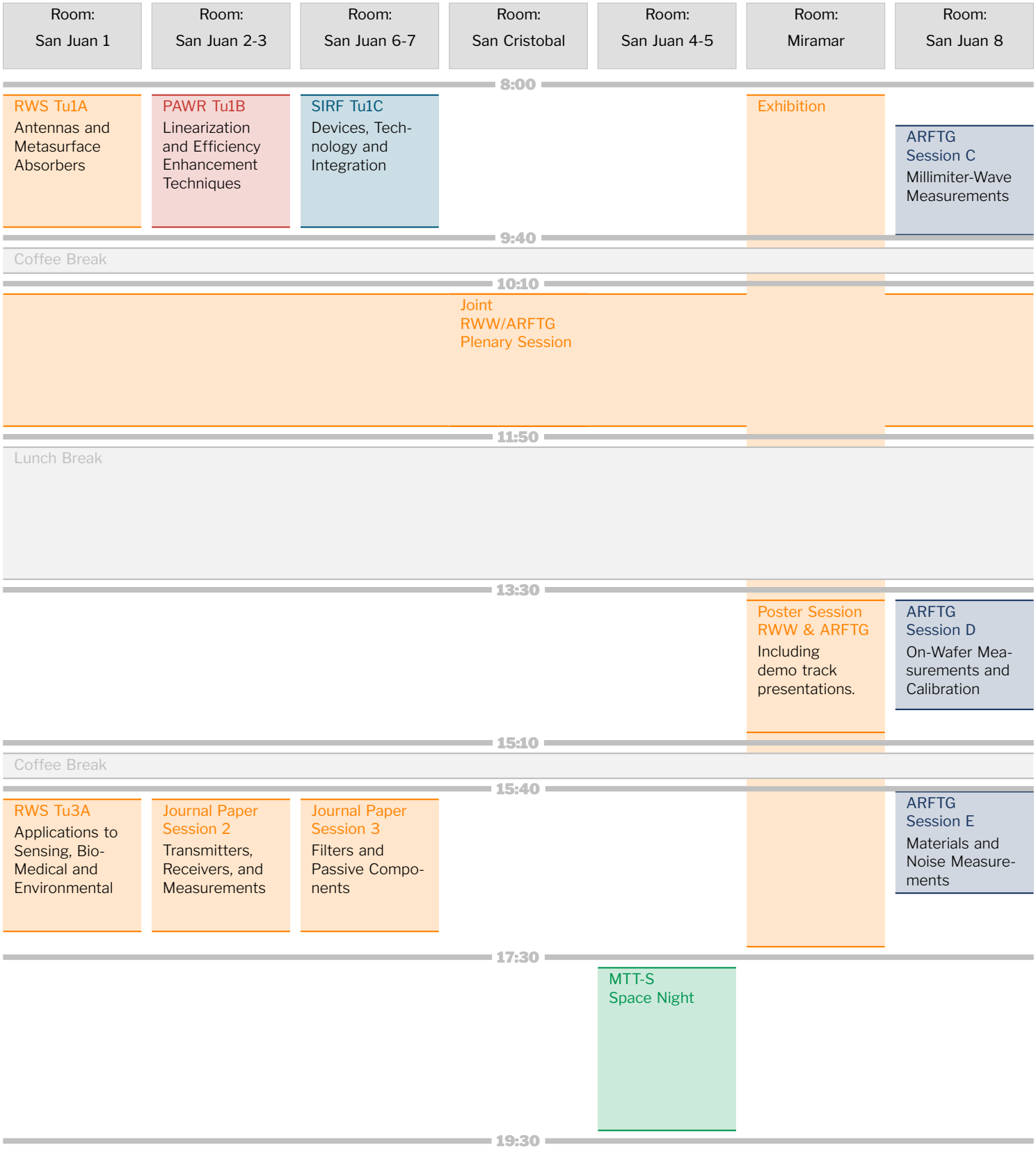
Event Overview • Sunday, 19 January 2025

Room: Bahia 1	Room: Bahia 2	Room: Laguna 1	Room: Laguna 2	Room: San Juan 8	Room: San Felipe
8:00					
					ARFTG/NIST Short Course (Day 1)
9:40					
10:10					
11:50					
13:30					
Workshop Power Amplifiers: System Challenges, Simulation and Latest Architectures	Workshop Design, Advanced Packaging and Heterogeneous Integration Solutions for mmWave and Sub-THz Applications	Workshop Radio Communication and Radio Sensing for Public Authorities	Workshop Hands-On Workshop for Signal Analyzing Measurement		
17:30					
19:00				Women in Microwaves	
20:15				Young Professionals Panel	
21:15					

Event Overview • Monday, 20 January 2025

Room: San Juan 1	Room: San Juan 2-3	Room: San Juan 6-7	Room: Laguna 2	Room: Miramar	Room: San Felipe	Room: San Juan 8
8:00						
MTT-S Distinguished Microwave Lecturers' Talks Part 1	PAWR Mo1B Modeling and Characterization	SIRF Mo1C K-/Ka-Band Low-Noise Amplifiers and Optical Receivers			ARFTG/NIST Short Course (Day 2)	
9:40						
Coffee Break						
10:10						
MTT-S Distinguished Microwave Lecturers' Talks Part 2	PAWR Mo2B Advanced Circuit Design and Topologies	SIRF Mo2C RF/mm-Wave Front-Ends and Phased Arrays				On Wafer Users Forum
11:50						
Lunch Break						
				Exhibition		
13:30						
RWS Mo3A Wireless Digital Signal Processing and Artificial Intelligence	PAWR Mo3B Applications, Novel Architectures and System Analysis	SIRF Mo3C Signal Generation and Frequency Conversion	Student Paper Contest			ARFTG Session A Loadpull and Nonlinear Measurement
15:10						
Coffee Break						
15:40						
PAWR/ARFTG Joint Panel	NSF Special Session	Journal Paper Session 1 Power Amplifiers and Microwave Sources				ARFTG Session B Broadband Measurements and Linearization
17:20						
18:30						
				RWW/ARFTG Joint Reception		
19:30						

Event Overview • Tuesday, 21 January 2025



Event Overview • Wednesday, 22 January 2025

Room: San Juan 1	Room: San Juan 2-3	Room: San Juan 6-7	Room: Laguna	Room: San Cristobal	Room: Miramar	Room: Laguna 2
8:00						
RWS We1A Power Dividers and Matrix Feeders	WisNet We1B High-Performing Radars for Positioning and Sensing	SHaRC We1C Antennas and RF Components for Space	Short Course Hands-On Full-Duplex Radio Design	IoT Summit **CANCELLED**	Exhibition	ARFTG Workshop ARFTG Workshop
9:40						
Coffee Break						
10:10						
RWS We2A Filters, Transitions and Interconnects	WisNet We2B Latest Advancements in Radar Design and Evaluation	SHaRC We2C Space Communication Systems				
11:50						
Lunch Break						
13:30						
RWS We3A MM-Wave to THz Systems & Applications	WisNet We3B Components and Optimization Techniques for Wireless Sensor Systems		Short Course AMD RFSoC – Architecture, System Development, and Applications			
15:10						
Coffee Break						
15:40						
RWS We4A Wireless Power Systems	Journal Paper Session 4 Wireless Power Transmission and Radar	Demystify IEEE Fellow Nomination				
17:30						

Workshop

Power Amplifiers: System Challenges, Simulation and Latest Architectures

Organizers: John Dooley, Maynooth University and Gregor Lasser, Chalmers University of Technology

Room: Bahia 1

13:30

Abstract:

Wireless systems are increasingly used to address some of the world's most pressing societal challenges, but deployment of these solutions also introduces specific technical challenges. A critical component in many wireless communication and sensing systems is the power amplifier (PA). Given the broad range of applications, there is a growing need for PAs that can operate across various power levels, support multiple frequency bands, offer wider bandwidths, and maintain high power efficiency. This has significantly expanded the role and design responsibilities of PA engineers.

In modern wireless communication systems, design specifications for power amplifiers now extend beyond their traditional input and output ports to encompass broader system-level requirements. This workshop will bring together insights from industry and academic leaders on key system-level considerations, including cellular network infrastructure, non-terrestrial communication link simulation, and innovative PA designs that are pushing the boundaries of wireless system performance.

17:30

Workshop

Design, Advanced Packaging and Heterogeneous Integration Solutions for mmWave and Sub-THz Applications

Organizers: Mehmet Kaynak, Texas Instruments and Ahmet Cagri Ulusoy, Karlsruhe Institute of Technology

Room: Bahia 2

13:30

Abstract:

In mm-wave applications, RF routing within IC packages is crucial for ensuring signal integrity, efficiency, and reliability. At mm-wave frequencies, signal paths are highly sensitive to losses, interference, and parasitic effects. Optimized RF routing minimizes insertion loss, reduces crosstalk, and controls parasitics, which preserves signal power and enhances clarity. Package interaction with silicon impacts thermal management, preventing hotspots that can degrade performance. Integration with Antenna-on-Package (AoP) structures further emphasizes the need for precise routing to avoid mismatches and reflections, optimizing antenna performance. Reliable RF routing is essential for consistent manufacturing, especially in automotive radar, where high performance and robustness are mandatory. Proper RF routing in mm-wave radar packages thus plays a vital role in achieving the high fidelity and reliability required for these advanced applications.

In this workshop, we will deeply explore high-frequency technologies, heterogeneous integration, and advanced interconnect solutions for mmWave and sub-THz applications. We will explore the need for and innovative approaches to heterogeneous integration (HI), which involves integrating multiple dies and chiplets (e.g., CMOS, InP, and SiGe BiCMOS chips) on advanced packaging, to push the boundaries of high-frequency systems into new territories.

The workshop will include insightful presentations from both academia and industry, highlighting the latest trends and future design and technologies, HI, and advanced packaging. These talks will merge theoretical research with practical applications, offering a comprehensive view of the field's progression.

14:30 15:30 16:30 17:30

13:30

Workshop

Radio Communication and Radio Sensing for Public Authorities

Organizers: Thomas Ussmueller, B&E antec, Christian Schulz, Ruhr University Bochum and Francesca Schenkel, Ruhr University Bochum

Room: Laguna 1

Abstract:

In an era where safety and security are paramount, radio sensing technologies offer innovative solutions across various domains of public safety and emergency response. This workshop brings together leading experts to discuss the latest advancements, applications, and challenges in the field of radio sensing and communication for public authorities. Key topics will include the integration of terrestrial and satellite-based systems to enhance the monitoring and coordination of air traffic, especially in remote and oceanic areas. In addition, the importance of secure and reliable communication channels in safety operations will be addressed. Potential vulnerabilities in radio communication and strategies to mitigate risks will be discussed, ensuring the integrity and confidentiality of critical information. Another focal point will be the application of radar technology in fire sensing, offering unique advantages over traditional optical and thermal methods. Participants will explore the principles of radar sensing, its ability to operate in various environmental conditions, and the ongoing challenges in signal interpretation and sensor integration. The workshop will also delve into innovative radar-based technologies for detecting life signs, designed to be deployed on reconnaissance robots or drones. This will cover the potential for these systems to revolutionize search and rescue operations, providing critical capabilities in disaster response scenarios. The workshop aims to provide a comprehensive overview of the current state and future potential of radio sensing technologies, offering valuable insights for researchers, practitioners, and policymakers dedicated to enhancing safety and security through technological innovation.

Workshop

Hands-On Workshop for Signal Analyzing Measurement

Organizers: Herrmann Boss, Rohde&Schwarz and Paul Peterson, Rohde&Schwarz

Room: Laguna 2

Abstract:

The current trend for wireless systems to operate at millimeter wave (mmWave) frequencies and over wide bandwidth drives challenging requirements for RF front ends. In this webinar, you will learn how MATLAB and Simulink can be used for modeling RF and mmWave transceivers, performing RF budget analysis, and simulating wideband adaptive architectures.

We will first address typical RF data analysis tasks, such as reading and writing Touchstone files, transforming, visualizing, and fitting S-parameters for distributed elements. As a second step, we will discuss how to model and simulate amplifiers, matching networks, and antenna arrays operating at mmWave frequencies. Using virtual prototypes, we will simulate wideband transmitters and receivers including co-existence and interference scenarios, beam-squinting and antenna coupling, and dynamic EVM measurements for different communications standards such as 5G FR2.

