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## Tu1A: Advances in Synthesis and Design Techniques for Non-Planar Filters

Chair: Simone Bastioli, RS Microwave — Co-Chair: Antonio Morini, Università Politecnica delle Marche

Room 401-402, 08:00–09:40, Tuesday 21 June 2022

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## Tu1B: Advances in Numerical and Computational Techniques for Simulation and Design Optimization

Chair: Erin Kiley, Massachusetts College of Liberal Arts — Co-Chair: José E. Rayas-Sánchez, ITESO

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Chair: Victor M. Lubecke, University of Hawaii at Manoa — Co-Chair: Alessandra Costanzo, Università di Bologna  
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<sup>1</sup>NIST, USA ; <sup>2</sup>LLNL, USA 

## Tu2A: Advances in Non-Planar Filter Technologies

Chair: Cristiano Tomassoni, Università di Perugia — Co-Chair: Xun Gong, University of Central Florida

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<sup>1</sup>RF Microtech, Italy ; <sup>2</sup>Università di Perugia, Italy ; <sup>3</sup>SIAE MICROELETTRONICA, Italy ; <sup>4</sup>ESA-ESTEC, The Netherlands 
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<sup>1</sup>Università di Pavia, Italy ; <sup>2</sup>Università di Perugia, Italy 

## Tu2B: A Retrospective and a Vision of Future Trends in RF and Microwave Design Optimization

Chair: José E. Rayas-Sánchez, ITESO — Co-Chair: Qi-Jun Zhang, Carleton University  
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*<sup>1</sup>SUSTech, China ; <sup>2</sup>University of Glasgow, UK ; <sup>3</sup>University of Birmingham, UK *
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## Tu2C: Advances in RF Sensors

Chair: Thomas Ussmueller, Universität Innsbruck — Co-Chair: Hamed Rahmani, IBM T.J. Watson Research Center  
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*<sup>1</sup>University of British Columbia, Canada*  ; *<sup>2</sup>Brno University of Technology, Czechia* 
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*<sup>1</sup>Georgia Tech, USA*  ; *<sup>2</sup>Atheraxon, USA* 

## Tu2D: Advanced mm-Wave/Sub-mm-Wave Mixers, Switches and Phase Shifters

Chair: Austin Chen, Peraso — Co-Chair: Stephen Maas, Nonlinear Technologies  
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Chair: Joseph Bardin, Google — Co-Chair: Luca Pierantoni, Università Politecnica delle Marche

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*<sup>1</sup>Aarhus University, Denmark A ; <sup>2</sup>University of Toronto, Canada ●*

## Tu3A: Reconfigurable Multi-Mode Resonators and Filters

Chair: Roberto Gómez-García, Universidad de Alcalá — Co-Chair: Xun Gong, University of Central Florida

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*<sup>1</sup>UESTC, China A ; <sup>2</sup>National Chiao Tung University, Taiwan A*









## Tu3C: Rectenna and Signal Design for RF Power Transmission and Energy Harvesting

Chair: Mahmoud Wagih, University of Southampton — Co-Chair: Kenjiro Nishikawa, Kagoshima University

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Chair: Marc Franco, Qorvo — Co-Chair: Robert H. Caverly, Villanova University

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*Richard Campbell, Katlin Dahn, Portland State University, USA* 
- PAGE 226  
Tu3D-6      **200W Outphasing Amplifier System for 650MHz**  
*Frederick H. Raab, Green Mountain Radio Research, USA* 

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## Tu3E: Cryogenic Measurement and Characterization for Quantum Systems

Chair: Fabio Sebastiano, Technische Universiteit Delft — Co-Chair: Evan Jeffrey, Google

Room 4D-4F, 13:30–15:10, Tuesday 21 June 2022

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Tu3E-1      **Measurement Techniques for Superconducting Microwave Resonators Towards Quantum Device Applications**  
*Corey Rae H. McRae, University of Colorado Boulder, USA* 
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Tu3E-2      **A Cryogenic On-Chip Noise Measurement Procedure with  $\pm 1.4$ -K Measurement Uncertainty**  
*Felix Heinz, Fabian Thome, Arnulf Leuther, Oliver Ambacher, Fraunhofer IAF, Germany* 
- N/A  
Tu3E-3      **Cryogenic Characterization of the High Frequency and Noise Performance of SiGe HBTs from DC to 70GHz and Down to 2K**  
*S. Bonen<sup>1</sup>, Gregory Cooke<sup>1</sup>, Thomas Jager<sup>1</sup>, A. Bharadwaj<sup>1</sup>, S. Pati Tripathi<sup>1</sup>, D. Céli<sup>2</sup>, P. Chevalier<sup>2</sup>, P. Schvan<sup>3</sup>, Sorin P. Voinigescu<sup>1</sup>*  
*<sup>1</sup>University of Toronto, Canada* ; *<sup>2</sup>STMicroelectronics, France* ; *<sup>3</sup>Ciena, Canada* 
- PAGE 237  
Tu3E-4      **Fully Automatic 4K Cryogenic Probe Station for DC and Microwave Measurements on 150mm and 200mm Wafers**  
*Joshua T. West<sup>1</sup>, Arthur Kurlej<sup>2</sup>, Alex Wynn<sup>2</sup>, Chad Rogers<sup>1</sup>, Mark A. Gouker<sup>2</sup>, Sergey K. Tolpygo<sup>2</sup>*  
*<sup>1</sup>High Precision Devices, USA* ; *<sup>2</sup>MIT Lincoln Laboratory, USA* 

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## Tu4A: Integrated Filters in the GHz and Sub-THz Range

Chair: Julien Lintignat, XLIM (UMR 7252) — Co-Chair: Hjalti H. Sigmarsson, University of Oklahoma

