



2022 IEEE Wireless and Microwave Technology Conference (WAMICON)

April 27-28, 2022

Location: Clearwater Beach, Florida



Wednesday April 27

7:00 AM – Breakfast (Exhibitors Foyer)

8:00 AM – W1A – Advances in Mm-Wave Devices and Beamforming (Bellaire)

Chairs: Satheesh Bojja Venkatakrishnan and Jim Culver

8:00 AM: **A W-Band GaN MMIC Continuous 90° Reflective Phase Shifter**

Anthony Romano, Timothy Sonnenberg, Shane Verploegh, Taylor Barton, and Zoya Popovic, University of Colorado Boulder, USA

8:20 AM: **Millimeter-Wave Digital Beamforming Receiver Using RFSoc FPGA for MIMO Communications**

Kefayet Ullah, Satheesh Bojja Venkatakrishnan, and John L. Volakis, Florida International University, USA

8:40 AM: **Broadband Reconfigurable Vivaldi Antenna for 5G Communication**

Mohamed Himdi and Cherif Amani, Universite de Rennes 1, France

9:00 AM: **Massive Multiple-Input Multiple-Output Antenna Architecture for Multiband 5G Adaptive Beamforming Applications**

Sunday Enahoro, Sunday Cooke Ekpo, and Andrew Gibson, Manchester Metropolitan University, United Kingdom

9:20 AM: **Design and Development of a Low Phase Noise Multi-Output Millimeter-Wave Frequency Synthesizer with High Output Power**

Shrija Bhattacharyya, Space Applications Centre, ISRO, India; Harshita Tolani and Anamiya Bhattacharya, Indian Space Research Organization, India

8:00 AM – W2A – Space Hardware Workshop (Reddington)

(Chairs: Eduardo Rojas and Larry Dunleavy)

8:00 AM: **Space Mission and Hardware Design: From the Idea to a Successful Demonstration in Space**

Jan Budroweit, German Aerospace Center (DLR)

8:30 AM: **Space Upscreening: A Cost Effective and Time Sensitive Approach**

Mini-Circuits

9:00 AM: **Risk Mitigation of RF COTs Components in High Reliability Applications**

Zayd Babmir, MicroSS STS

Wednesday April 27

9:40 AM – Break (Longboat Key)

10:00 AM – Keynote (Bellaire/Reddington)

11:10 AM – Exhibitor Spotlight (Bellaire/Reddington)

11:50 AM – Lunch (Watercolour)

12:50 PM – W1B – Special Session: Mm-Wave Amplifier and Front-End Technologies
(Bellaire)

Chairs: Kenle Chen and Hjalti Sigmarsson

12:50 PM: **(Invited paper) GaN MMICs for Millimeter-Wave Front Ends**

Zoya Popovic, University of Colorado Boulder, USA

1:10 PM: **(Invited paper) A Review of Millimeter-wave InP Distributed Amplifiers**

Phat Nguyen and Nguyen Nguyen, University of California, Davis, USA; Alexander Stameroff, Keysight Technologies, USA; Anh-Vu Pham, University of California, Davis, USA

1:30 PM: **(Invited paper) Gallium Nitride HEMTs for Power Amplifiers above 100 GHz**

Everett O'Malley, Andrea Arias-Purdue, Matthew Guidry, and James Buckwalter, University of California, Santa Barbara, USA

1:50 PM: **A 0.5W, 45% PAE GaAs X-Band Front End Module MMIC**

Timothy M Gittemeier, Nguyenvu Chu, and Michael Roberg, Qorvo, USA

2:10 PM: **(Invited paper) Waveform Engineering in III-V Power Amplifiers**

Tushar Sharma, Renesas Electronics, San Diego, California, USA

12:50 PM – W2B – Novel Algorithms and Hardware for Space Communications
(Reddington)