With practical examples, we will demonstrate how to optimize baseband signal processing algorithms and control logic together with RF transceivers to compensate for RF impairments, to increase resilience to interfering signals, and to support multiple communication standards.

14:30

15:30

16:30

17:30

Distinguished Women in Microwaves Event

Organizer: Jasmin Grosinger, Graz University of Technology, Austria

Room: San Juan 4

19:00

Distinguished Women in Microwaves Event

The Women in Microwaves (WiM) event at the upcoming IEEE Radio & Wireless Week (RWW) 2025 will spotlight distinguished women who have advanced the field of microwave theory and technology considerably. Three outstanding women in microwaves will discuss their respective research fields and careers. A light reception will accompany the event, allowing us to network and connect. Dr. Sandra Cruz-Pol, ERC Program Director, National Science Foundation, Alexandria, VA, USA, will talk about RF Sensors for Remote Sensing the Earth and the Importance of RF Spectrum Management. Dr. Bernadette Smith, a Senior R&D Software Engineer at Keysight Technologies, USA, will detail Millimeter and Sub-THz Noise Figure and Noise Parameter Measurements for 6G. Prof. Ifana Mahbub from The University of Texas at Dallas, TX, USA, will dive deep into the Next Generation of Wireless Power Transfer Network of Unmanned Aircraft Systems.

RF Sensors for Remote Sensing the Earth and the Importance of RF Spectrum Management

Speaker: Sandra Cruz-Pol ERC Program Director, National Science Foundation, Alexandria, VA, USA

Abstract: In this talk, I will review my research work in using satellite and ground-based microwave sensors to study the Earth. I will also talk about the ever-growing importance of radio regulations for efficiently sharing the radio spectrum among many users to minimize RFI and benefit society.

Millimeter and Sub-THz Noise Figure and Noise Parameter Measurements for 6G

Speaker: Bernadette Smith Senior R&D Software Engineer at Keysight Technologies, USA

Abstract: Accurate noise measurements play a critical role in component design and verification across various domains. Emerging technologies in 6G, remote sensing, and automotive radar, among others, require measurements in the millimeter and sub-THz range, and these measurements are often performed on-wafer. Reliable and accurate noise characterization becomes increasingly challenging, with difficulties surrounding instrumentation, calibration and correction, and measurement uncertainty. Key challenges will be discussed including the need for multi-tiered calibrations (especially relevant for on-wafer measurements or systems utilizing down-converters) and the requirement to manage source impedance deviation using impedance tuners. Other issues, including those surrounding temperature effects and on-wafer probing will also be addressed. State-of-the-art calibration and measurement techniques using the VNA-based cold source method will be presented along with a survey of commercially available accessories, including noise tuners, high-frequency switches, and low-noise amplifiers.

Next Generation of Wireless Power Transfer Network of Unmanned Aircraft Systems

Speaker: Ifana Mahbub, University of Texas, Dallas, TX, USA

Abstract: This talk highlights the next generation of wireless power transfer (WPT) network concept that is scalable, safe, and efficient and can be deployed in a UAS by incorporating waveform engineering, electromechanical beamforming, integrated phased-array antenna, and transmitter (TX)/receiver (RX) co-design. Although interest in radiative (far-field) WPT using beamforming has been growing rapidly because of its capability to energize a large number of autonomous devices, most of these works are still in the theoretical phase without any practical implementation. This talk presents the implementation of a distributed beamforming network using a bottom-up approach (from the antenna to the interconnected network) that is highly important for addressing the challenges associated with a dynamically changing environment. Practical system-level implementation strategies and multi-scale and multi-technique approaches to building a resilient WPT network for UAVs will be discussed. First, the challenges associated with the dual approach of electrical beamforming and the mechanical steering of the TX antennas to maximize the RF-RF link efficiency will be discussed. Secondly, an investigation of the efficient rectifier circuitry designed on-chip as well as commercial off-the-shelf components (COTS) to maximize the power conversion efficiency RF-DC efficiency will be presented. Finally, future research directions on increasing the power transfer distance to scale up the amount of power delivered to the load for the proposed wireless power beaming network system will be highlighted.

20:15

Young Professionals Panel

Organizer: Davi Rodrigues, The University of Texas at El Paso

Room: San Juan 4

20:15

20:15

Young Professionals Panel

This interactive panel will offer a rare opportunity to tap into the minds of accomplished professionals who have navigated the complexities of either industry or academia. The panelists will provide guidance to young professionals and answer questions from the audience. Join us at the Young Professionals Panel for a chance to connect, learn, and ignite your career!

Panelists:

Dr. Kevin Chuang

Dr. Kevin Chuang is a Technology Leader at Analog Devices, Inc. (ADI), Wilmington, MA, USA, where he focuses on accelerating radio technology innovations for next-generation wireless communications at the intersection of RF systems and signal processing. Kevin is well-versed in startup, federally funded R&D laboratories, and publicly traded companies with a broad experience in developing wireless technologies from systems to circuits. Prior to joining ADI, he has co-founded NanoSemi, a spin-off from the MIT and MIT Lincoln Laboratory, where he contributed to the development of wideband linearization systems from concept to product launch, which was subsequently acquired by MaxLinear. He is a senior member of IEEE and holds more than 25 IEEE publications and 20 U.S. patents.

Dr. Miguel Velez-Reyes

Dr. Miguel Velez-Reyes is the George W. Edwards/El Paso Electric Distinguished Professor in Engineering and Chair of the Electrical and Computer Engineering Department at the University of Texas at El Paso (UTEP). He also holds a joint appointment with Pacific Northwest National Laboratory as a Senior Scientist. He received the IEEE Walter Fee Outstanding Young Engineer Award in 1999. He is a board member of the Inclusive Engineering Consortium and an advocate to provide access to excellent education to students from underserved populations and foster social mobility of students from economically disadvantaged backgrounds. He is a life member of SHPE and SACNAS, and Senior Member of IEEE. He is also a member of ASEE, and AGU.

Dr. Bernadette Smith

Dr. Bernadette Smith has a BS in Physics from the California Institute of Technology and a PhD in Physics from the University of Colorado at Boulder. Her PhD research concentrated on searches for supersymmetry at the Large Hadron Collider at The European Organization for Nuclear Research (CERN). Finding a new passion for instrumentation and measurement science, she pivoted careers and is now a Senior R&D Software Engineer at Keysight Technologies. She has been with Keysight Technologies since 2011, working primarily with vector network analyzers. She currently specializes in microwave and RF noise figure measurements, calibration and correction (including fixturing), and uncertainty analysis, and has one patent in this area.

Dr. Sandra Cruz-Pol

Dr. Sandra Cruz-Pol was born and raised in Puerto Rico. She received a Ph.D. in Electrical Engineering from Penn State University working with passive and active satellite and ground-based sensors studying atmospheric gases and the sea surface emissivity. She worked in active remote sensing at UMass for her MS degree. Her BS degree is from University of Puerto Rico at Mayagüez (UPRM). All three degrees were obtained with the Suma Cum Laude distinction. Dr. Cruz-Pol is a Senior member of the IEEE. She was the Associate Editor for University Affairs for the IEEE GRSS Newsletter for 5 years.

21:15

21:15

Sports and Health Programm

Organizer: Jasmin Gabsteiger, Friedrich-Alexander University, Erlangen-Nürnberg

Sports Sessions

Instructor: Jasmin Gabsteiger

Jasmin is a Ph.D. student in Electrical Engineering at FAU in Erlangen, Germany. Since 2014, she has been teaching fitness classes, including at Adidas. In addition to her regular classes at Adidas, she also hosts fitness events at various hotels worldwide. As a Group Fitness Master Trainer, LesMills Instructor, and certified Yoga teacher, she is excited to bring her expertise to RWW2025. Jasmin enjoys pushing everyone to their limits while ensuring that all fitness levels are catered to, so everyone gets the most out of her classes.

Lunchtime Stretch

Description:
This stretch session can be done in any clothes, no shoes required, and you won't sweat heavily. It's designed to release tension, improve posture, and give you a refreshing midday break. The stretches will focus on flexibility and mobility, targeting areas like the neck, back, and shoulders, which are often stiff after sitting.

When:
On Sunday, Monday and Wednesday
12:00-12:20

Where:
Lounge Area 2nd floor

Full Body Workout

Description:
Shoes are optional, and all necessary equipment, including towels, will be provided on-site. Please bring enough water. This workout uses a towel as a prop to challenge your entire body. Expect a mix of strength, cardio, and endurance exercises that target all major muscle groups. The session is accessible to all fitness levels, and Jasmin will offer modifications to ensure everyone can participate and get a great workout.

When:
On Monday and Wednesday
06:00-06:45

Where:
Pool area, Meeting 5 minutes before at the hotel reception

Yoga

Description:
This yoga class will focus on improving flexibility, balance, and mental relaxation. The flow combines stretching, breathing exercises, and poses that engage your core and calm your mind. Suitable for all levels, it provides a balance of challenge and relaxation, leaving you energized and centered.

When:
Tuesday
06:00-06:45

Where:
Pool area, Meeting 5 minutes before at the hotel reception

DML Part 1

DML Special Session

Chair: Markus Gardill, Brandenburg University of Technology Cottbus

Room: San Juan 1

8:00

Power Without Pain: High Power MMIC PA Design, the Pitfalls and how to Avoid Them

Speaker: Michael Roberg

Abstract: Dr. Roberg, an Engineering Fellow at mmTron, Inc., will share insights on designing MMIC power amplifiers (PAs) with a focus on avoiding common pitfalls, drawn from his 20+ years of experience in defense and commercial industries.

8:20

8:40

Microwave/RF Devices and their Interactions with Novel Nano-Materials for Sensing and Communication Applications

Speaker: Mohammad Hossein Zarifi

Abstract: Dr. Zarifi, a leading expert in applied electromagnetics, will discuss the role of microwave and RF sensors in sensing and communication, especially through interactions with nanomaterials like MXene and mesoporous metal-organic frameworks.

9:00

Sensing, Tracking, Imaging with Artificial Electromagnetic Materials

Speaker: Chung-Tse Michael Wu

Abstract: Dr. Wu will discuss the revolutionary use of metamaterials in sensing and secure communication, focusing on how CRLH-TL leaky-wave antennas (LWAs) can enable real-time detection and secured wireless communication.

9:20

9:40

PAWR Session Mo1B

Modeling and Characterization

Chair: John Dooley, Maynooth University
Co-Chair: Gregory Lasser, Chalmers University of Technology

Room: San Juan 2-3

8:00

Mo1B-1: Impact of Temperature-dependent Emission Time Constant of AlGaN-GaN HEMTs on DPD with Trapping Effects Compensation

Authors: Zhijian Yu, Ampleon; Yi Zhu, Ampleon; John R Gajadharsing, Ampleon

Mo1B-2: Towards System-Level Modeling of Broadband Sub-THz Amplifiers for Wireless Communication

Authors: Simon Haussmann, Institute of Robust Power Semiconductor Systems (ILH) University of Stuttgart; Dominik Wrana, Institute of Robust Power Semiconductor Systems (ILH) University of Stuttgart; Lutfi Samara, Huawei Technologies, Munich Research Center; Tommaso Zugno, Huawei Technologies, Munich Research Center; Ingmar Kallfass, Institute of Robust Power Semiconductor Systems (ILH) University of Stuttgart

Mo1B-3: Physics-Based Modeling and Characterization of Wide GaN-HEMTs

Authors: Soheil Nouri, University of Arkansas; Amirreza Ghadimi Avval, University of Arkansas; Samir M El-Ghazaly, University of Arkansas

9:00

Mo1B-4: Strategies for Tackling Numerical Issues in Coefficient Selection Algorithms for Volterra Models

Authors: Elías Marqués-Valderrama, Universidad de Sevilla; Maria J. Madero-Ayora, University of Sevilla; Juan A Becerra, University of Sevilla

9:40

SIRF Session Mo1C

K-Ka-Band Low-Noise Amplifiers and Optical Receiver

Chair: Ickhyun Song, Hanyang University
Co-Chair: Roee Ben Yishay, Mobileye, Intel

Room: San Juan 6-7

8:00

Mo1C-1: CMOS LNA and VGA for K-Band LEO SATCOM Receiver Using Body-to-Source Floating Technique

Authors: Yo-Sheng Lin, National Chi Nan University; Jin-Fa Chang, National Changhua University of Education

Mo1C-2: A Two-stage Ka-band Transformer-feedback Low-Noise Amplifier in 90-nm CMOS Technology

Authors: Yu-Chia Su, National Central University; Kuei-Hao Huang, National Central University; Hong-Yeh Chang, National Central University

Mo1C-3: Low Power K- and Ka- Wideband LNA Design in 22 nm FD-SOI Using Transfomer-Tuned Input

Authors: Martin Rack, Université Catholique de Louvain; Sidina Wane, EV Technologies; Damienne Bajon, eV-Technologies; Jean-Pierre Raskin, Universite catholique de Louvain; Dimitri Lederer, Université Catholique de Louvain

9:00

Mo1C-4: 44 GHz Bandwidth Optical Receiver Monolithically Integrated in a SiGe ePIC BiCMOS Technology

Authors: Festim Iseini, IHP GmbH; Andrea Malignaggi, IHP Microelectronics; Nicola Pelagalli, IHP Microelectronics; Anna Peczek, IHP Microelectronics; Corrado Carta, IHP Microelectronics; Gerhard Kahmen, IHP GmbH

9:40

DML Part 2

DML Special Session

Chair: Markus Gardill, Brandenburg University of Technology Cottbus

Room: San Juan 1

PAWR Session Mo2B

Advanced Circuit Design and Topologies

Chair: Vittorio Camarchia, Politecnico di Torino
Co-Chair: Xinyu Zhou, The Hong Kong Polytechnic University

Room: San Juan 2-3

SIRF Session Mo2C

RF-mm-Wave Front-Ends and Phased Arrays

Chair: Amit Jha, Qualcomm
Co-Chair: Hong-Yeh Chang, National Central University

Room: San Juan 6-7

10:10

Advanced Methods for Precise and Complete Microwave Component Measurements

Speaker: Joel Dunsmore

Abstract: Dr. Dunsmore will present advanced methods for measuring components with VNAs, with a focus on nonlinear test methods and more.