Room 401-402, 15:40–17:00, Tuesday 21 June 2022

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- N/A  
Tu4A-1      **A 31-Tap Reconfigurable Analog FIR Filter Using Heterogeneously Integrated Polystrata Delay-Lines**  
*Eric Wagner<sup>1</sup>, Tim LaRocca<sup>1</sup>, Mark Verderber<sup>2</sup>, Carlos Rezende<sup>3</sup>, Peter May<sup>3</sup>*  
*<sup>1</sup>Northrop Grumman, USA* ; *<sup>2</sup>Smiths Interconnect, USA* ; *<sup>3</sup>Nuvotronics, USA* 
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Tu4A-2      **An Inductor-Less All-Passive Higher-Order N-Path Filter Based on Rotary Clocking in N-Path Filters**  
*Mohammad Khorshidian, Sastry Lakshmi Narasim Garimella, Aravind Nagulu, Harish Krishnaswamy, Columbia University, USA* 
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Tu4A-3      **A Miniaturized Differential CMOS BPF with High Selectivity and Improved In-Band Flatness Based on Transformer-Type Resonators**  
*Kun Li<sup>1</sup>, Bin Liu<sup>1</sup>, Pei-Ling Chi<sup>2</sup>, Yong Wang<sup>1</sup>, Tao Yang<sup>1</sup>*  
*<sup>1</sup>UESTC, China* ; *<sup>2</sup>National Chiao Tung University, Taiwan* 
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Tu4A-4      **Dual-Band Patch Filter 180/270GHz on BiCMOS 55nm**  
*Mohammed Wehbi<sup>1</sup>, Marc Margalef-Rovira<sup>2</sup>, Cedric Durand<sup>3</sup>, Sylvie Lepilliet<sup>2</sup>, Ariana L.C. Serrano<sup>4</sup>, Philippe Ferrari<sup>1</sup>*  
*<sup>1</sup>TIMA (UMR 5159), France* ; *<sup>2</sup>IEMN (UMR 8520), France* ; *<sup>3</sup>STMicroelectronics, France* ; *<sup>4</sup>Universidade de São Paulo, Brazil* 

## Tu4B: Components for Advanced Systems and Applications

Chair: Kenneth Mays, Boeing — Co-Chair: Damla Dimlioglu, Cornell University

Room 403-404, 15:40-17:00, Tuesday 21 June 2022

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Tu4B-1      **A DC to 110GHz Plasma Switch**  
*Alden Fisher<sup>1</sup>, Thomas R. Jones<sup>2</sup>, Dimitrios Peroulis<sup>1</sup>*  
<sup>1</sup>Purdue University, USA  ; <sup>2</sup>University of Alberta, Canada 
- PAGE 255  
Tu4B-2      **A Four-Port Circulating Duplexer for Simultaneous Transmit Receive Wireless Operation**  
*Dror Regev<sup>1</sup>, Nimrod Ginzburg<sup>2</sup>, Erez Zolkov<sup>2</sup>, Erez Loebel<sup>2</sup>, Itamar Melamed<sup>2</sup>, Shimi Shilo<sup>1</sup>, Doron Ezri<sup>1</sup>, Emanuel Cohen<sup>2</sup>*  
<sup>1</sup>Toga Networks, Israel  ; <sup>2</sup>Technion, Israel 
- PAGE 259  
Tu4B-3      **E-Band Power Forward and Divider Switch for On-Chip Reconfigurable and Scalable Arrays**  
*Kyu-Jong Choi, Byung-Wook Min, Yonsei University, Korea *
- PAGE 263  
Tu4B-4      **Passive Disposable Microwave Sensor for Online Microplastic Contamination Monitoring**  
*Maziar Shafiei<sup>1</sup>, Zahra Abbasi<sup>2</sup>, Carolyn L. Ren<sup>1</sup>*  
<sup>1</sup>University of Waterloo, Canada  ; <sup>2</sup>University of Calgary, Canada 

## Tu4C: Low-Frequency Wireless Power Transfer and Harvesting Systems

Chair: Dieff Vital, University of Illinois at Chicago — Co-Chair: Nuno Borges de Carvalho, Universidade de Aveiro

Room 501-502, 15:40-17:00, Tuesday 21 June 2022

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

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Tu4C-1      **Experimental Demonstration of Nonlinear Metasurfaces for High-Performance Low-Cost Near-Field Base Station**  
*Jorge Virgilio de Almeida<sup>1</sup>, Xiaoqiang Gu<sup>1</sup>, M.M. Mosso<sup>2</sup>, C.A.F. Sartori<sup>3</sup>, Ke Wu<sup>1</sup>*  
<sup>1</sup>Polytechnique Montréal, Canada  ; <sup>2</sup>PUC-Rio, Brazil  ; <sup>3</sup>Universidade de São Paulo, Brazil 
- N/A  
Tu4C-2      **Capacitive Coupler for Wireless Power Transfer to Intravascular Implant Devices**  
*Masaya Tamura, Takamasa Segawa, Marimo Matsumoto, Toyohashi University of Technology, Japan *
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Tu4C-3      **Power Supply to Multiple Sensors and Leakage Field Analysis Using Cavity Resonance-Enabled Wireless Power Transfer**  
*Suzuka Akai<sup>1</sup>, Hiromasa Saeki<sup>2</sup>, Masaya Tamura<sup>1</sup>*  
<sup>1</sup>Toyohashi University of Technology, Japan  ; <sup>2</sup>Murata Manufacturing, Japan 
- PAGE 275  
Tu4C-4      **Low Magnetic Loss Metamaterial Based Miniaturized WPT System for Biomedical Implants**  
*S. Alshhawy, Adel Barakat, Ramesh K. Pokharel, Kuniaki Yoshitomi, Kyushu University, Japan *

## Tu4D: Advanced High-Speed Mixed-Signal Circuits For Optical and mm-Wave Systems

Chair: Srinivasan Gopal, Broadcom Corporation — Co-Chair: Hermann Boss, Rohde & Schwarz

Room 503-504, 15:40–17:00, Tuesday 21 June 2022

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- N/A  
Tu4D-1      **160GSa/s-and-Beyond 108GHz-Bandwidth Over-2V<sub>ppd</sub> Output-Swing 0.5μm InP DHBT 2:1 AMUX-Driver for Next-Generation Optical Communications**  
*R. Hersent<sup>1</sup>, A. Konczykowska<sup>1</sup>, F. Jorge<sup>1</sup>, F. Blache<sup>1</sup>, V. Nodjiadjim<sup>1</sup>, M. Riet<sup>1</sup>, C. Mismar<sup>1</sup>, J. Renaudier<sup>2</sup>*  
<sup>1</sup>III-V Lab, France ; <sup>2</sup>Nokia Bell Labs, France 
- PAGE 279  
Tu4D-2      **An Energy-Efficient, 60Gbps Variable Transimpedance Optical Receiver in a 90nm SiGe HBT Technology**  
*Luis A. Valenzuela, Ghazal Movaghar, James Dalton, Navid Hosseinzadeh, Hector Andrade, Aaron Maharry, Clint L. Schow, James F. Buckwalter, University of California, Santa Barbara, USA *
- PAGE 283  
Tu4D-3      **An Area Efficient Low-Power mmWave PRBS Generator in FDSOI**  
*Florian Probst<sup>1</sup>, Andre Engelmann<sup>1</sup>, Marco Dietz<sup>1</sup>, Vadim Issakov<sup>2</sup>, Robert Weigel<sup>1</sup>*  
<sup>1</sup>FAU Erlangen-Nürnberg, Germany ; <sup>2</sup>Technische Universität Braunschweig, Germany 