Chairs: Eduardo Rojas and Jan Budroweit

Wednesday April 27

- 12:50 PM: **Low Complexity Single Source 2-D DOA Estimation Based on Reduced Dimension SVR**
Md Imrul Hasan and Mohammad Saquib, University of Texas at Dallas, USA
- 1:10 PM: **(Invited paper) Considerations for V- and W-Band Inter-Satellite Links**
Holger Maune, University of Magdeburg, Germany; Karl-Heinz Hübner, KHH Consulting, Germany; Gerald Gold, FAU Erlangen-Nürnberg, Germany
- 1:30 PM: **Using Software-Defined Radios to Investigate Radiation Effects on RF Devices**
Jan Budroweit, Niklas Aksteiner, and Janis S Häseker, German Aerospace Center (DLR), Germany
- 1:50 PM: **Ka/V Band Satellite Communications Test Bed for Receiver Hardware and Waveform Analysis with Simulated Channel Impairments**
Daylon G Hester and Mark Adams, Auburn University, USA
- 2:10 PM: **Advanced Manufacturing and Characterization of mm-Wave Two-Layer Reflectarray Cells**
Samuel LeBlanc, Embry-Riddle Aeronautical University, USA; Kenneth Church, Sciperio Inc., USA; Eduardo Rojas, Embry-Riddle Aeronautical University, USA; Eduardo Martinez-de-Rioja, Universidad Rey Juan Carlos, Spain; Eduardo Carrasco and Jose A. Encinar, Universidad Politecnica de Madrid, Spain
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2:30 PM – Exhibitor Showcase (Maderia/Indian Shores)

3:00 PM – W1C – Special Session: RF Fingerprinting and Machine Learning for Communication Systems (Bellaire)

Chairs: Eduardo Rojas and Ilhan Akbas

- 3:00 PM: **(Invited paper) Secure mmWave Spectrum Sharing with Autonomous Beam Scheduling for 5G and Beyond**
Arupjyoti (Arup) Bhuyan, INL, USA; Mingyue Ji, Xiang Zhang, Sneha Kumar Kasera, and Shamik Sarkar, University of Utah, USA
- 3:20 PM: **(Invited paper) Millimeter-Wave Physical Layer Security through Space-Time Modulated Transmitter Arrays**
Suresh Venkatesh, Xuyang Lu, Hooman Saeidi, and Kaushik Sengupta, Princeton University, USA

Wednesday April 27

3:40 PM: **(Invited paper) DNN-based Denial of Quality of Service Attack on Software-defined Hybrid Edge-Cloud Systems**

Saptarshi Debroy, The City University of New York (CUNY), USA

4:00 PM: **(Invited paper) Embedding a Digital Security Engine in Power Amplifiers for Physical-Layer Identification of IoT Nodes**

Taiyun Chi, Rice University, USA

3:00 PM – W2C – RF Measurements and Time Domain Processing (Reddington)

Chairs: Larry Dunleavy and Craig Sapashe

3:00 PM: **A Real Time RF Analog Signal Processor for Time Delay Estimation**

Hanxiang Zhang and Bayaner Arigong, Florida State University, USA

3:20 PM: **(Invited talk) Precision Timing Measurements in 5G TDD Networks**

Matthew Diessner, Wireless Telecom Group, USA

3:40 PM: **(Invited workshop) Measuring S-Parameters and Power with Uncertainty**

Osman Ceylan, Maury Microwave (3:40 PM - 4:20 PM)

4:20 PM – W1D – Poster Session (Exhibitors Foyer)

Chairs: Michael Grady and Joshua Kovitz

Research papers:

Nearfield Anechoic Chamber and Farfield On-Site Antenna Calibration Pattern Comparison of an S-band Planar Phased Array Radar

Christine Parry, Alexander Morris, and Timothy Bonin, MIT Lincoln Laboratory, USA

Typical Offset of Usable Antenna Bandwidth due to Surface Roughness

Gerald Gold and Lukas Engel, Friedrich-Alexander University Erlangen-Nürnberg, Germany

A Novel Second Harmonic Separation Microwave Network

Hanqing Zhao and Hanxiang Zhang, Florida State University, USA; Yuepeng Zhang, Argonne National Lab, USA; Bayaner Arigong, Florida State University, USA