Mo2B-1: Broadband H-Band Power Amplifier with Optimum Intermediate Splitter and Combiner Impedance

Authors: Thomas Ufschlag, University of Stuttgart; Benjamin Schoch, University of Stuttgart; Lukas Gebert, University of Stuttgart; Roger Lozar, Fraunhofer Institute for Applied Solid State Physics; Axel Tessmann, Fraunhofer Institute for Applied Solid State Physics; Ingmar Kallfass, University of Stuttgart

Mo2C-1: A 5.1–10.5 GHz SiGe BiCMOS Power Amplifier for 6G NR with 29 dBm PSAT and 40.1

Authors: Davide Pecile, University of Padova; Stefan Kokorovic, Infineon Technologies; Alberto Gambarucci, Infineon Technologies; Andrea Bevilacqua, University of Padova

10:30

Mo2B-2: Low-Complexity Sequential LMBA for FR1 5G NR

Authors: Peiyuan Shi, Politecnico di Torino; Luis Crespo Zuloaga, Universidad de Cantabria; Giulia Bartolotti, Politecnico di Torino; Zhifan Zhang, Politecnico di Torino; Anna Piacibello, Politecnico di Torino; Jose Garcia, Universidad de Cantabria; Vittorio Camarchia, Politecnico di Torino

Mo2C-2: A High-Gain 240-325-GHz Power Amplifier for IEEE 802.15.3d Applications in an Advanced BiCMOS Technology

Authors: Ahmed Gadallah, IHP Microelectronics; Andrea Malignaggi, IHP Microelectronics; Batuhan Sutbas, IHP Microelectronics; Holger Rücker, IHP Microelectronics; Dietmar Kissinger, Ulm University; Mohamed Eissa, IHP GmbH

10:50

Wireless Power Transmission based on Retro-reflective Beamforming

Speaker: Mingyu Lu

Abstract: Dr. Lu will cover how retro-reflective beamforming can enable efficient wireless power transmission, a crucial technology for the Internet of Things (IoT).

Mo2B-3: A 15 GHz Stacked GaAs Power Amplifier For Potential 6G Application

Authors: Zhiyi Liu, Chalmers University of Technology; Rob Vissers, Chalmers University of Technology; Gregor Lasser, Chalmers University of Technology

Mo2C-3: A V-Band VSPS Using Deep-Saturated SiGe HBTs With 0.34 dB Amplitude and 0.7° Phase Errors

Authors: Batuhan Sutbas, IHP Microelectronics; Mohamed Eissa, IHP GmbH; Gerhard Kahmen, IHP GmbH

11:10

Mo2B-4: K-Ka-Band Eight-Way Power-Combined Power Amplifier in 180 nm E-Mode GaAs

Authors: Rob Vissers, Chalmers University of Technology; Christian Fager, Chalmers University of Technology; Gregor Lasser, Chalmers University of Technology

Mo2C-4: 90–100 GHz 6-Bit Blixer-Based Active Phase Shifter in SiGe BiCMOS

Authors: Kateryna Smirnova, Karlsruhe Institute of Technology; Mark P van der Heijden, NXP Semiconductors; Domine Leenaerts, Eindhoven University of Technology; Ahmet Cagri Ulusoy, Karlsruhe Institute of Technology

11:30

The Role of millimeter-wave Beamforming and Integration Technologies on Non-Terrestrial Networks

Speaker: Luigi Boccia

Abstract: Dr. Boccia will highlight how emerging microwave systems are shaping the future of satellite and aerial networks for universal connectivity.

Mo2B-5: A 77-GHz Power Amplifier in a 90-nm GaN Process

Authors: Stefan Stroessner, University of Colorado; Zoya Popovic, University of Colorado

Mo2C-5: A Fully-Integrated Four-Channel Phased Array D-Band Transceiver Achieving 10 GBit-s at 10 m

Authors: Christoph Herold, IHP GmbH; Alper Karakuzulu, Renesas Electronics Germany GmbH; Andrea Malignaggi, IHP GmbH; Matthias Scheide, IHP GmbH; Nebojsa Maletic, IHP GmbH; Karthik Krishnegowda, IHP GmbH; Corrado Carta, IHP GmbH

11:50

Monday, 20 January 2025 • Early Afternoon Sessions

RWS Session Mo3A

Wireless Digital Signal Processing and Artificial Intelligence

Chair: Arnaldo Oliveira, Universidade de Aveiro
Co-Chair: Jing Wang, CableLabs

Room: San Juan 1

PAWR Session Mo3B

Applications, Novel Architectures and System Analysis

Chair: Anna Piacibello, Politecnico di Torino
Co-Chair: Chenhao Chu, ETHZ

Room: San Juan 2-3

SIRF Session Mo3C

Signal Generation and Frequency Conversion

Chair: Michael Wu, National Taiwan University
Co-Chair: Austin Chen, Infinera

Room: San Juan 6-7

13:30

Mo3A-1: Agile and Wideband PAM4-based All-Digital Receiver

Authors: Jose M Domingues, University of Aveiro; Samuel S Pereira, Instituto De Telecomunicacoes; Luís F Almeida, University of Aveiro; Hugerles S Silva, Instituto De Telecomunicacoes; Arnaldo R Oliveira, Instituto De Telecomunicacoes; Nuno Carvalho, Instituto De Telecomunicacoes

Mo3B-1: 10-16 GHz High Efficiency Power Amplifier MMIC Using GaN HEMT for 6G Applications

Authors: Chenhao Chu, ETH Zurich; Takuma Torii, Mitsubishi Electric Corporation; Shintaro Shinjo, Mitsubishi Electric Corporation; Koji Yamanaka, Mitsubishi Electric Corporation; Hua Wang, ETH Zurich

Mo3C-1: A Stacked Class-F VCO in 45nm SOI CMOS

Authors: Sutton Hathorn, Purdue University; Saeed Mohammadi, Purdue University

13:50

Mo3A-2: A Bandwidth-Scalable CNN-based Channel Estimation Algorithm for 5G Systems

Authors: Fábio L Coutinho, Instituto De Telecomunicacoes; Hugerles S Silva, Instituto De Telecomunicacoes; Arnaldo R Oliveira, Instituto De Telecomunicacoes

Mo3BD2: A 70W Dual-Band High Efficiency MMIC Doherty PA Linearized over 200MHz iBW for 2.3-2.7GHz Macro Base Station Driver Applications

Authors: Kaisseh F Houssein, Ampleon; Christophe Quindroit, Ampleon; Valentin Favard, Ampleon; Mariano Ercoli, Ampleon; Nelsy Monsauret, Ampleon; Stephan Maroldt, Ampleon

Mo3C-2: > 7 dBm, 89.8–97.2 GHz Colpitts-Clapp VCO Using Forward-Biased Diodes in 0.25 µm InP-HBT

Authors: Satoshi Kawahara, NTT Device Technology Laboratories; Tsutomu Takeya, NTT Device Technology Laboratories; Teruo Jyo, NTT Device Technology Laboratories; Hitoshi Wakita, NTT Device Technology Laboratories; Munehiko Nagatani, NTT Device Technology Laboratories; Miwa Mutoh, NTT Device Technology Laboratories; Yuta Shiratori, NTT Device Technology Laboratories; Hiroyuki Takahashi, NTT Device Technology Laboratories

14:10

Mo3A-3: UNet-Based Deep Learning Pathloss Estimator with Boundary Condition Input

Authors: Arash Ahmadi, École de Technologie Supérieure; Abhiroop Bhattacharya, École de Technologie Supérieure de Montreal; Mathieu Gratuze, École de Technologie Supérieure; Sylvain G Cloutier, École de Technologie Supérieure; Richard Al Hadi, École de Technologie Supérieure

Mo3B-3: A 5 to 25GHz Four-Way Power Combined Low Voltage Driver Amplifier Robust to Radiation, Temperature, Process and Aging

Authors: Jesse Moody, Sandia National Laboratories; Stefan Lepkowski, Sandia National Laboratories; Tyler Liebsch, Sandia National Laboratories; Phil Oldiges, Sandia National labs

Mo3C-3: A D-Band 6.8 GHz Lock Range 5th Sub-Harmonic Injection-Locked Oscillator in 22 nm FDSOI

Authors: Andre Engelmann, Friedrich-Alexander-Universität Erlangen-Nürnberg; Florian Probst, Friedrich-Alexander-Universität Erlangen-Nürnberg; Philip Hetterle, Friedrich-Alexander-Universität Erlangen-Nürnberg; Kai Scheller, Friedrich-Alexander-Universität Erlangen-Nürnberg; Albert-Marcel Schrotz, University of Erlangen-Nuremberg; Robert Weigel, Friedrich-Alexander-Universität Erlangen-Nürnberg

14:30

Mo3A-4: Fully Digital Ultra-low-bit Linear Embedding Beamforming System with Quantization Compensation

Authors: Xiangyu Mao, Georgia Institute of Technology; Coleman B DeLude, Georgia Institute of Technology; Wei Chun Wang, Georgia Institute of Technology; Justin Romberg, Georgia Institute of Technology; Saibal Mukhopadhyay, Georgia Institute of Technology

Mo3B-4: An On-Die Diode-Based Temperature Sensor in GaN without Device Characterization

Authors: Grace E Gomez, University of Colorado; Noah K Schakel, University of Colorado; Ricky Mannion, University of Colorado; Taylor Barton, University of Colorado

Mo3C-4: A 7 mW 22 GHz Frequency Divider Chain by 2048 using CML, TSPC and CMOS Logic in 22FDX

Authors: Tetiana Baluta, Technische Universität Braunschweig; Alexander Meyer, Technische Universität Braunschweig; Adilet Dossanov, Technische Universität Braunschweig; Liubov Bakhchova, Technische Universität Braunschweig; Yerzhan Kudabay, Technische Universität Braunschweig; Vadim Issakov, Technische Universität Braunschweig

14:50

Mo3A-5: Efficient Explainable Boosting Machine for RF Active Metasurface Array Synthesis

Authors: Sakib Reza, University of Texas at Dallas; Sanjay Das, University of Texas at Dallas; Shamik Kundu, Intel Corporation; Kanad Basu, University of Texas at Dallas; Ifana Mahbub, University of Texas at Dallas

15:10

The RWW Student Paper Contest

The purpose of the Student Paper Contest is to reward students for exceptional work and consider group projects as well as individual projects. The RWW Student Paper Contest provides students with the opportunity to share their work and discuss their results with experts from industry and academia. It is open to all students attending the RWW and presenting a paper at one of the topical conferences (RWS, PAWR, WiSNet, SiRF, and SHaRC). Starting from 2017 the Steering Committee established a new format of the Student Paper Contest, which is now a single event for the whole RWW.