## Tu4E: Next-Generation mm-Wave GaN Technologies and MMICs for 5G/6G and DoD Applications

Chair: Jeong-sun Moon, HRL Laboratories — Co-Chair: David Brown, BAE Systems

Room 4D-4F, 15:40–17:00, Tuesday 21 June 2022

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Tu4E-1      **Emerging Millimeter-Wave Device Technology — Next Generation GaN and Beyond**  
*Thomas E. Kazior<sup>1</sup>, Gregory M. Jones<sup>2</sup>, Tsu-Hsi Chang<sup>3</sup>*  
<sup>1</sup>DARPA, USA ; <sup>2</sup>Advanced Research Consultants, USA ; <sup>3</sup>HetInTec, USA 
- PAGE 291  
Tu4E-2      **Improved N-Polar GaN mm-Wave Linearity, Efficiency, and Noise**  
*Matthew Guidry, Pawana Shrestha, Wenjian Liu, Brian Romanczyk, Nirupam Hatui, Christian Wurm, Rohit R. Karnaty, Haoran Li, Elaheh Ahmadi, Stacia Keller, James F. Buckwalter, Umesh K. Mishra, University of California, Santa Barbara, USA *
- PAGE 295  
Tu4E-3      **ScAlN-GaN Transistor Technology for Millimeter-Wave Ultra-High Power and Efficient MMICs**  
*Eduardo M. Chumbes<sup>1</sup>, John Logan<sup>1</sup>, Brian Schultz<sup>1</sup>, Matt DeJarld<sup>1</sup>, Maher Tahhan<sup>1</sup>, Nicholas Kolia<sup>1</sup>, Matt Hardy<sup>2</sup>, Mario Ancona<sup>2</sup>, David Meyer<sup>2</sup>*  
<sup>1</sup>Raytheon Technologies, USA ; <sup>2</sup>U.S. Naval Research Laboratory, USA 
- PAGE 298  
Tu4E-4      **Multi-Channel Schottky-Gate BRIDGE HEMT Technology for Millimeter-Wave Power Amplifier Applications**  
*Keisuke Shinohara<sup>1</sup>, Casey King<sup>1</sup>, Dean Regan<sup>1</sup>, Eric Regan<sup>1</sup>, Andrew Carter<sup>1</sup>, Andrea Arias<sup>1</sup>, Joshua Bergman<sup>1</sup>, Miguel E. Urteaga<sup>1</sup>, Berinder Brar<sup>1</sup>, Yu Cao<sup>2</sup>, Andy Xie<sup>2</sup>, Edward Beam<sup>2</sup>, Cathy Lee<sup>2</sup>*  
<sup>1</sup>Teledyne Scientific & Imaging, USA ; <sup>2</sup>Qorvo, USA 

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Tu4E-5

**Highly Linear and Efficient mm-Wave GaN HEMTs and MMICs**

*Jeong-sun Moon<sup>1</sup>, Bob Grabar<sup>1</sup>, Joel Wong<sup>1</sup>, Joe Tai<sup>1</sup>, Erdem Arkun<sup>1</sup>,  
Didiel V. Morales<sup>1</sup>, Chuong Dao<sup>1</sup>, Shyam Bharadwaj<sup>1</sup>, Dave Fanning<sup>1</sup>,  
Nivedhita Venkatesan<sup>2</sup>, Patrick Fay<sup>2</sup>*

<sup>1</sup>HRL Laboratories, USA  ; <sup>2</sup>University of Notre Dame, USA 


**Tu4F: Robert J. Trew: More Than 50 Years of Service to the Microwave Community**

*Chair: Samir El-Ghazaly, University of Arkansas — Co-Chair: George Haddad, University of Michigan  
Room 4A-4C, 15:40-17:00, Tuesday 21 June 2022*

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N/A  
Tu4F-1

**Remembering Dr. Robert James Trew**

*Heather M. Trew, U.S. Department of the Treasury, USA *

N/A  
Tu4F-2

**Following the Evolution of High-Frequency Electronics: From Diodes to Transistors  
— A Memorial to the Life of Dr. Robert J. Trew (1944-2019)**

*Madhu S. Gupta, University of California, San Diego, USA *


N/A  
Tu4F-3

**Robert J. Trew and the Microwave Community**

*Mike Golio, Golio Endeavors, USA *

N/A  
Tu4F-4

**Bob Trew: Teacher, Researcher, Mentor, and Friend**








*Alfy Riddle, Quanergy Systems, USA *










## TuF1 : Tuesday Interactive Forum Session

Chairs: Akim A. Babenko, Justus A. Brevik, Robert D. Horansky, NIST

Room 2A-2B, 15:10-17:00, Tuesday 21 June 2022

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- N/A  
TuF1-1 **Plenary Poster: Control and Readout of a Superconducting Qubit Using a Photonic Link**  
*Florent Lecocq, Frank Quinlan, Jason Horng, Katarina Cicak, José Aumentado, Scott Diddams, John Teufel, NIST, USA* 
- PAGE 317  
TuF1-2 **VHF-UHF EMI Source Tracking Experiments**  
*Richard Campbell, Nicole Fellows, Kelly Dickens, Ana Rugani, Portland State University, USA* 
- PAGE 321  
TuF1-3 **Quantum Method for Scaling the Finite Element Based Quantum Solutions of Electromagnetic Problems**  
*Louis Zhang<sup>1</sup>, Qi-Jun Zhang<sup>2</sup>*  
*<sup>1</sup>University of Toronto, Canada*  ; *<sup>2</sup>Carleton University, Canada* 
- PAGE 325  
TuF1-5 **Low-Loss On-Chip Passive Circuits Using C4 Layer for RF, mmWave and Sub-THz Applications**  
*Qiang Yu<sup>1</sup>, Gwang-Soo Kim<sup>1</sup>, Jeffrey Garrett<sup>1</sup>, Derek Thomson<sup>1</sup>, Georgios C. Dogiamis<sup>1</sup>, Nathan Monroe<sup>2</sup>, Ruonan Han<sup>2</sup>, Yunzhe Ma<sup>1</sup>, James Waldemer<sup>1</sup>, Ye Seul Nam<sup>1</sup>, Gustavo Beltran<sup>1</sup>, Vijaya B. Neeli<sup>1</sup>, Surej Ravikumar<sup>1</sup>, Said Rami<sup>1</sup>, Chris Peltó<sup>1</sup>, Eric Karl<sup>1</sup>*  
*<sup>1</sup>Intel, USA*  ; *<sup>2</sup>MIT, USA* 
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TuF1-6 **Compact W-Band Silicon-Micromachined Filters with Increased Fabrication Robustness**  
*O. Glubokov, M. Mehrabi Gohari, James Campion, Joachim Oberhammer, KTH, Sweden* 