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Pattern Synthesis of Conformal Rectangular Waveguide-fed Metasurface Antennas

Insang Yoo and David Smith, Duke University, USA

Switchable and Tunable Triple-band Elliptic Bandpass Filter with Constant Absolute Bandwidth

Jincheng Zhao, Hailing Yue, and Guru Subramanyam, University of Dayton, USA

Advanced Manufacturing of Passive Wireless High-Temperature Pressure Sensor Using 3-D Laser Machining

Seng Loong Yu, Embry-Riddle Aeronautical University, USA; Swadipta Roy, Sreekala Suseela, Taofeek Orekan, Joshua McConkey, and Reamonn Soto, Sensatek Propulsion Technology, Inc, USA; Eduardo Rojas, Embry- Riddle Aeronautical University, USA

Nonlinear Embedding Model for Waveform Engineering Motivated PA Design

Chris DeMartino, Modelithics, USA

Student Paper Competition Finalists:

A W-Band GaN MMIC Continuous 90° Reflective Phase Shifter

Anthony Romano, Timothy Sonnenberg, Shane Verploegh, Taylor Barton, and Zoya Popovic, University of Colorado Boulder, USA

Design and Optimization of Broadband Matching Networks for Wide-Scanning Phased Arrays

Patrick D. O'Connor-Lynch and Hjalti Sigmarsson, University of Oklahoma, USA

Design of a Symmetric Lumped-Element Bandpass Filtering Attenuator (Filtenuator)

Jonathan M Knowles, Hjalti Sigmarsson, and Jay W McDaniel, University of Oklahoma, USA

Low Complexity Single Source 2-D DOA Estimation Based on Reduced Dimension SVR

Md Imrul Hasan and Mohammad Saquib, University of Texas at Dallas, USA

Element-Level Microwave Filter Integration in Fully-Digital Phased Array Radar Systems

Gokhan Ariturk, Nawaf Almuqati, and Hjalti Sigmarsson, University of Oklahoma, USA

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Low Complexity Beam Steering Antenna Array Using Beamforming Network Subarrays

Santhi Swaroop Madeti, Stephen E Sadow, and Gokhan Mumcu, University of South Florida, USA

5G BAW Technology: Challenges and Solutions

Mudar AlJoumayly, Ralph Rothemund, Michael Schaefer, and Wolfgang Heeren, BAW R&D, Qorvo, Inc.

5:30 PM – Ski Show and Reception (Poolside)

6:30 PM – Banquet and Networking (Poolside)

Thursday April 28

7:00 AM – Breakfast (Exhibitors Foyer)

8:00 AM – T1A – Special Session: Novel Techniques in Beam-Steering/Multi- Beam Antenna Design & Manufacturing (Bellaire)

Chairs: Thomas Weller and Gokhan Mumcu

8:00 AM: **SIW based Packaging Technique for Gain Improvement and Coupling Reduction in mmWave Antenna-in-Package (AIP) solutions**

Aditya Manoj Dave and Rhonda Franklin, University of Minnesota, USA

8:20 AM: **(Invited paper) Graded Index Superstrate Layer for Large Scan Angle Phased Arrays**

Patrick Bluem and Roberto Rojas, MIT Lincoln Laboratory, USA

8:40 AM: **(Invited paper) Additive Manufacture of a Luneburg Lens with a Conformal Feed Array for Ultrawide Scan Angle Passive Beamforming**

Mark Mirotznik, Kyle McParland, and Colin Bonner, University of Delaware, USA

9:00 AM: **Low Complexity Beam Steering Antenna Array Using Beamforming Network Subarrays**

Santhi Swaroop Madeti, Stephen E Sadow, and Gokhan Mumcu, University of South Florida, USA

9:20 AM: **(Invited paper) UWB Future G Transceivers & Wearable Electronics**

John L. Volakis, Florida International University, USA

8:00 AM – T2A – Localization and Detection for Internet of Everything (Reddington)