The following rules apply for participating at the Student Paper Contest:

- First author must be a student (a full time or a part time). A letter is required from major advisor (Professor) stating that the first author is a registered full-time student or part-time student and has done a substantial portion of the work. Failure to provide this letter will result in disqualification.
- Number of authors on the paper: No limit, including outside authors. Outside authors are defined as co-authors from industry or from other institutions (government labs, other universities, etc.). The outside authors are included to encourage group-project submissions. The review committee will consider the number of authors vs. the level of work presented in the paper in order not to penalize the individual project submissions.

Student Paper Contest submissions are first evaluated by the Technical Program Committee (TPC), along with all other manuscript submissions, and receive no special consideration when being considered for acceptance to the symposium. Those papers that are accepted for oral presentation, identified as Student Paper submissions, and that meet the criteria (Relevance, Novelty, Quality, and Content) become eligible for the Student Paper Contest. The TPC and the Student Paper Contest Chairs will separately evaluate these papers again to select Student Paper Finalists.

Each Student Paper Finalist is required to prepare a short elevator pitch and a poster. Judges from all topical conferences will select the first and second place winners among the Student Paper Finalists based on the quality of the final paper, the poster presentation, and the oral presentation. The winners will be announced at the Plenary Session on Tuesday. Like last year, the first place winner is invited to write a paper for the IEEE MTT-S Microwave Magazine.

Ken Kolodziej, MIT Lincoln Laboratory
Davi V.Q. Rodrigues, UT El Paso
RWW Student Paper Contest Chairs

Process & Rules of the Student Paper Contest

Each Student Paper Finalist is required to prepare a short elevator pitch and a poster.

The elevator pitches take place on Monday 20 January from 13:30 to 15:10 in room Laguna 2.

The poster presentations take place on Monday 20 January from 15:40 to 17:20 starting in the coffee break in the Miramar Ballroom.

For the elevator pitches finalists will be in the role of the entrepreneur and present their idea to potential investors (the judges). There will only be a flip chart for supporting the presentation. Maximum two persons per paper can bring whatever they can carry for a presentation of four minutes.

The winners will be announced in the Plenary Session on Tuesday, 21 January.

Finalists 2025

- **ANN Versus Cascaded Behavioral Models for DPD Linearization of Wideband Dual-Input PAs**, Raúl Criado, University Politècnica de Catalunya
- **44 GHz Bandwidth Optical Receiver Monolithically Integrated in a SiGe ePIC BiCMOS Technology**, Festim Iseini, Ihp Gmbh
- **Impulse Radio Ultrawideband (IR-UWB) Signal Based Far-field Wireless Power Beaming (WPB) System Using Antipodal Vivaldi Antenna Array**, Adnan Basir Patwary, The University of Texas at Dallas
- **Characterization and Implementation of Cyanate Ester Composite GCPW-Fed Leaky Wave Antenna for Space Applications**, Cameron Martinez, IEEE
- **Agile and Wideband PAM4-based All-Digital Receiver**, Jose Domingues, University of Aveiro
- **Two Differential Wideband SIW-to-RWG Transitions for Thin Single Layer Substrates With Additional Tapering for D-Band Applications**, Tobias Braun, Ruhr University Bochum
- **An Evaluation of Mid-Band Signal Level Variability with 4G and 5G Phones**, Max Hollingsworth, University of Colorado
- **Broadband H-Band Power Amplifier with Optimum Intermediate Splitter and Combiner Impedance**, Thomas Ufschlag, Universität Stuttgart
- **A GPS Disciplined RFDAC Based C-Band Radar**, Simon Heining, Johannes Kepler University Linz
- **A Dual-Band 3 × 3 Nolen Matrix Network with Distinct Progressive Phase Difference**, Hanxiang Zhang, Florida State University
- **Frequency-Domain Analysis of a Coupled Oscillator Sensor with an Exceptional Point of Degeneracy**, Camilo Moncada, Universidad de Cantabria
- **An E-Band Quadrupler Utilizing a 45° Polyphase Filter for Improved Harmonic Rejection**, Pascal Stadler, Ruhr University Bochum
- **60GHz Leaky-Wave Antenna Design for SISO Radar System with Angle Estimation**, Jasmin Gabsteiger, Friedrich-Alexander-Universität Erlangen-Nürnberg
- **Field Effect Strategy to Enhance RF Performance of High-Resistivity Silicon Substrates**, Massinissa Nabet, UCLouvain
- **A Novel Treatment of Obstructive Sleep Apnea Using Continuous Wave Interferometry Radar**, Geyang Xu, Texas Tech University
- **Four-Way Power Divider and Distributed Attenuator for 39 GHz Bidirectional Phased-Array Transceiver**, Yo-Sheng Lin, National Chi Nan University

15:40

Joint PAWR/ARFTG Panel

Organizers: John Dooley, Maynooth University and
Gregor Lasser, Chalmers University

Room: San Juan 1

What wireless systems will exist in 10 years, and how will AI be designing them?

This panel session will discuss the emerging opportunities for AI in future microwave and wireless systems. The panel will address some of the areas which will see increased use of AI tools and techniques, such as Design, DPD and Test & Measurement

16:00

16:20

16:40

17:00

17:20

Special Session

National Science Foundation (NSF)

Organizer: Davi V. Q. Rodrigues,
The University of Texas at El Paso

Room: San Juan 2-3

National Science Foundation

Join Program Directors from the National Science Foundation as they share valuable insights on current funding priorities, emerging research trends, and other key topics aimed at informing and inspiring attendees to pursue opportunities for securing NSF funding for their research projects

Speakers:
Jenshan Lin,
Program Director of the Communications, Circuits, and Sensing Systems Program in the Division of Electrical, Communications, and Cyber Systems

Sandra Cruz-Pol,
Program Director of the Engineering Research Centers in the Division of Engineering Education and Centers

José Colom-Ustáriz,
Program Director of the Established Program to Stimulate Competitive Research (EPSCoR) in the Office of Integrative Activities

Journal Paper Session

Power Amplifiers and Microwave Sources

Chair: Peter H. Siegel, NASA Jet Propulsion Laboratory

Room: San Juan 6-7

JP1-1: A Two-Way GaN Doherty Amplifier for 5G FR2 With Extended Back-Off Range

Authors: Rocco Giofrè, Anna Piacibello, Vittorio Camarchia, Paolo Colantonio

JP1-2: High-Gain and High-Linearity MMIC GaN Doherty Power Amplifier With 3-GHz Bandwidth for Ka-Band Satellite Communications

Authors: Anna Piacibello, Roberto Quaglia, Rocco Giofrè, Ricardo Figueiredo, Paolo Colantonio, Nuno Borges Carvalho, Vaclav Valenta, Vittorio Camarchia

JP1-3: Development of a Space-Grade Ka - Band MMIC Power Amplifier in GaN/Si Technology for SAR Applications

Authors: Chiara Ramella, Corrado Florian, Maria Del Rocìo Garcìa, Iain Davies, Marco Pirola, Paolo Colantonio

JP1-4: A Low-Cost Reflection Oscillator Using Substrate Integrated Coaxial Line Technology

Authors: Saurabh Shukla, Soumava Mukherjee

JP1-5: A Novel Stability Improvement Method of S-Band Magnetron Systems Based on Its Anode Current Feature

Authors: Shaoyue Wang, Yan Zhao, Xiaojie Chen, Changjun Liu

17:20

RWS Session Tu1A

Antennas and Meta-surface Absorbers

Chair: Jong-Gwan Yook, Yonsei University
Co-Chair: Juan-Antonio Becerra, University of Sevilla

Room: San Juan 1

PAWR Session Tu1B

Linearization and Efficiency Enhancement Techniques

Chair: Christian Fager, Chalmers University of Technology
Co-Chair: Pere Gilabert, Universitat Politècnica de Catalunya

Room: San Juan 2-3

SIRF Session Tu1C

Devices, Technology and Integration

Chair: Mehmet Kaynak, Texas Instruments
Co-Chair: Michael Wu, National Taiwan University

Room: San Juan 6-7

8:00

Tu1A-1: 60GHz Leaky-Wave Antenna Design for SISO Radar System with Angle Estimation

Authors: Jasmin Gabsteiger, Friedrich-Alexander-Universität Erlangen-Nürnberg; Dominik Langer, Hamburg University of Technology; Christian Dorn, Technical University of Munich; Alexander Koelpin, Institute of High-Frequency Technology; Fabian Lurz, Chair of Integrated Electronic Systems

Tu1B-1: Generative Adversarial Network based Digital Predistortion Linearization for 6G Joint Communications and Sensing

Authors: Kevin Chuang, Analog Devices; Muhammad Saad Zia, Analog Devices; Weite Zhang, Analog Devices, Inc.

Tu1C-1: Application of Device-Degradation Modeling to SiGe-LNA Analysis

Authors: Taeyeong Kim, Hanyang University; Jongho Lee, Hanyang University; Junhwa Jeong, Hanyang University; Michael A Oakley, Georgia Institute of Technology; John D Cressler, Georgia Institute of Technology; Ickhyun Song, Hanyang University

8:00

8:20

Tu1A-2: A Broadband High Gain 3D Printed Ellipsoidal Dielectric Lens Antenna

Authors: Alex D Santiago-Vargas, Purdue University; Islam H Abdelaziem, Purdue University; Kenle Chen, University of Central Florida; Dimitrios Peroulis, Purdue University

Tu1B-2: ANN Versus Cascaded Behavioral Models for DPD Linearization of Wideband Dual-Input PAs

Authors: Raül Criado, University Politècnica de Catalunya; Wantao Li, University Politècnica de Catalunya; Gabriel Montoro, Universitat Politècnica de Catalunya; William Thompson, Analog Devices; Kevin Chuang, Analog Devices; Pere L Gilabert, Universitat Politècnica de Catalunya

Tu1C-2: Characterization of HBT-based Avalanche Noise Sources Using Standard Test Structures for Measurement of Transistor Scattering Parameters

Authors: Ethan Bernardini, University of Perugia; Giacomo Schiavolini, University of Perugia; Giulia Orecchini, University of Perugia; Gunter Fischer, IHP Microelectronics; Corrado Carta, IHP Microelectronics; Federico Alimenti, University of Perugia

8:20

8:40

Tu1A-3: Multi-Feed Multi-Layer In-Antenna Power Combining Approach

Authors: Behdad Jamadi, Virginia Polytechnic Institute and State University; Woojun Lee, Virginia Polytechnic Institute and State University; Jeffrey S Walling, Virginia Polytechnic Institute and State University

Tu1B-3: Robust Digital Pre-Distortion Parameter Estimation with Interpretable Feature Selection

Authors: Jonathan Guimaraes Ribeiro, Maynooth University; Rana Bogrekci, Northeastern University ; Aidan Colgan, Maynooth University; Michael Codd, Maynooth University; Zhilin Ren, Northeastern University ; Yiyue Jiang, Northeastern University ; Declan Byrne, Maynooth University; Miriam Leeser, Northeastern University ; John Dooley, Maynooth University

Tu1C-3: Robust Measurement and De-embedding Techniques of Si-SiGe HBT Devices up to 500 GHz

Authors: Philippine Billy, STMicroelectronics; Jojo Varghese, University of Bordeaux; Magali De Matos, University of Bordeaux; Didier Celi, STMicroelectronics; Nicolas Derrier, STMicroelectronics; Alexis Gauthier, STMicroelectronics; Pascal Chevalier, STMicroelectronics; Thomas Zimmer, University of Bordeaux

8:40

9:00

Tu1A-4: Design and Implementation of a Slant Polarized Wideband Vivaldi Antenna Array Feed for Monopulse Radar Reflectors

Authors: Reza Masoumi, University of Tabriz; Robab Kazemi, University of Tabriz; Aly E Fathy, University of Tennessee

Tu1B-4: Understanding Memory and Nonlinearity Impact on the Structure of Volterra Series Covariance Matrices

Authors: Juan A Becerra, Universidad de Sevilla; Elías Marqués-Valderrama, Universidad de Sevilla; Maria J. Madero-Ayora, Universidad de Sevilla

Tu1C-4: Field Effect Strategy to Enhance RF Performance of High-Resistivity Silicon Substrates

Authors: Massinissa Nabet, UCLouvain; Martin Rack, Université Catholique de Louvain; Yiyi Yan, UCLouvain; Kumar Pradhan, IIITDM Kancheepuram; Jean-Pierre Raskin, Universite catholique de Louvain

9:00

9:20

Tu1A-5: A Novel Thermally-Activated Carbonyl Paint-Based Metasurface Absorber for Cutting-Edge RF Switch Applications

Authors: Abu H Murshed, University of Texas at Dallas; Karthik Kakaraparty, The university of Texas at Dallas; Russell C Reid, Utah tech university; Ifana Mahbub, University of Texas at Dallas

9:40

RWW/ARFTG Plenary Session

Chair: Holger Maune, Otto von Guericke University
Co-Chair: Rusty Myers, Keysight Technologies

Room: San Juan 4-5

10:10

RWW/ARFTG Plenary Session

The Final Frontier – Using Si/SiGe Technology in Space Systems

Speaker: John D. Cressler, Georgia Tech, USA

John D. Cressler received his PhD from Columbia University in 1990. He is currently Regents Professor, Schlumberger Chair Professor in Electronics, and the Ken Byers Teaching Fellow in Science and Religion, in the School of Electrical and Computer Engineering at Georgia Tech. His research interests center on SiGe electronic and photonic devices, circuits, and systems. He and his team have published over 800 scientific papers in these areas, and he has graduated 72 PhD students over his 32-year academic career. He has published a number of books, both non-fiction and historical fiction, and he has received a number of awards for both his teaching and research.