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TuF1-7 **On the Drain-to-Source Capacitance of Microwave FETs in Triode Region**  
*João L. Gomes, Luís C. Nunes, José C. Pedro, Universidade de Aveiro, Portugal* 
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TuF1-8 **An Injection-Lockable InP-DHBT Source Operating at 421GHz with -2.4dBm Output Power and 1.7% DC-to-RF Efficiency**  
*Alexander Possberg<sup>1</sup>, Florian Vogelsang<sup>2</sup>, Nils Pohl<sup>2</sup>, Maruf Hossain<sup>3</sup>, Hady Yacoub<sup>3</sup>, Tom K. Johansen<sup>4</sup>, Wolfgang Heinrich<sup>3</sup>, Nils Weimann<sup>1</sup>*  
*<sup>1</sup>Universität Duisburg-Essen, Germany*  ; *<sup>2</sup>Ruhr-Universität Bochum, Germany*  ; *<sup>3</sup>FBH, Germany*  ; *<sup>4</sup>Technical University of Denmark, Denmark* 
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TuF1-9 **GaN Characterization Method Towards Linearizability Prediction**  
*Ammar Issaoun, Ampleon, The Netherlands* 
- PAGE 344  
TuF1-10 **Miniaturized Dual-Band TM-Mode Dielectric Filter and its Reconfiguration Capabilities**  
*Abdulrahman Widaa, Michael Höft, CAU, Germany* 
- PAGE 348  
TuF1-11 **Low-Directivity High-Gain Rectenna Array for Improving Power-Harvesting Efficiency on 5.8GHz Batteryless Transponder**  
*Marco Passafiume, Monica Righini, Giovanni Collodi, Alessandro Cidronali, Università di Firenze, Italy* 
- PAGE 352  
TuF1-12 **Study on Power Conversion Efficiency of Rectenna Array with Deformed Flat-Top Beam for Microwave Power Transmission**  
*Nobuyuki Takabayashi, Naoki Shinohara, Tomohiko Mitani, Kyoto University, Japan* 

## We1A: High-Density Integration of Transmission Line Structures

Chair: Jay McDaniel, University of Oklahoma — Co-Chair: Jason Soric, Raytheon

Room 401-402, 08:00–09:40, Wednesday 22 June 2022

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We1A-1      **Multilayer Composite Right/Left-Hand Transmission Line with Ultra-Wideband and Miniaturized Characteristics**  
*Mingran Jia, Yuandan Dong, Jingwei Zhang, Xun Luo, UESTC, China* 
- N/A  
We1A-2      **Multilayer GCPW-to-AFSIW Transition for High-Performance Systems on Substrate**  
*Jean-Charles Henrion<sup>1</sup>, Anthony Ghiotto<sup>1</sup>, Tifenn Martin<sup>1</sup>, Jean-Marie Pham<sup>1</sup>,  
Petronilo Martin-Iglesias<sup>2</sup>, Christophe Goujon<sup>3</sup>, Laurent Carré<sup>4</sup>*  
<sup>1</sup>IMS (UMR 5218), France  ; <sup>2</sup>ESA-ESTEC, The Netherlands  ; <sup>3</sup>DGA, France  ;  
<sup>4</sup>ACTIA Telecom, France 
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We1A-3      **Substrate-Integrated Hybrid Metallo-Dielectric Waveguide for Millimeter-Wave and Terahertz Applications**  
*Chunmei Liu, Ke Wu, Polytechnique Montréal, Canada* 
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We1A-4      **Compact Interference Based Microstrip Single-Pole Double-Throw Utilizing Liquid Crystal Phase Shifter**  
*Dongwei Wang, Ersin Polar, Henning Tesmer, Rolf Jakoby, Technische Universität Darmstadt, Germany* 
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We1A-5      **Integrated Low-Loss Planar Goubau Lines on Glass Interposer for 6G Wireless Applications**  
*Xiaofan Jia, Madhavan Swaminathan, Georgia Tech, USA* 
- PAGE 371  
We1A-6      **Analysis of Electro-Thermal Characterization of Substrate Integrated Suspended Line**  
*Shiqiang Meng, Kaixue Ma, Yongqiang Wang, Tianjin University, China* 

## We1B: Advances in High Frequency Device Modeling

Chair: Shahed Reza, Sandia National Laboratories — Co-Chair: Rob Jones, BAE Systems

Room 403-404, 08:00–09:40, Wednesday 22 June 2022

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- N/A  
We1B-1      **Back-Gate Lumped Resistance Effect on AC Characteristics of FD-SOI MOSFET**  
*Martin Vanbrabant, Lucas Nyssens, Valeriya Kilchytska, Jean-Pierre Raskin, UCLouvain, Belgium* 
- PAGE 375  
We1B-2      **Statistical Modeling of Manufacturing Variability in GaN HEMT I-V Characteristics with ASM-HEMT**  
*Fredo Chavez<sup>1</sup>, Nicholas C. Miller<sup>2</sup>, Devin T. Davis<sup>2</sup>, Sourabh Khandelwal<sup>1</sup>*  
<sup>1</sup>Macquarie University, Australia  ; <sup>2</sup>AFRL, USA 
- PAGE 378  
We1B-3      **200W GaN PA Design Based on Accurate Multicell Transistor Modeling**  
*V. Vadalà<sup>1</sup>, A. Raffo<sup>2</sup>, G. Bosi<sup>2</sup>, A. Barsegyan<sup>3</sup>, James Custer<sup>3</sup>, Gabriele Formicone<sup>3</sup>,  
John Walker<sup>3</sup>, G. Vannini<sup>2</sup>*  
<sup>1</sup>Università di Milano-Bicocca, Italy  ; <sup>2</sup>Università di Ferrara, Italy  ; <sup>3</sup>Integra Technologies, USA 
- PAGE 382  
We1B-4      **Neural Network Based GaN HEMT Modelling for Millimeter Wave Power Amplifiers**  
*Kenya Nishiguchi, Takeshi Kawasaki, Masahiro Tanomura, Sumitomo Electric Industries, Japan* 

## We1C: Advanced 5G Wireless System Architectures and Underlying Over-the-Air Characterization Techniques

Chair: Kenneth E. Kolodziej, MIT Lincoln Laboratory — Co-Chair: Arnaldo S.R. Oliveira, Universidade de Aveiro