Chairs: Steven Lardizabal and Jing Wang

8:00 AM: **Unanticipated Hardware Trojan Detection Technique Based on Antenna Reflection Coefficient Features Outside of its Operation Frequency**

Noemí Miguélez-Gómez and Eduardo Rojas, Embry-Riddle Aeronautical University, USA

8:20 AM: **The Rasmussen Cognition Model for Cognitive Radar**

James A Crowder, Cobham Advance Electronic Solutions (CAES) Advanced Technology and Engineering (AT&E), USA

Thursday April 28

- 8:40 AM: **UHF RFID tag localization using pattern reconfigurable reader antenna**
Md Shakir Hossain, Md Abu Saleh Tajin, and Kapil Dandekar Drexel University, USA
- 9:00 AM: **(Invited paper) UAV-based Localization of Mobile Phones for Search and Rescue Applications**
Christian Dorn, Technical University of Munich & Chair of Micro- and Nanosystems Technology, Germany; Andreas Depold, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany; Fabian Lurz, Hamburg University of Technology, Germany; Stefan Erhardt, Friedrich-Alexander University Erlangen-Nuremberg, Germany; Amelie Hagelauer, Technical University of Munich, Germany
- 9:20 AM: **A Semi-Empirical Model for Predicting the Effects of Moisture on Microwave Signal Attenuation in Fouled Railroad Ballast**
Ismail H Uluer, Oregon State University, USA; Jeff Frolik, University of Vermont, USA; Thomas Weller, Oregon State University, USA
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8:00 AM – T3A – Advanced Filters and Passive Components (Siesta Key)

Chairs: Hjalti Sigmarsson and Michael Grady

- 8:00 AM: **Design of a Symmetric Lumped-Element Bandpass Filtering Attenuator (Filtenuator)**
Jonathan M Knowles, Hjalti Sigmarsson, and Jay W McDaniel, University of Oklahoma, USA
- 8:20 AM: **Miniaturization of Multi-Functional Filters Using Spiral Resonators Coupled to Their Scaled Negative Images**
Zahra Manzoor and Mohammad Abu Khater, Purdue University, USA; Mattias Thorsell and Sten Gunnarsson, Chalmers University of Technology, Sweden; Brian Edward, Saab Inc., USA; Dimitrios Peroulis, Purdue University, USA
- 8:40 AM: **Novel X-Band Phase Shifter using Reconfigurable Bandstop Filter**
Georgiy Brussenskiy and Xun Gong, University of Central Florida, USA
- 9:00 AM: **Design of a Frequency-Agile and Surface Mountable Suspended Integrated Strip- Line Bandpass Filter Using Castellated Vias**
Eric W Wells, Hjalti Sigmarsson, and Jay W McDaniel, University of Oklahoma, USA

Thursday April 28

9:20 AM: **Synthesis of Filters Comprising Cascaded Quadruplets With Both Single and Mixed Couplings**

Wael M Fathelbab, Northrop Grumman Corporation, USA

9:40 AM – Break – Exhibitors (Mediera/Indian Shores)

10:00 AM – Keynote (Bellaire/Reddington)

11:10 AM – Award Announcements (Bellaire/Reddington)

10:00 AM – Student Day Activities and Presentations (Siesta Key, 10:00 AM – 11:50 AM)

11:50 AM – Lunch (Watercolour)

12:50 PM – T1B – Special Session: Advanced RF Power Amplifiers and Front-Ends
(Bellaire)

Chairs: Patrick Roblin and Kenle Chen

12:50 PM: **(Invited paper) Bias and Bias Line Effects on Wideband RF Power Amplifier Performance**

William Sear, Devon Donahue, Michelle Pirrone, and Taylor Barton, University of Colorado Boulder, USA

1:10 PM: **GaN MMIC RF Switches for In-Band Full-Duplex Phased Array Calibration**
Seth J Johannes, University of Colorado Boulder, USA; Kenneth E. Kolodziej, MIT Lincoln Laboratory, USA; Zoya Popović, University of Colorado Boulder, USA