Abstract:
Space has been aptly called the “final frontier” (thank you, Star Trek!). The application needs of the global space and aerospace communities are predictably many and varied, ranging from a diverse set of communications and imaging satellites, to the GPS constellation, to microwave and millimeter-wave (mmW) remote sensing to support weather forecasting and climate science, to exploration of other worlds, which include: the mighty James Webb Space Telescope (probing the origins of the universe), the shadowed polar craters of the Moon (where water ice resides), Mars surface (colonization?), and Europa (the search for extraterrestrial life in the water ocean beneath the 10 km ice cap). While classically, orbital satellites were massive, tough to launch, and extremely expensive (a few $Bs), the current (and rapidly accelerating) trend has swung decidedly towards using relatively low-cost (a few $M) and easy to launch constellations of single or multi-U CubeSats (1U = 10x10x10 cm3) to cost-effectively address the plethora of emerging needs. These days, this has been increasingly supported by commercial space ventures (e.g., SpaceX, BlueOrigin et al., vs. the old gang—NASA and DoD), which are proliferating rapidly. As appealing as space is for visioning fun new science and slick applications, it remains a decidedly unfriendly place to visit. Space is the quintessential “extreme environment,” bathed in intense radiation from both our Sun (high energy electrons and protons trapped by the Earth’s magnetosphere in radiation belts) and the cosmos (GeV energy galactic cosmic rays from supernovae). By way of level setting, a satellite in the most benign Earth orbit, Low Earth Orbit (LEO – 160-1000 km up from the surface), experiences 100,000 rad of ionizing radiation dose over mission life. In comparison, 500 rad will kill a person! That is, we are asking a lot of our electronics in such systems, and given the extreme cost constraints of launch weight, adding a few inches of lead shielding is not the ideal solution! In addition, it is mighty chilly in space (2.73 K = -455°F, the cosmic background), and when the sunlight shines on you, it gets uncomfortably warm, very quickly (e.g., on the surface of the Moon, from -180°C to +120°C from darkness to light, within a few moments). Yep, space is a tough place to do business. As I have long argued [1], Si/SiGe HBT BiCMOS technology provides a unique solution for many of the needs of these emerging space systems, including: 1) extreme levels of performance (multi-hundred GHz) with the SiGe HBT and high integration levels with on-board CMOS, for realizing compelling system functionality/unit volume, at low cost; 2) the rapid improvement of all electronic circuit relevant performance metrics with cooling, with operational capability down into the mK quantum regime (SiGe HBTs love chilly weather!); 3) the ability to operate robustly up to 150-200°C, with modest performance loss; 4) the ability to operate robustly over wide temperature ranges (in principle from mK to 150-200°C); 5) built-in robustness to multi-Mrad total ionizing dose radiation; and 6) built-in heavy ion induced latchup immunity (read: those pesky GeV cosmic rays). Long ago (1990s), the notion of creating a low-cost Si-based electronic + photonic integrated circuit (EPIC) “superchip” was envisioned (R. Soref), which brought together advanced SiGe HBTs (analog, RF-mmW), CMOS (digital), and Si integrated photonics (with the possible exception of a laser, which could be flipped onto the die worse case). In essence, EPICs are a low-cost, high-yielding, reliable, highly integrated Si platform for putting electrons and light into the same conversation! Clearly this represents a paradigm shift to business as usual. Now, with even more compelling system functionality/unit volume, at low cost. Such an EPIC superchip could in principle satisfy all-comers-of-new-needs. While photonics has long been used in space (think solar cells, imagers), EPICs are new to that space game, but possess great potential for the emergent needs in this new vision of CubeSat/SmallSat driven space systems, including, thing like: LIDAR (spacecraft-to-spacecraft positioning); deep space and within constellation optical communications (huge data rate improvement); and on-spacecraft high bandwidth data transport (think data center in the sky for instruments that spew out tons of data that need to get back home quickly). This field of EPICs in space is only a few years old, but already much has been learned, and results look very encouraging. In this plenary address, I will highlight the current status and the future trends of using Si/SiGe electronic and photonics in space systems.

12:00

RWW/ARFTG Plenary Session

Chair: Holger Maune, Otto von Guericke University
Co-Chair: Rusty Myers, Keysight Technologies

Room: San Juan 4-5

10:10

RWW/ARFTG Plenary Session

From niche to dominance - Si/SiGe in integrated microwave electronics

Speaker: Hermann Schumacher, Ulm University

Hermann Schumacher received is Diploma in Electrical Engineering in 1982, and his Doctorate in Engineering (Dr.-Ing., with highest distinction) in 1986, both from RWTH Aachen University. In 1986, he joined Bell Communications Research in Red Bank, NJ, USA, researching compound semiconductor devices for optoelectronic integration of high-speed fiberoptic applications. Among other things, he was involved in early work on InP/InGaAs heterojunction bipolar transistors (HBTs). In 1990, he joined Ulm University, Ulm, Germany. There, he and his research group worked on Si/SiGe HBTs (initially with the Daimler Research Center in Ulm), and, increasingly, microwave and millimeter-wave integrated circuits. From 2000 until 2016, he led the Competence Center on Integrated Circuits in Communications, a public-private partnership. Investigated applications ranged from short-range ultra-wideband radars for vital sign detection and security systems to complex frontend ICs for active electronically scanned satellite antennas. From 2011 until 2022, Professor Schumacher developed and directed the School of Advanced Professional Studies, the continuing education unit of Ulm University.

Abstract:

Si/SiGe frontend ICs played a crucial role in making wireless systems in the upper microwave and millimeter-wave range a common sight in civilian, even consumer, systems, such as active satellite antennas for low-earth orbit satellite systems, automotive radars, or high-speed communication links in 5G and emerging 6G standards. Getting there has not been easy. Silicon, after all, has a rather mediocre electron mobility compared to III-V semiconductor families, and a truly semi-insulating substrate suitable for planar transmission line passives is hard to achieve. Starting as early as 1965 (T.M. Hyltin), Silicon was investigated as a potential competitor for GaAs as a semiconductor substrate for microwaves. Early in the 1980s, advances in the technology of Si IMPATT devices breathed new life into microwave electronics on Si. But by and large, monolithic microwave integrated circuits (MMICs) remained firmly in the GaAs camp. Starting in the late 1990s, this changed when the Si microwave IC community realized that the path forward was not to be found in imitating GaAs design approaches. The problem with lossy Si substrates was mitigated by thin-film microstrip lines. With the Si/SiGe heterojunction bipolar transistor an active device emerged which rivaled, and later surpassed, III-V high electron mobility transistors in transit frequency and maximum frequency of oscillation. The advantage of using Silicon for micro- and millimeter-wave ICs is, at least initially, not in its lower substrate cost. Given the comparatively small technological changes introduced by Si/SiGe HBTs to existing and mature BiCMOS processes, Si-based MMICs very quickly increased in complexity. Once commercial markets evolved, the ability to fabricate Si-MMICs on large wafer diameters rapidly brought cost down. The underlying Si processes offered mixed-signal and digital add-ons unavailable in III-V competitors, reducing the packaging complexity. Concentrated passives, including on-chip transformers, replaced transmission line elements, leading to very substantial area reduction. Even micro-electro-mechanical switches (MEMS) can be integrated on chip, including the necessary DC-DC converters for electrostatic actuation. While at RF, MEMS did not catch on as initially expected, their time may still come as we move further up in frequency. The IEEE Topical Meetings on Silicon Monolithic Integrated Circuits in RF Systems (SiRF), whose 25th installment we celebrate in 2025, have been an excellent yardstick of this field's progress over the years, while still providing room for other device concepts, such as SiGe MODFETs, graphene MODFETs, or carbon nanotube transistors. Results from SiRF's proceedings will be used to outline a short history of Si-based micro- and millimeter-wave electronics, augmented with earlier results which may help to understand where we came from, and why Si/SiGe BiCMOS was such a disruptive change. The presentation will conclude with a look ahead, continuously aware that "predictions are very hard, especially about the future", an aphorism attributed to Yogi Berra, Albert Einstein, but uttered by neither.

12:00

RWW/ARFTG Plenary Session

Chair: Holger Maune, Otto von Guericke University
Co-Chair: Rusty Myers, Keysight Technologies

Room: San Juan 4-5

10:10

RWW/ARFTG Plenary Session

The convergence of Advanced Models and Measurements for Virtual Prototyping Success

Speaker: Larry Dunleavy, Modelithics Inc.
Dr. Larry Dunleavy co-founded Modelithics, Inc. in 2001, to provide improved modeling solutions and high-quality microwave and millimeter-wave measurement services for RF and microwave designers. He also is a Professor within USF's Department of Electrical Engineering, where has been a faculty member since 1990. He is the Co-Director of the Center for Wireless and Microwave Information Systems (The WAMI Center). His teaching and research interests embrace all aspects of RF & Microwave circuit design, measurements, and modeling. In 1991 he enjoyed a summer research appointment at the Air Force Research Facility at Hanscom Field, MA. In 1997-98 he spent a sabbatical year with the Noise Metrology Laboratory of the National Institute of Standards in Boulder, CO. Dr. Dunleavy also served as the General Chair and Co-chair of the 2014 IEEE MTT-S IMS held in Tampa Florida. Prior to joining USF, in the period from 1982 to 1990, he worked for E-Systems Company and Hughes Aircraft companies as an RF & Microwave design and test engineer. Dr. Dunleavy received the B.S.E.E. degree from Michigan Technological University in 1982 and the M.S.E.E. and Ph.D. degrees in 1984 and 1988, respectively, from the University of Michigan. He was a Howard Hughes Doctoral Fellow. Dr. Dunleavy is a Senior Member of IEEE and is active in the IEEE MTT Society and a Lifetime Member of the Automatic RF Techniques Group (ARFTG) and a founding member and serves on the Executive Committee for the IEEE WAMICON Conference held annually in Florida each year.

Abstract: The electronic design automation (EDA) industry has become mature with time, frequency non-linear, electromagnetic and multi-domain simulation capabilities that are beyond anything envisioned a few decades ago. EDA advances are still being demanded and becoming available. An example is practical multi-physics simulations that promise to facilitate circuit, electromagnetic and thermal simulation needs in the same platform with a single 3D model description. The goal of all this capability is to predict, and optimize before building anything, future measured" real-world" behavior of a physical system or circuit with a virtual model, or digital twin of that system or circuit.

The congruence of future measured behavior of a physical prototype, or product, to virtual prototype simulated behavior depends as much on the EDA tool capabilities as on the appropriateness and accuracy of the models used to represent the components within. Development of such models can take many forms depending on the type of component and type of simulations the models are to be used for. However, in most cases, accurate component-level measurements are essential for model development and/or model validation. In the end, virtual prototyping success comes down to intelligent use of accurate measurements at every stage of the process from model development and validation to closing the loop on the final measured behavior of the designed product.

This talk will give an up-to-date summary of best practice RF/Microwave/mm-wave modeling strategies that include a range of different model types, and strategies, and how measurements are used in the process. Also to be discussed are examples of virtual prototyping success, where the ability to predict future linear, non-linear, noise and EM coupling effects is shown to be not only possible, but increasingly available to designers worldwide!