Room 501-502, 08:00–09:40, Wednesday 22 June 2022

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- N/A  
We1C-1      **Air-Induced PIM Cancellation in FDD MIMO Transceivers**  
*Vesa Lampu<sup>1</sup>, Lauri Anttila<sup>1</sup>, Matias Turunen<sup>1</sup>, Marko Fleischer<sup>2</sup>, Jan Hellmann<sup>2</sup>, Mikko Valkama<sup>1</sup>*  
<sup>1</sup>Tampere University, Finland  ; <sup>2</sup>Nokia, Germany 
- PAGE 386  
We1C-2      **Virtual Receiver Matrix for Future Multifunction Wireless Systems**  
*Seyed Ali Keivaan, Pascal Burasa, Ke Wu, Polytechnique Montréal, Canada *
- PAGE 390  
We1C-3      **Over-The-Air Test Method for Evaluation of 5G Millimeter Wave Devices Under 3D Spatially Dynamic Environment from Single Feeder**  
*David Reyes Paredes<sup>1</sup>, Mark A. Beach<sup>2</sup>, Moray Rumney<sup>3</sup>*  
<sup>1</sup>Silicon Austria Labs, Austria  ; <sup>2</sup>University of Bristol, UK  ; <sup>3</sup>Rumney Telecom, UK 
- N/A  
We1C-4      **Proof-of-Concept of Millimeter-Wave RF Beamforming Transmitter Architecture Employing Frequency-Multiplier-Based Up-Converters**  
*Ahmed Ben Ayed<sup>1</sup>, Ifrah Jaffri<sup>1</sup>, Ali M. Darwish<sup>2</sup>, Patrick Mitran<sup>1</sup>, Slim Boumaiza<sup>1</sup>*  
<sup>1</sup>University of Waterloo, Canada  ; <sup>2</sup>U.S. Army Research Laboratory, USA 
- PAGE 394  
We1C-5      **Over-the-Air Digital Predistortion of 5G FR2 Beamformer Array by Exploiting Linear Response Compensation**  
*Mattia Mengozzi, Gian Piero Gubiino, Alberto M. Angelotti, Corrado Florian, Alberto Santarelli, Università di Bologna, Italy *

## We1D: Nonlinear Analysis and Design of Microwave Signal Generation and Processing Circuits

Chair: Fabrizio Bonani, Politecnico di Torino — Co-Chair: Almudena Suárez, Universidad de Cantabria

Room 503-504, 08:00–09:40, Wednesday 22 June 2022

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We1D-1      **Nonlinear Analysis of Oscillators Based on a Slow-Wave Structure for Phase-Noise Reduction**  
*Mabel Pontón, Sergio Sancho, Amparo Herrera, Almudena Suárez, Universidad de Cantabria, Spain *
- PAGE 402  
We1D-2      **Quadrature Harmonic Self-Oscillating Mixer for Multifunction Wireless Communication and Sensing Systems**  
*Yasser Bigdeli, Pascal Burasa, Ke Wu, Polytechnique Montréal, Canada *
- N/A  
We1D-3      **Nonlinear Analysis of an Injection-Locked Oscillator Coupled to an External Resonator**  
*Víctor Ardila, Franco Ramírez, Almudena Suárez, Universidad de Cantabria, Spain *
- PAGE 406  
We1D-4      **Noise Analysis for Six-Port Radars with Schottky Diode Detectors**  
*Fabian Michler<sup>1</sup>, Benedict Scheiner<sup>1</sup>, Robert Weigel<sup>1</sup>, Fabian Lurz<sup>2</sup>*  
<sup>1</sup>FAU Erlangen-Nürnberg, Germany  ; <sup>2</sup>Technische Universität Hamburg, Germany 












## We1E: High Power GaN RF and Microwave Power Amplifiers

Chair: Nestor Lopez, MIT Lincoln Laboratory — Co-Chair: Michael Roberg, Qorvo

Room 1A - 1C, 08:00-09:40, Wednesday 22 June 2022

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We1E-1      **A 700–2800MHz Switchless Class-G Power Amplifier with Two-Quadrant Modulation for Back-Off Efficiency Improvement**  
*Xiaofan Chen, Ming Zhao, Wenhua Chen, Zhenghe Feng, Tsinghua University, China* 
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We1E-2      **Investigation of Input Nonlinearity in Sequential Load Modulated Balanced Amplifiers**  
*Chenhao Chu<sup>1</sup>, Tushar Sharma<sup>2</sup>, Sagar K. Dhar<sup>2</sup>, Ramzi Darraji<sup>3</sup>, Anding Zhu<sup>1</sup>*  
*<sup>1</sup>University College Dublin, Ireland  ; <sup>2</sup>Renesas Electronics, USA  ; <sup>3</sup>Ericsson, Canada *
- PAGE 418  
We1E-3      **Intrinsically Mode-Reconfigurable Load-Modulation Power Amplifier Leveraging Transistor's Analog-Digital Duality**  
*Niteesh Bharadwaj Vangipurapu, Haifeng Lyu, Yuchen Cao, Kenle Chen, University of Central Florida, USA* 
- PAGE 422  
We1E-4      **A 17.3–20.3GHz Doherty Power Amplifier with 14W Saturated Output Power and 28% PAE at 6dB OPBO in 150nm GaN Technology**  
*E. Richard<sup>1</sup>, T. Huet<sup>1</sup>, H. Moula Karimdjy<sup>1</sup>, M. Camiade<sup>1</sup>, C. Chang<sup>1</sup>, V. Serru<sup>1</sup>, F. Fernandez<sup>2</sup>, J. Suedois<sup>2</sup>, I. Davies<sup>3</sup>, V. Valenta<sup>3</sup>*  
*<sup>1</sup>UMS, France  ; <sup>2</sup>Thales, France  ; <sup>3</sup>ESA-ESTEC, The Netherlands *
- PAGE 426  
We1E-5      **A 50W CW 1–6GHz GaN MMIC Power Amplifier Module with Greater Than 30% Power Added Efficiency**  
*Michael Roberg, Jason Zhang, Robert Flynt, Matthew Irvine, Qorvo, USA* 

## We1F: Radar from Space to Ground (and Below) — The Synergy Between Commercial, Government, and Metrology Applications

Chair: Peter Knott, Fraunhofer FHR

Room 1D-1F, 08:00-09:40, Wednesday 22 June 2022

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- N/A  
We1F-1      **Keynote: Recent Radar Advances and their Impact**  
*Joseph Guerci, Information Systems Laboratories, USA* 
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We1F-2      **Upgrading the HUSIR Radar for Deep-Space Satellite Imaging**  
*Mohamed D. Abouzahra<sup>1</sup>, Michael E. MacDonald<sup>1</sup>, Roy K. Lee<sup>1</sup>, Donna L. Grimes<sup>1</sup>, Brian H. Simakauskas<sup>1</sup>, N. Lopez<sup>1</sup>, Christopher Eckert<sup>2</sup>, Joseph M. Usoff<sup>1</sup>*  
*<sup>1</sup>MIT Lincoln Laboratory, USA  ; <sup>2</sup>MIT, USA *
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We1F-3      **Influence of Soil Moisture on the Detection of Buried Objects Using an Airborne GPSAR**  
*Alexander Grathwohl<sup>1</sup>, Bernd Arendt<sup>2</sup>, Thomas Walter<sup>2</sup>, Christian Waldschmidt<sup>1</sup>*  
*<sup>1</sup>Universität Ulm, Germany  ; <sup>2</sup>Technische Hochschule Ulm, Germany *
- PAGE 436  
We1F-4      **Frequency-Domain Characterization of Millimeter-Wave FMCW Signal Based on a Precisely Synchronized NVNA Measurement Setup**  
*Yichi Zhang<sup>1</sup>, Dandan Wu<sup>2</sup>, Hongying Gao<sup>1</sup>, Zhao He<sup>1</sup>, Meining Nie<sup>1</sup>*  
*<sup>1</sup>NIM, China  ; <sup>2</sup>CATARC, China *
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We1F-5      **Sparse Processing for Driver Respiration Monitoring Using In-Vehicle mmWave Radar**  
*Yu Rong<sup>1</sup>, Kumar Vijay Mishra<sup>2</sup>, Daniel W. Bliss<sup>1</sup>*  
*<sup>1</sup>Arizona State University, USA  ; <sup>2</sup>U.S. Army Research Laboratory, USA *