1:30 PM: **(Invited paper) Novel X-The Analytic Doherty-Outphasing Power Amplifiers Continuum Theory**

Chenyu Liang, Qorvo, Inc, USA; Patrick Roblin, The Ohio State University, USA

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1:50 PM: **(Invited paper) Periodically Switched Acoustic-Filtering RF Front-Ends Using Commutated-LC Circuits for Wireless Receivers**

Hyungjoo Seo and Jin Zhou, University of Illinois at Urbana-Champaign, USA

2:10 PM: **Modular Design and Characterization of a Reconfigurable Sequential Power Amplifier**

Sarmad Ozan, Manish Nair, Mark Beach, and Tommaso Cappello, University of Bristol, United Kingdom

12:50 PM – T2B – Advances in Antennas and Feed Networks (Reddington)

Chairs: Michael Grady and Gokhan Mumcu

12:50 PM: **A K-band Resonant Impedance Tuner with a Solid-State Hybrid Tuning**

Mohammad Abu Khater, Muna Awajan, and Dimitrios Peroulis, Purdue University, USA

1:10 PM: **Design and Optimization of Broadband Matching Networks for Wide-Scanning Phased Arrays**

Patrick D. O'Connor-Lynch and Hjalti Sigmarsson, University of Oklahoma, USA

1:30 PM: **Element-Level Microwave Filter Integration in Fully-Digital Phased Array Radar Systems**

Gokhan Ariturk, Nawaf Almuqati, and Hjalti Sigmarsson, University of Oklahoma, USA

1:50 PM: **Phase-Controlled Beamforming Network applied to Linear Arrays**

Valentina Palazzi, Federico Alimenti, Paolo Mezzanotte, and Luca Roselli, University of Perugia, Italy

2:10 PM: **Transversely Slotted Leaky-Wave Antenna with Purer Linear Polarization**

Yunhao Fu, King Yuk Chan, and Rodica Ramer, University of New South Wales, Australia

12:50 PM – Student Day Activities and Presentations (Siesta Key, 12:50 PM – 2:30 PM)

2:30 PM – Exhibitor Showcase (Mediera/Indian Shores)

Thursday April 28

3:00 PM – Young Professionals (YP) and Women in Microwaves (WiM) Event
(Bellaire/Reddington, 3:00 PM – 4:40 PM)

4:40 PM – YP and WiM Reception (Veranda)

3:00 PM – T3C – Sensors and Waveguides (Siesta Key)

Chairs: Jing Wang and Joshua Kovitz

3:00 PM: Laser-Assisted and Additively Manufactured Multilayer Metal-Insulator-Metal Capacitors

Omer Faruk First, Oregon State University, USA; Jing Wang, University of South Florida, USA; Thomas Weller, Oregon State University, USA

3:20 PM: 3D-Printed Compact Full-E-Band Wavemode Transitions for Direct Launching from IC to Waveguides with minimal Line Length on PCB

Konstantin Lomakin, Friedrich-Alexander University, Germany; Saif Alhasson, NXP Semiconductors Germany GmbH, Germany; Gerald Gold, FAU Erlangen-Nürnberg, Germany

3:40 PM: Improved Bandwidth using a 3D Printed Quasi-Ideal Grounded Coplanar Waveguide Transmission Line

Michael Grady, Georgia Tech Research Institute, USA; Aviram Iancovici and Yaakov Borenstein, Nano Dimension, USA

4:00 PM: ASK Modulator Design for Passive RFID Tags in Backscatter Communication Systems

Amus Chee Yuen Goay, Deepak Mishra, and Aruna Seneviratne, University of New South Wales, Australia

4:20 PM: Integrated Compact-Size Rectenna with Enhanced RF to DC Power Conversion Efficiency and High-Gain Antenna

Rawaa Maher, Adel Bedair, and Ahmed Sayed Ahmed Abdelhamid Allam, Egypt-Japan University of Science and Technology (E- JUST), Egypt; Haruichi Kanaya, Kyushu University, Japan