12:00

Interactive Forum IF1 - Room: Miramar

13:30

IF-1: A Variable Envelope Outphasing Concept for Transmitter Linearization

Authors: Kingsley Momor, University of Oulu; Bilal Khan, University of Oulu; Aarno Pärssinen, University of Oulu; Nuutti Tervo, University of Oulu

IF-2: Study of Gain Compression Bandwidth on Power Amplifier Linearization Performances for 5G Applications

Authors: Christophe Quindroit, Ampleon; Kaisseh F Houssein, Ampleon; Nelsy Monsauret, Ampleon; Mariano Ercoli, Ampleon

IF-3: Simplified Real-Valued Time-Delay Neural Network for Compensation of Power Amplifier Impairments

Authors: Sri Satish Krishna Chaitanya Bulusu, University of Oulu; Lesthuruge Silva, University of Oulu; Bilal Khan, University of Oulu; Praneeth Susarla, University of Oulu; Nuutti Tervo, University of Oulu; Mikko J Sillanpää, University of Oulu; Olli Silvén, University of Oulu; Marko E Leinonen, University of Oulu; Markku Juntti, University of Oulu; Aarno Pärssinen, University of Oulu

IF-4: Multi-Channel Modular All-Digital Transmitter

Authors: Luís F Almeida, University of Aveiro; Samuel S Pereira, Instituto De Telecomunicacoes; Arnaldo R Oliveira, Instituto De Telecomunicacoes; Nuno Carvalho, Instituto De Telecomunicacoes

IF-5: Digitally-Assisted RF Self-Interference Cancellation for STAR Systems Using an FxBLMS Algorithm

Authors: Marcus W Wolff, University of Colorado; Pierre-Francois W Wolfe, Massachusetts Institute of Technology, Lincoln Laboratory; Kenneth E Kolodziej, Massachusetts Institute of Technology, Lincoln Laboratory

IF-6: A Fully Substrate Integrated Moebius Loop Antenna System for EMP Measurements

Authors: Christof Pfannenmüller, Friedrich-Alexander-Universität Erlangen-Nürnberg; Thomas Kurin, Otto von Guericke University; Stephan Schreiner, Friedrich-Alexander-Universität Erlangen-Nürnberg; Robert Weigel, Friedrich-Alexander-Universität Erlangen-Nürnberg; Georg Fischer, Friedrich-Alexander-Universität Erlangen-Nürnberg; Fabian Lurz, Otto von Guericke University

IF-7: A Compact 245-310 GHz Balun in 130-nm SiGe BiCMOS Technology

Authors: Aniello Franzese, IHP Microelectronics; Batuhan Sutbas, IHP Microelectronics; Volkan Ertuk, IHP GmbH; Thomas Mausolf, IHP GmbH; David Bierbüsse, RWTH Aachen University; Renato Negra, RWTH Aachen University; Ehsan Shokrolahzade, Delft University of Technology; Marco Spirito, Technische Universiteit Delft; Corrado Carta, IHP GmbH

IF-8: A 268 GHz LNA for sub-THz Applications in a 90 nm SiGe:C Technology

Authors: Hakan Papurcu, Ruhr University Bochum; Melika Dedovic, Ruhr University Bochum; Florian Vogelsang, Ruhr University Bochum; Klaus Aufinger, Infineon Technologies AG; Nils Pohl, Ruhr University Bochum

IF-9: A 0.37 THz Subharmonic Downconverting IQ Mixer in a 90 nm SiGe:C BiCMOS Technology with High Image Rejection Ratio

Authors: Melika Dedovic, Ruhr University Bochum; Tobias T Braun, Ruhr University Bochum; Jonathan Bott, Ruhr University Bochum; Jan Schoepfel, Ruhr University Bochum; Florian Vogelsang, Ruhr University Bochum; Hakan Papurcu, Ruhr University Bochum; David Starke, Ruhr University Bochum; Klaus Aufinger, Infineon Technologies AG; Nils Pohl, Ruhr University Bochum

IF-10: A 40-58 GHz Differential Three-Push Frequency Tripler in a 90-nm SiGe BiCMOS Technology

Authors: Muhammed Ali Yildirim, Ruhr University Bochum; Justin Romstadt, Ruhr University Bochum; Pascal Stadler, Ruhr University Bochum; Tobias Welling, Ruhr University Bochum; Klaus Aufinger, Infineon Technologies AG; Nils Pohl, Ruhr University Bochum

IF-11: Voltage-Controlled-Oscillator with Hybrid Tail Inductor and Source-Degenerated Inductor

Authors: Wen-Cheng Lai, Taiwan University of Science and Technology

IF-12: Integration of Lateral Si-SiGe HBTs on Advanced FD-SOI Technology: Process Development and Challenges

Authors: Philippine Billy, STMicroelectronics; Soumya R Panda, University of Bordeaux; Nicolas Guitard, STMicroelectronics; Olivier Weber, STMicroelectronics; Alexis Gauthier, STMicroelectronics; Pascal Chevalier, STMicroelectronics; Thomas Zimmer, University of Bordeaux; Sebastien Fregonese, Centre National de la Recherche Scientifique

IF-13: Analysis of Calibration and De-embedding for On-Wafer Characterization up to 170 GHz in 22-nm FDSOI CMOS Technology

Authors: Quang Huy Le, Fraunhofer IPMS; Kaiwen Feng, Fraunhofer IPMS; Thomas Kämpfe, Fraunhofer IPMS

Demo Track - Room: Miramar

13:30

Mirror-based FMCW Radar System for 3-D Environmental Imaging

Presenter:
Marc Hamme

Affiliation:
Ruhr University Bochum

Abstract:
A novel system that performs three-dimensional scans of the environment using a monostatic frequency modulated continuous wave (FMCW) radar sensor with a center frequency of 80 GHz and a bandwidth of 20 GHz. The system uses a flat metal surface to deflect the electromagnetic waves emitted by the radar sensor like a mirror. The orientation is adjusted in two axes to scan the surrounding space and objects. Signal processing is used to generate a three-dimensional representation of the measured radar data. At the presentation site continuous live measurements of the indoor environment are provided. The processed results will demonstrate the radar images of nearby objects and people.

An Open Source Browser-based GUI for Circuit Drawing

Presenter:
Christof Pfannenmueller

Affiliation:
Friedrich Alexander University Erlangen-Nuernberg

Abstract:
A browser-based graphical user interface (GUI) is presented that provides fast and easy drawing possibilities for schematic circuits. The circuitry can be drawn in every browser as the GUI is accessible under an open-source license and supports either traditional or touch-based user input. The resulting graphics can be exported as vector based images or CircuiTikZ-based code for direct integration in LATEX-like typesetting documents.

Printed RF Interconnects

Presenter:
Georg Gramlich

Affiliation:
Karlsruhe Institute of Technology

Abstract:
Packaging still presents a key challenge above 100 GHz. Wirebonds introduce high losses and limit the available bandwith due to the required compensation structures. Other approaches such as eWLB or split-blocks introduce high costs and are either too expensive for prototyping or large-scale production. A promising alternative are printed interconnects: The possibility to shape the printed conductors nearly arbitrarily allows to keep the transmission line impedance constant and to create wideband interconnects. In this exhibition, a printed RF interconnect will be displayed and the utilized UPD-printing technology will be explained.

15:10

RWS Session Tu3A

Applications to Sensing, Bio-Medical and Environmental

Chair: Robert Caverly, Villanova University
Co-Chair: Changzhan Gu, Shanghai Jiao Tong University

Room: San Juan 1

Journal Paper Session JP2

Transmitters, Receivers, and Measurements

Chair: Almudena Suárez, Universidad de Cantabria

Room: San Juan 2-3

Journal Paper Session JP3

Filters and Passive Components

Chair: Roberto Gómez García, IEEE MWTL

Room: San Juan 6-7

15:40

Tu3A-1: Frequency-Domain Analysis of a Coupled Oscillator Sensor with an Exceptional Point of Degeneracy

Authors: Camilo Moncada, Universidad de Cantabria; Franco Ramirez, Universidad de Cantabria; Almudena Suarez, Universidad de Cantabria

JP2-1: A 36–91 GHz Broadband Beamforming Transmitter Architecture With Phase Error Between 1.2°–2.8° for Joint Communication and Sensing

Authors: Zheng Liu, Emir Ali Karahan, Kaushik Sengupta

JP3-1: Monolithically-Integrated 3D Printed Bandpass Filters Using Highly-Miniaturized Dome-Shaped Resonators

Authors: Kunchen Zhao, Christian Elmiger, Dimitra Psychogiou

16:00

Tu3A-2: Impact of Rb Condensation on Resonant Structure for Microwave Rydberg-Atom Electrometers

Authors: Georgia Sandidge, University of Colorado; Zoya Popovic, University of Colorado

JP2-2: A 424 and 448 GHz Receiver for Aircraft Contrail Observations

Authors: Andy Fung, Pekka Kangaslahti, William Chun, Joelle Cooperrider, Javier Bosch-Lluis, Joan Munoz-Martin, Mary Soria, Erika Hernandez, Alan Tanner, Omkar Pradhan, Willam Deal, Caitlyn Cooke, Gerry Mei, Aaron Swanson, Khanh Nguyen

JP3-2: Simulation Conditions to Compute the Dispersion Diagram of 3D Periodic Structures

Authors: Hairu Wang, Oskar Zetterstrom, Pilar Castillo-Tapia, Francisco Mesa, Oscar Quevedo-Teruel

16:20

Tu3A-3: Advantages of MIMO Radar for Contactless Pulse Waveform Monitoring using End-to-End Learning

Authors: Chandler J Bauder, University of Tennessee; Aly E Fathy, Univ. of Tennessee

JP2-3: Proving the Feasibility of D-Band Single SiGe MMIC Vector Network Analyzer Extension Modules with Large System Dynamic Range

Authors: Justin Romstadt, Lukas Dierkes, Stephan Hauptmeier, Tobias T. Braun, Hakan Papurcu, Jens Richter, Pascal Stadler, Ahmad Zaben, Klaus Aufinger, Jan Barowski, Nils Pohl

JP3-3: Practical Characterization of the Effect of the Transmission Carrier Phases in Passive Intermodulation

Authors: Davide Smacchia, Pablo Soto, Vicente E. Boria, Òscar Monerris, Javier Ossorio, David Raboso, José Vicente Morro, Mónica Martínez-Mendoza

16:40

Tu3A-4: An Evaluation of Mid-Band Signal Level Variability with 4G and 5G Phones

Authors: Max Hollingsworth, University of Colorado; Dirk Grunwald, University of Colorado

JP2-4: A VNA-Based Wideband Measurement System for Large-Signal Characterization of Multiport Circuits

Authors: Christoph Schulze, Mattia Mengozzi, Gian Piero Gibiino, Alberto Maria Angelotti, Corrado Florian,Alberto Santarelli, Wolfgang Heinrich, Olof Bengtsson

JP3-4: Development of Functional Broadband Microstrip-to-Folded SIW Ku-Band Transition

Authors: Amit Kumar Singh, Srikanta Pal

17:00

JP2-5: Ordinary and Extraordinary Permittivities of 4H SiC at Different Millimeter-Wave Frequencies, Temperatures, and Humidities

Authors: Tianze Li, Lei Li, Xiaopeng Wang, James C. M. Hwang, Shana Yanagimoto, Yoshiyuki Yanagimoto

JP3-5: Demonstrating Broadside-Coupled Coplanar Waveguide Interconnects to 325 GHz

Authors: Nicholas R. Jungwirth, Meagan C. Papac, Bryan T. Bosworth, Aaron M. Hagerstrom, Eric J. Marksz, Jerome Cheron, Kassiopeia Smith, Angela C. Stelson, Ari Feldman, Dylan F. Williams, Christian J. Long, Nathan D. Orloff

17:20

MTT-S Space Night

Organizer: Jan Budroweit, German Aerospace Center

Room: San Juan 4-5

17:30

MTT-S Space Night

The MTT-S Space Night is a semi-social event on behalf of the IEEE Radio Wireless Week (RWW) and the co-located conference the IEEE Space Hardware and Radio Conference (SHaRC). This years Space Night addresses the topic on “Radio Frequency Interferences and their impact to Radio Services”. We will have dedicated invited talks giving us insights on regulation aspects, technical challenges and impact to services. After the invited talk, we will host an interactive discussion with the speakers and invite you to as your questions the our speakers and bring in your thoughts in this important topic

Don’t miss the Space Night program and enjoy exciting talks and discussion while having complementary light snack and drinks.