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## We1G: mm-Wave and Terahertz Power Amplifiers and Front-End Modules

Chair: Taiyun Chi, Rice University — Co-Chair: Joe Qiu, U.S. ARMY Research Office

Room 4D-4F, 08:00–09:40, Wednesday 22 June 2022

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We1G-1      **A Compact SiGe Stacked Common-Base Dual-Band PA with 20/18.8dBm  $P_{\text{sat}}$  at 36/64GHz Supporting Concurrent Modulation**  
*Zheng Liu, Emir Ali Karahan, Kaushik Sengupta, Princeton University, USA* 
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We1G-2      **A 150–175GHz 30dB  $S_{21}$  G-Band Power Amplifier with 0.25W  $P_{\text{out}}$  and 15.7% PAE in a 250nm InP HBT Technology**  
*Zach Griffith, Miguel E. Urteaga, Petra Rowell, Lan Tran, Teledyne Scientific & Imaging, USA* 
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We1G-3      **A 2-Stage, 140GHz Class-B Power Amplifier Achieving 22.5% PAE at 17.3dBm in a 250nm InP HBT Technology**  
*Eythan Lam, Kang Ning, Ahmed Ahmed, Mark Rodwell, James F. Buckwalter, University of California, Santa Barbara, USA* 
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We1G-4      **A Compact, 114GHz, High-Efficiency Power Amplifier in a 250nm InP HBT Process**  
*Jeff Shih-Chieh Chien, James F. Buckwalter, University of California, Santa Barbara, USA* 
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We1G-5      **GaN-on-Si Ka-Band Single-Chip Front-End MMIC for Earth Observation Payloads**  
*Patrick Ettore Longhi<sup>1</sup>, Ferdinando Costanzo<sup>1</sup>, Lorenzo Pace<sup>1</sup>, Walter Ciccognani<sup>1</sup>, Sergio Colangeli<sup>1</sup>, Rocco Giofrè<sup>1</sup>, Rémy Leblanc<sup>2</sup>, Fabio Vitobello<sup>3</sup>, Ernesto Limiti<sup>1</sup>*  
*<sup>1</sup>Università di Roma “Tor Vergata”, Italy  ; <sup>2</sup>OMMIC, France  ; <sup>3</sup>REA, Belgium *

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## We2A: Advancements in Planar and Substrate Integrated Filters and Multiplexers

Chair: Christopher Galbraith, MIT Lincoln Laboratory — Co-Chair: Dimitra Psychogiou, University College Cork

Room 401-402, 10:10–11:50, Wednesday 22 June 2022







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We2A-1      **Design of In-Line Filter With Cross-Couplings Paths and Source Loaded Dangling Resonator Produced Transmission Zeros**  
*Yi Wu, Kaixue Ma, Yongqiang Wang, Tianjin University, China* 
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We2A-2      **Dual-Band SIW Filter with Widely Separated Passbands Based on  $TE_{101}$  and  $TE_{301}$  Modes**  
*Yilong Zhu<sup>1</sup>, Yuandan Dong<sup>1</sup>, Xun Luo<sup>1</sup>, Jens Bornemann<sup>2</sup>*  
*<sup>1</sup>UESTC, China  ; <sup>2</sup>University of Victoria, Canada *
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We2A-3      **Miniaturized Tri-Band Bandpass Filter with Wide Stopband Using Stacked-Coupled SIDGS Resonators**  
*Yuanxun Zhou, Deshan Tang, Yunbo Rao, Yuandan Dong, Xun Luo, UESTC, China* 
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We2A-4      **A Compact K-/Ka-Band Diplexer with Dual-Mode Folded SIW Cavities**  
*Noah Sielck, Anton Sieganschin, Kevin Erkelenz, Arne F. Jacob, Technische Universität Hamburg, Germany* 
- N/A  
We2A-5      **Miniaturized Quarter-Mode SIW Filters Loaded by Dual-Mode Microstrip Resonator with High Selectivity and Flexible Response**  
*Gu Lin, Yuandan Dong, Xun Luo, UESTC, China* 
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We2A-6      **Miniaturized 28GHz Packaged Bandpass Filter with High Selectivity and Wide Stopband Using Multilayer PCB Technology**  
*Yunbo Rao, Huizhen Jenny Qian, Jie Zhou, Yuandan Dong, Xun Luo, UESTC, China* 

## We2B: Advances in the Characterization of Microwave and mm-Wave Materials and Components

Chair: David R. Jackson, University of Houston — Co-Chair: Costas D. Sarris, University of Toronto  
Room 403-404, 10:10-11:50, Wednesday 22 June 2022








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*Nikita Mahjabeen<sup>1</sup>, Yali Zhang<sup>2</sup>, Aditya Dave<sup>2</sup>, Joseph Um<sup>2</sup>, Allison Harpel<sup>2</sup>, Bethanie Stadler<sup>2</sup>, Rhonda R. Franklin<sup>2</sup>, Rashaunda Henderson<sup>1</sup>*  
<sup>1</sup>University of Texas at Dallas, USA ; <sup>2</sup>University of Minnesota, USA 
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We2B-2      **Generation of High-Order Modes in Sub-THz Dielectric Waveguides by Misalignment of the Transition Structure**  
*Serguei Smirnov, Nikolaos Xenidis, Joachim Oberhammer, Dmitri V. Lioubtchenko, KTH, Sweden* 
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We2B-3      **A Mode-Matching-Based Technique for Electromagnetic Characterization of Anisotropic Materials in Cylindrical Waveguides**  
*Ricardo R. Rodrigues<sup>1</sup>, Vivian B. Cosenza<sup>1</sup>, Guilherme S. Rosa<sup>1</sup>, Rafael A. Penchel<sup>2</sup>*  
<sup>1</sup>PUC-Rio, Brazil ; <sup>2</sup>Universidade de São Paulo, Brazil 
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We2B-4      **Modeling Thick Metal in Forward Volume Spin Wave Transducers**  
*Max Robbins, David Connelly, Jonathan Chisum, University of Notre Dame, USA* 