As for last year, at the end of the space night, we will have another Quiz where attendees can win nice prices!

The Space Night is sponsored by the IEEE Future Direction Initiative Low Earth Orbit Satellite and Systems (LEO SatS).

IEEE LEO SatS

19:30

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RWS Session We1A

Power Dividers and Matrix Feeders

Chair: Shahrokh Saeedi, Boeing
Co-Chair: Li Yang, University of Alcala

Room: San Juan 1

WisNet Session We1B

High-Performing Radars for Positioning and Sensing

Chair: Paolo Mezzanotte, University of Perugia
Co-Chair: Valentina Palazzi, University of Perugia

Room: San Juan 2-3

SHaRC Session We1C

Antennas and RF Components for Space

Chair: Jan Budroweit, German Aerospace Center
Co-Chair: Eduardo Rojas, Embry-Riddle Aeronautical University

Room: San Juan 6-7

8:00

We1A-1: A Dual-Band 3 × 3 Nolen Matrix Network with Distinct Progressive Phase Difference

Authors: Hanxiang Zhang, Florida State University; Hao Yan, Florida State University; Po Wei Liu, Florida State University; Saeed Zolfagahary Pour, Florida State University; Jonathan Casamayor, Florida State University; Bayaner Arigong, Florida State University

We1B-1: Planar Near-Field Measurement with a Mechanically Modulated Scatterer

Authors: Yu Huang, University of Wisconsin, Madison; Alan D Bettermann, University of Wisconsin-Madison; Daniel van der Weide, University of Wisconsin, Madison

We1C-1: Characterization and Implementation of Cyanate Ester Composite GCPW-Fed Leaky Wave Antenna for Space Applications

Authors: Cameron P Martinez, IEEE ; Juan Mejia-Ariza, Jet Propulsion Laboratory; Eduardo Rojas, Embry-Riddle Aeronautical University

8:20

We1A-2: Four-Way Power Divider and Distributed Attenuator for 39 GHz Bidirectional Phased-Array Transceiver

Authors: Jhin-Sheng Huang, National Chi Nan University; Yo-Sheng Lin, National Chi Nan University; Bo-Shun Chen, National Chi Nan University

We1B-2: Using FMCW Radar and Range-Gated Clutter Suppression for Trombone Slide Position Detection

Authors: Martin E Meister, Texas Tech University; Aaron B Carman, Texas Tech University; Changzhi Li, Texas Tech University

We1C-2: Q-V-Band Distributed Scalable DBF Antenna with Direct Digital Transceiver for LEO Constellation Satellites

Authors: Noriharu Suematsu, Tohoku University; Tomoyuki Furuichi, Tohoku University; Satoshi Tsukamoto, Tohoku University

8:40

We1A-3: Design and Additive Manufacturing of an E-Plane 1-to-9 Power Divider for Satellite Communication

Authors: Felix Bachbauer, Friedrich-Alexander-Universität Erlangen-Nürnberg; Simon Pietschmann, Friedrich-Alexander-Universität Erlangen-Nürnberg; Jing Shi, Friedrich-Alexander-Universität Erlangen-Nürnberg; Gerald Gold, Friedrich-Alexander-Universität Erlangen-Nürnberg

We1B-3: Design and Evaluation of a Precise Positioning System using 5G Sidelink for Automotive Use Cases

Authors: Tobias Huemmer, Otto von Guericke University; Christian Dorn, Technical University of Munich; Maximilian Stark, Bosch Research; Fabian Lurz, Otto von Guericke University

We1C-3: A Distributed Hardware-in-the-Loop Testbed for Attitude Control of Small Communication Satellites

Authors: Timon Petermann, Zentrum für Telematik (ZfT); Eric Jäger, Zentrum für Telematik (ZfT); Lisa Elsner, Zentrum für Telematik (ZfT); Dominik Pearson, Center for Telematics; Guido Dietl, Zentrum für Telematik (ZfT); Klaus Schilling, Zentrum für Telematik (ZfT)

9:00

We1A-4: 3D-Printed Broadband Dielectric Image Line Splitters for sub-THz Applications

Authors: Leonhard Hahn, Friedrich-Alexander-Universität Erlangen-Nürnberg; Maximilian Gloßner, Friedrich-Alexander-Universität Erlangen-Nürnberg; Lukas Bürk, Friedrich-Alexander-Universität Erlangen-Nürnberg; Christian Carlowitz, Friedrich-Alexander-Universität Erlangen-Nürnberg; Gerald Gold, Friedrich-Alexander-Universität Erlangen-Nürnberg; Martin Vossiek, Friedrich-Alexander-Universität Erlangen-Nürnberg

We1B-4: V2R: FMCW Radar Data Synthesis from Videos for Long Range Gesture Recognition

Authors: Koushik A Manjunatha, Amazon.com, Inc.; Morris Hsu, Amazon.com, Inc.; Rohit Kumar, Amazon.com, Inc.; Sai Prashanth Chinnapalli, Amazon.com, Inc.

We1C-4: Design of a 17.3-21.2 GHz SATCOM Upconverter Based on COTS with Low Spurious Emission

Authors: Francesco Adamo, University of Trento; Guendalina Simoncini, PICOSATS s.r.l.; Simone Pauletto, University of Trieste; Sergio Carrato, University of Trieste; Anna Gregorio, University of Trieste

9:20

We1B-5: A Novel Treatment of Obstructive Sleep Apnea Using Continuous Wave Interferometry Radar

Authors: Geyang Xu, All Saints Episcopal School; Christopher Williams, Texas Tech University; Ke T Xu, Texas Tech University; Changzhi Li, Texas Tech University

9:40

Wednesday, 22 January 2025 • Late Morning Sessions

RWS Session We2A

Filters, Transitions and Interconnects

Chair: Roberto Gomez-Garcia, University of Alcala
Co-Chair: Holger Maune, Otto-von-Guericke-Universität Magdeburg

Room: San Juan 1

10:10

We2A-1: Super-miniaturized Merged-Supercavity Mode System Excited by Cross Coupling SIW Resonators

Authors: Zahra Manzoor, Purdue University; Dimitrios Peroulis, Purdue University

10:30

We2A-2: AFSIW Filter with Tunable Complementary Split Ring Resonators

Authors: Maxime Le Gall, Exens Solutions; Anthony Ghiotto, Bordeaux Institute of Technology; Issam Marah, Exens Solutions

10:50

We2A-3: Unified Synthesis of the Folded Crosscoupled Network Realizing (N-2) Finite Frequency Transmission Zeros

Authors: Wael M Fathelbab, Northrop Grumman Corporation

11:10

We2A-4: An Ultra-Precise Dispensing (UPD) Printed, Ultra-Broadband PCB to MMIC Interconnect

Authors: Georg Gramlich, Karlsruhe Institute of Technology; Lilli Weiss, Karlsruhe Institute of Technology; Luca Valenziano, Karlsruhe Institute of Technology; Martin Roemhild, University of Stuttgart; Holger Baur, University of Stuttgart; Adrian Schwarzenberger, Karlsruhe Institute of Technology; Carsten Eschenbaum, SilOriX; Christian Koos, Karlsruhe Institute of Technology; Norbert Fruehauf, University of Stuttgart; Thomas Zwick, Karlsruhe Institute of Technology; Akanksha Bhutani, Karlsruhe Institute of Technology

11:30

We2A-5: Two Differential Wideband SIW-to-RWG Transitions for Thin Single Layer Substrates With Additional Tapering for D-Band Applications

Authors: Tobias T Braun, Ruhr University Bochum; Justin Romstadt, Ruhr University Bochum; Christian Schweer, Ruhr University Bochum; Nils Pohl, Ruhr University Bochum; Steffen Hansen, Fraunhofer FHR

11:50

WisNet Session We2B

Latest Advancements in Radar Design and Evaluation

Chair: Thomas Kurin, University of Magdeburg
Co-Chair: Davi Rodrigues, University of Texas at El Paso

Room: San Juan 2-3

10:10

We2B-1: A GPS Disciplined RFDAC Based C-Band Radar

Authors: Simon Heining, Johannes Kepler University Linz; Soumya Krishnapuram Sireesh, Infineon Technologies; Richard Hüttner, Johannes Kepler University Linz; Christoph Wagner, Silicon Austria Labs; Reinhard Feger, Johannes Kepler University Linz; Andreas Stelzer, Johannes Kepler University Linz

10:30

We2B-2: A Modular Ray Tracing-Based Framework for Automotive Radar Waveform Evaluation

Authors: Moritz Kahlert, HELLA GmbH & Co. KGaA; Jinwen Pan, HELLA GmbH & Co. KGaA; Tai Fei, University of Applied Science and Arts Dortmund; Claas Tebruegge, HELLA GmbH & Co. KGaA; Markus Gardill, Brandenburg University of Technology

10:50

We2B-3: Micrometer-Scale Displacement Measurement Method Using 80GHz CMOS MMW Radar

Authors: Yusuke Mitsui, Toshiba Corporation; Kazuhiro Tsujimura, Toshiba Corporation; Hroki Mori, Toshiba Corporation

11:10

We2B-4: K-Band QPSK PMCW Radar with Digital I-Q Constellation Phase Compensation and I-Q Imbalance Correction

Authors: Derek P Thompson, Texas Tech University; Changzhi Li, Texas Tech University

11:30

We2B-5: Comparison of Different Spreading Sequences and Codes for Joint Communication and Sensing

Authors: Samira Faghih-Naini, Friedrich-Alexander-Universität Erlangen-Nürnberg; Sebastian Peters, Friedrich-Alexander-Universität Erlangen-Nürnberg; Georg Fischer, Friedrich-Alexander-Universität Erlangen-Nürnberg; Robert Weigel, Friedrich-Alexander-Universität Erlangen-Nürnberg; Torsten Reissland, Friedrich-Alexander-Universität Erlangen-Nürnberg

11:50

SHaRC Session We2C

Space Communication Systems

Chair: Eduardo Rojas, Embry-Riddle Aeronautical University
Co-Chair: Markus Gardill, Brandenburg University of Technology Cottbus

Room: San Juan 6-7

10:10

We2C-1: Spectrum and RFI Sensing using 2.4 GHz Digital Multi-Beam Circular Apertures with 360 FoV

Authors: Arjuna Madanayake, Florida International University; Benn Thevathasan, Florida International University; Chamara Rathnayaka, Florida International University; Umesha Kumarasiri, Florida International University; Sivakumar Sivasankar, Florida International University; Viduneth Ariyarathna, Florida International University

10:30

We2C-2: Real-Time Evaluation Method for Single Event Effects in High-Speed Digitzed RF Data

Authors: Jan Budroweit, DLR; Ferdinand Stehle, DLR e.V.; Felix Eichstaedt, DLR e.V.

10:50

We2C-3: The UWE-5 Educational CubeSat Mission - Overview and Status

Authors: Markus Gardill, Brandenburg University of Technology

11:10

We2C-4: Developments of RF Payload Equipment and Technologies in Q-V Band and Beyond

Authors: Václav Valenta, European Space Agency

11:50

RWS Session We3A

MM-Wave to THz Systems & Applications

Chair: Davi Rodrigues, University of Texas at El Paso
Co-Chair: Hamhee Jeon, Qorvo, Inc.