## We2C: AI/ML for RF and mm-Wave Applications

Chair: Rui Ma, MERL — Co-Chair: Abhijit Chatterjee, Georgia Tech  
Room 501-502, 10:10-11:50, Wednesday 22 June 2022

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We2C-1      **Deep Learning-Enabled Inverse Design of 30-94GHz P<sub>sat,3dB</sub> SiGe PA Supporting Concurrent Multiband Operation at Multi-Gb/s**  
*Zheng Liu, Emir Ali Karahan, Kaushik Sengupta, Princeton University, USA* 
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*Kuchul Jung, Jongseok Woo, Saibal Mukhopadhyay, Georgia Tech, USA* 
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*Manish Nair, Tommaso Cappello, Shuping Dang, Vaia Kalokidou, Mark A. Beach, University of Bristol, UK* 
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*Zonghao Li, Anthony Chan Carusone, University of Toronto, Canada* 
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*Ren Shibata, Masataka Ohira, Zhewang Ma, Saitama University, Japan* 
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We2C-6      **Zeroth-Order Optimization for Varactor-Tuned Matching Network**  
*Michelle Pirrone, Emiliano Dall'Anese, Taylor Barton, University of Colorado Boulder, USA* 
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We2C-7      **Closed-Loop Antenna Impedance Tuning via Transfer Function Learning for 5G Sub-6GHz User Equipment**  
*Taha Yekan, Donghoon Lee, Pranav Dayal, Walid Y. Ali-Ahmad, Samsung, USA* 

## We2E: Advanced Linearization Techniques for PAs and MIMO Transmitters

Chair: Anding Zhu, University College Dublin — Co-Chair: Pere L. Gilibert, Universitat Politècnica de Catalunya  
Room 1A - 1C, 10:10-11:50, Wednesday 22 June 2022









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We2E-1      **Load-Modulation-Based IMD3 Cancellation for Millimeter-Wave Class-B CMOS Power Amplifiers Achieving EVM < 1.2%**  
*Masoud Pashaeifar, Leo C.N. de Vreede, Morteza S. Alavi, Technische Universiteit Delft, The Netherlands* 
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We2E-2      **Load-Mismatch Tracking Digital Predistortion for Mobile-Terminal Power Amplifiers**  
*Xin Liu<sup>1</sup>, Wenhua Chen<sup>1</sup>, Wenhao Chen<sup>2</sup>, Yan Guo<sup>2</sup>, Zhenghe Feng<sup>1</sup>*  
*<sup>1</sup>Tsinghua University, China*  ; *<sup>2</sup>Huawei Technologies, China* 
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We2E-3      **Mixture of Experts Neural Network for Modeling of Power Amplifiers**  
*Arne Fischer-Bühner<sup>1</sup>, Alberto Brihuega<sup>2</sup>, Lauri Anttila<sup>3</sup>, Manil Dev Gomony<sup>1</sup>, Mikko Valkama<sup>3</sup>*  
*<sup>1</sup>Nokia Bell Labs, Belgium*  ; *<sup>2</sup>Nokia, Finland*  ; *<sup>3</sup>Tampere University, Finland* 
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*Mohammed Almoneer, Hoda Barkhordar-pour, Patrick Mitran, Slim Boumaiza, University of Waterloo, Canada* 
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*Yuuichi Aoki, Yonghoon Kim, Yongan Hwang, Heedo Kang, Sunryoul Kim, An-Sang Ryu, Sung-Gi Yang, Samsung, Korea* 

## We2F: Advanced Concepts for 77GHz Radar

Chair: Wael A. Ahmad, Keysight Technologies — Co-Chair: Alexander Koelpin, Technische Universität Hamburg  
Room 1D-1F, 10:10-11:50, Wednesday 22 June 2022

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







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*Tony Liu<sup>1</sup>, Hao Yun Hsu<sup>1</sup>, Juergen Hasch<sup>2</sup>, Sorin P. Voinigescu<sup>1</sup>*  
*<sup>1</sup>University of Toronto, Canada*  ; *<sup>2</sup>Robert Bosch, Germany* 
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We2F-2      **A Harmonic Automotive Radar for Bicycle Detection with RFID Tags at 79/158GHz**  
*Tobias T. Braun, Jan Schöpfel, Christian Schweer, Nils Pohl, Ruhr-Universität Bochum, Germany* 
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We2F-3      **High Angular Resolution Digital Beamforming Based on Combination of Linear Prediction and 1D-CLEAN for Automotive MIMO Radar**  
*Minh Q. Nguyen<sup>1</sup>, Reinhard Feger<sup>1</sup>, Demerlika Amarilda<sup>2</sup>, Markus Pichler-Scheder<sup>3</sup>, Andreas Stelzer<sup>1</sup>*  
*<sup>1</sup>Johannes Kepler Universität Linz, Austria*  ; *<sup>2</sup>ZF Friedrichshafen, Germany*  ;  
*<sup>3</sup>LCM, Austria* 
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*Georg Körner, Christoph Birkenhauer, Patrick Stief, Christian Carlowitz, Martin Vossiek, FAU Erlangen-Nürnberg, Germany* 
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*Janis Wörmann, Sven Ebeling, Benjamin Schoch, Ingmar Kallfass, Universität Stuttgart, Germany* 

## We2G: mm-Wave and Terahertz System Demonstrations and Concepts

Chair: William R. Deal, Northrop Grumman — Co-Chair: Wooram Lee, Penn State University

Room 4D-4F, 10:10-11:50, Wednesday 22 June 2022

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*Siwei Li, Gabriel M. Rebeiz, University of California, San Diego, USA* 
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We2G-2      **A W-Band, 92-114GHz, Real-Time Spectral Efficient Radio Link Demonstrating 10Gbps Peak Rate in Field Trial**  
*Mikael Hörberg<sup>1</sup>, Bengt Madeberg<sup>1</sup>, Daniel Sjöberg<sup>1</sup>, Herbert Zirath<sup>1</sup>, Konstantinos Bitsikas<sup>2</sup>, Konstantinos Kravariotis<sup>2</sup>, Spiros Tsapalis<sup>2</sup>, Marcus Gavell<sup>3</sup>, Göran Granström<sup>3</sup>, Rickard Lövblom<sup>3</sup>, Dimitris Siomos<sup>4</sup>, Sam Agneessens<sup>1</sup>, Jonas Hansryd<sup>1</sup>*  
<sup>1</sup>Ericsson, Sweden  ; <sup>2</sup>Ericsson, Greece  ; <sup>3</sup>Gotmic, Sweden  ; <sup>4</sup>OTE Group, Greece 
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*Morteza Tavakoli Taba<sup>1</sup>, S.M. Hossein Naghavi<sup>1</sup>, Mohammed Aseeri<sup>2</sup>, Ehsan Afshari<sup>1</sup>*  
<sup>1</sup>University of Michigan, USA  ; <sup>2</sup>KACST, Saudi Arabia 
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*Ken B. Cooper, Brian J. Drouin, Omkar Pradhan, Jose V. Siles, Raquel Rodriguez Monje, Deacon J. Nemchick, Robert J. Dengler, Leslie K. Tamppari, Jet Propulsion Laboratory, USA* 
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*Georgios C. Dogiamis, Thomas W. Brown, Neelam Prabhu Gaunkar, Ye Seul Nam, Triveni S. Rane, Surej Ravikumar, Vijaya B. Neeli, Jessica C. Chou, Said Rami, Intel, USA* 