Room: San Juan 1

WisNet Session We3B

Components and Optimization Techniques for Wireless Sensor Systems

Chair: Vaclav Valenta, European Space Agency
Co-Chair: Marie Horlbeck, University of Magdeburg

Room: San Juan 2-3

13:30

We3A-1: An E-Band Quadrupler Utilizing a 45° Polyphase Filter for Improved Harmonic Rejection

Authors: Pascal Stadler, Ruhr University Bochum; Justin Romstadt, Ruhr University Bochum; Muhammed Ali Yildirim, Ruhr University Bochum; Tobias Welling, Ruhr University Bochum; Klaus Aufinger, Infineon Technologies AG; Nils Pohl, Ruhr University Bochum

We3B-1: QoS based resource management for concurrent operation using MCTS

Authors: Sebastian Durst, Fraunhofer FHR; Kilian Barth, Fraunhofer FHR; Tobias Müller, Fraunhofer FHR; Pascal Marquardt, Fraunhofer FHR

13:50

We3A-2: Mirror-based FMCW Radar System for 3-D Environmental Imaging

Authors: Marc Hamme, Ruhr University Bochum; Patrick Kwiatkowski, Ruhr University Bochum; Nils Pohl, Ruhr University Bochum

We3B-2: Dynamic Antenna Impedance Tuning for Sub-GHz Systems

Authors: Christian Dorn, Technical University of Munich; Christof Pfannenmüller, Friedrich-Alexander-Universität Erlangen-Nürnberg; Jasmin Gabsteiger, Friedrich-Alexander-Universität Erlangen-Nürnberg; Thomas Kurin, Otto von Guericke University Magdeburg; Fabian Lurz, Otto von Guericke University Magdeburg; Amelie Hagelauer, Fraunhofer EMFT

14:10

We3A-3: On the Accuracy of Range Estimation with Doppler Influence in FC-FMCW: Benefits and Limitations

Authors: Theresa Antes, Karlsruhe Institute of Technology; Thomas Zwick, Karlsruhe Institute of Technology; Benjamin Nuss, Karlsruhe Institute of Technology

We3B-3: Performance Optimization of Resource-Constrained Wireless Receiver Front-Ends with Power-Centric Design Approaches

Authors: Desmond Wong, New York University; Akshayalakshmi Padmanathan, New York University Tandon School of Engineering; Hamed Rahmani, New York University

14:30

We3A-4: SNR Enhancement Using Sub-Array-Based Processing with Application to Millimeter Wave Imaging at W-Band

Authors: Shahrokh Hamidi, University of Waterloo; M.R Nezhad-Ahmadi, University of Waterloo

We3B-4: Analysis of Digital Self-Interference Cancellation for Different Modulation Formats

Authors: Alexander Ruderer, Otto von Guericke University; Fabian Lurz, Otto von Guericke University; Thomas Ussmueller, B & E antec Nachrichtentechnik

14:50

15:10

Short Courses - Room: Laguna 1

8:00

Hands-On Full-Duplex Radio Design

Lecturer: Kenneth E. Kolodziej, MIT Lincoln Laboratory

Abstract: Full-duplex technology is revolutionizing the wireless world! This system concept is fundamentally different that traditional radios that divide transmission and reception in either time and/or frequency. Future networks will leverage this emerging technology to improve efficiency and enhance mobile user experiences. This short course will introduce attendees to the various self-interference cancellation techniques that enable full-duplex operation in wireless systems and will allow them to experiment with their own full-duplex designs through hands-on engineering with real-world hardware/software.

12:00

13:30

AMD Radio Frequency System on Chip (RFSoC) – Architecture, System Development, and Applications

Lecturers: Robert (Bob) Stewart, University of Strathclyde and
Louise Crockett, University of Strathclyde

Abstract: Systems for radio and wireless instrumentation, particularly in research & development environments, can benefit from the ability to create custom designs easily. However, one of the difficulties is that the ADCs and DACs tend to be separate from the processing platform, requiring a range of skills and potentially some interfacing challenges to solve.

AMD Zynq UltraScale+ RFSoC is a family of devices that combine multiple multi-Gsps RF-ADCs and RF-DACs with processors and Field Programmable Gate Array (FPGA) programmable logic, all on the same chip. These are powerful platforms with various applications including: 5G mobile and other wireless communications systems, radar, measurement and instrumentation, and quantum computing. The reprogrammable features of RFSoC devices can be especially useful where custom functionality, dynamic operation, or future upgrades are required.

This short course will introduce the RFSoC architecture and features, and outline the design process for developing custom systems. In particular, we will highlight how software, hardware, and data converters can be combined to make an integrated system, leveraging the open-source PYNQ (Python productivity for Zynq) project to make the design process easier. The operation of the high speed RF-DACs and RF-DACs will also be reviewed, applying the classical signal processing theory of Nyquist sampling to support RF frequencies up to 5GHz. Finally, we will present some RFSoC-PYNQ examples, discuss potential applications, and highlight support for getting started with this technology.

17:30

RWS Session We4A

Wireless Power Systems

Chair: Changzhi Li, Texas Tech University
Co-Chair: Dieff Vital, University of Illinois Chicago

Room: San Juan 1

Journal Paper Session JP4

Radar, Localization, and Sensory Systems

Chair: Roberto Gómez García, IEEE MWTL

Room: San Juan 2-3

Demystify IEEE Fellow Nomination

Jenshan Lin, University of Florida

Room: San Juan 6-7

15:40

We4A-1: Impulse Radio Ultrawideband (IR-UWB) Signal Based Far-field Wireless Power Beaming (WPB) System Using Antipodal Vivaldi Antenna Array

Authors: Adnan Basir Patwary, University of Texas at Dallas; Ifana Mahbub, University of Texas at Dallas

JP4-1: A Novel 3-D Printed Dual-Port Rectenna for Simultaneous Energy Harvesting and Backscattering of a Passively Generated UWB Pulse

Authors: Giulia Battistini, Giacomo Paolini, Alessandra Costanzo, Diego Masotti

IEEE Fellow Nomination Info Session

This IEEE Fellow Nomination Information Session at the upcoming IEEE Radio & Wireless Week (RWW) 2025 will offer an opportunity to learn about the IEEE Fellow nomination and elevation process as well as the statistics in the past. In addition to providing information and encouraging nominations, this session aims to provide last-minute help to nominators before the upcoming Fellow nomination deadline on 07 February 2025. IEEE Fellow is a distinction reserved for select IEEE members whose extraordinary accomplishments in any of the IEEE fields of interest are deemed fitting of this prestigious grade elevation. The total number of Fellow recommendations in any one year must not exceed one-tenth of one percent of the IEEE voting membership on record as of 31 December of the year preceding (IEEE Bylaw I-305.9).

16:00

We4A-2: Wireless Power Transmitting Coil Achieving Uniform Magnetic Flux Density Distribution

Authors: Tatsumu Mitsuhashi, Hirosaki University; Atsushi Kurokawa, Hirosaki University

JP4-2: A Two-Way Power Combined Ka-Band Rectifier for Low Input Power Energy Harvesting

Authors: Tal Elazar, Edoh Shaulov, Eran Socher

16:20

We4A-3: Experimental Demonstration of a Combined RF-Ultrasonic Wireless Powering System

Authors: Yufei Ma, University of Glasgow; Chong Li, University of Glasgow

JP4-3: Multitone PSK Modulation Design for Simultaneous Wireless Information and Power Transfer

Authors: Prerna Dhull, Dominique Schreurs, Giacomo Paolini, Alessandra Costanzo, Mehran Abolhasan, Negin Shariati

16:40

We4A-4: A Novel Long Range Wireless Power Transmission System Using Fresnel Lenses for S-band EM Waves

Authors: Anish A Anand, Palos Verdes Peninsula High School

JP4-4: Introducing Inharmonic Radar: Tag Detection in the Automotive Bands of Present and Future at 76–81/134–141 GHz via Fractional Multiplication

Authors: Tobias T. Braun, Jan Schöpfel, Christian Bredendiek, Juan Jose Forero B., Nils Pohl

17:00

JP4-5: Reconfigurable FMCW Resolution Improvement Using Adaptive Cancellation

Authors: Aaron B. Carman, Changzhi Li

17:20

ARFTG Abbreviated Program

104th ARFTG Microwave Measurement Conference

Software Architectures and Automation of Microwave Measurement Methods and Systems
San Juan, Puerto Rico, US, 19-22 January 2025

Monday January 20th

10:30-12:00	20th On-Wafer Users Forum
13:10-14:40	Session A: Loadpull and Nonlinear Measurements
15:00-15:35	Coffee Break and Exhibition
15:35-17:00	Session B: Broadband Measurements and Linearization

Tuesday January 21st

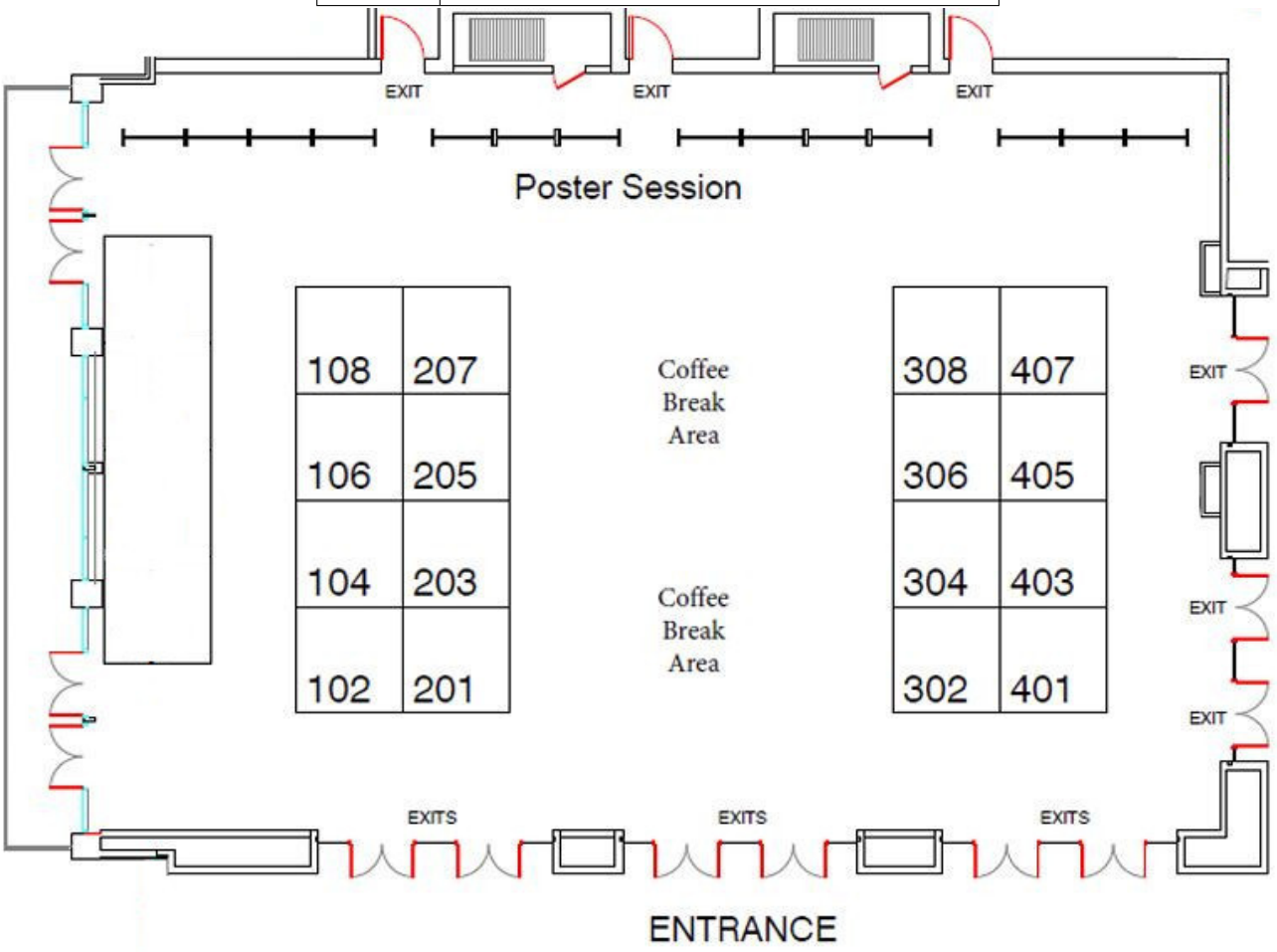
08:20-09:45	Session C: Millimeter-Wave Measurements
09:45-10:10	Coffee Break and Exhibition
10:10-11:50	Plenary Session
12:00-13:30	Awards Lunch
13:30-14:55	Session D: On-Wafer Measurements and Calibration
14:55-15:35	Coffee Break and Exhibition
15:35-16:55	Session E: Materials and Noise Measurements

The full program is available at: https://arftg.org/arftg-104-program-out-now/

Industry Exhibits

Exhibitors

Booth	Exhibitor
308	Anritsu
205	Eravant
207	FormFactor
104	Junkosha, Inc.
108	Keysight
304	Microsanj
102	MPI Corporation
203	QWED
201	Rohde & Schwarz USA Inc.
306	Spinner GmbH
302	Virginia Diodes, Inc.



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Floor Plan

Notes