## We3A: Advances in Passive Devices

Chair: Bayaner Arigong, Florida State University — Co-Chair: Hualiang Zhang, UMass Lowell

Room 401-402, 13:30-15:10, Wednesday 22 June 2022











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- N/A  
We3A-1      **High-Q On-Chip Capacitors Featuring “Self-Inductance Cancellation” for RF and mm-Wave Applications**  
*Arian Rahimi, Pratheesh Somarajan, Qiang Yu, Elham Mohammadi, Jeffrey Garrett, Said Rami, Kalyan C. Kolluru, Intel, USA* 
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*Samundra K. Thapa, Ramesh K. Pokharel, Baichuan Chen, Tomoki Fukuda, Adel Barakat, Kyushu University, Japan* 
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*D. Gustafsson, P. Ingelhart, K. Andersson, T. Dahl, R. Lindman, R. Lundqvist, Ericsson, Sweden* 
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*Mohamed M. Fahmi<sup>1</sup>, Raafat R. Mansour<sup>2</sup>*  
<sup>1</sup>DRDC, Canada  ; <sup>2</sup>University of Waterloo, Canada 
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*Yonghui Shu, Lingyun Ren, Eravant, USA* 

## We3B: Advances in Interconnects

Chair: Rhonda Franklin, University of Minnesota — Co-Chair: Georgios Dogiamis, Intel  
Room 403-404, 13:30–15:10, Wednesday 22 June 2022

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*Han-Yu Tsao, Yuxin Wang, Robert M. Weikle, Arthur W. Lichtenberger, Nicolas Scott Barker, University of Virginia, USA* 
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*D. Schwantuschke<sup>1</sup>, E. Ture<sup>1</sup>, T. Braun<sup>2</sup>, T.D. Nguyen<sup>2</sup>, M. Wöhrmann<sup>2</sup>, M. Pretl<sup>3</sup>, S. Engels<sup>3</sup>*  
*<sup>1</sup>Fraunhofer IAF, Germany*  ; *<sup>2</sup>Fraunhofer IZM, Germany*  ; *<sup>3</sup>Rohde & Schwarz, Germany* 
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*Ting Zheng, Muhannad S. Bakir, Georgia Tech, USA* 
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*Bo Yu<sup>1</sup>, Zhigang Wang<sup>1</sup>, Peng Wu<sup>2</sup>, Oupeng Li<sup>3</sup>, Hua Cai<sup>3</sup>, Jia He<sup>3</sup>, Guangjian Wang<sup>3</sup>, Ruimin Xu<sup>1</sup>*  
*<sup>1</sup>UESTC, China*  ; *<sup>2</sup>CAS, China*  ; *<sup>3</sup>Huawei Technologies, China* 
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We3B-5      **110GHz Nanowire-Based Integrated Via Technology for 3D Silicon Integration**  
*Yali Zhang<sup>1</sup>, Joseph Um<sup>1</sup>, Nikita Mahjabeen<sup>2</sup>, Bethanie Stadler<sup>1</sup>, Rashaunda Henderson<sup>2</sup>, Rhonda R. Franklin<sup>1</sup>*  
*<sup>1</sup>University of Minnesota, USA*  ; *<sup>2</sup>University of Texas at Dallas, USA* 

## We3C: Towards Physically Secure Communication and Computation

Chair: John Hu, Oklahoma State University — Co-Chair: Shreyas Sen, Purdue University  
Room 501-502, 13:30–15:10, Wednesday 22 June 2022

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We3C-1      **A Quantitative Analysis of Physical Security and Path Loss with Frequency for IBOB Channel**  
*Arunashish Datta, Mayukh Nath, Baibhab Chatterjee, Shovan Maity, Shreyas Sen, Purdue University, USA* 
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*Md. Faizul Bari, Meghna Roy Chowdhury, Baibhab Chatterjee, Shreyas Sen, Purdue University, USA* 
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We3C-3      **Electromagnetic Analysis of Integrated On-Chip Sensing Loop for Side-Channel and Fault-Injection Attack Detection**  
*Archisman Ghosh<sup>1</sup>, Mayukh Nath<sup>1</sup>, Debayan Das<sup>2</sup>, Santosh Ghosh<sup>2</sup>, Shreyas Sen<sup>1</sup>*  
*<sup>1</sup>Purdue University, USA*  ; *<sup>2</sup>Intel, USA* 
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*Shaghayegh Vosoughitabar, Alireza Nooraiepour, Waheed U. Bajwa, Narayan Mandayam, Chung-Tse Michael Wu, Rutgers University, USA* 
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*Md. Faizul Bari<sup>1</sup>, Baibhab Chatterjee<sup>1</sup>, Luke Duncan<sup>2</sup>, Shreyas Sen<sup>1</sup>*  
*<sup>1</sup>Purdue University, USA*  ; *<sup>2</sup>KBR, USA* 

## We3D: LNAs and Receivers at W-band and Beyond

Chair: Pekka Kangaslahti, Jet Propulsion Laboratory — Co-Chair: Roei Ben-Yishay, Intel

Room 503-504, 13:30–15:10, Wednesday 22 June 2022

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*Fabian Thome, Peter Brückner, Stefano Leone, Rüdiger Quay, Fraunhofer IAF, Germany* 
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*Hong-Shen Chen, Yu-Lun Hu, Wei-Cheng Chang, Jenny Yi-Chun Liu, National Tsing Hua University, Taiwan* 
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*Patrick J. Artz<sup>1</sup>, Philipp Scholz<sup>1</sup>, Thomas Mausolf<sup>2</sup>, Friedel Gerfers<sup>1</sup>*  
<sup>1</sup>Technische Universität Berlin, Germany  ; <sup>2</sup>IHP, Germany 
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We3D-4      **Experimental Characterization of Temperature-Dependent Microwave Noise of Discrete HEMTs: Drain Noise and Real-Space Transfer**  
*Bekari Gabritchidze<sup>1</sup>, Kieran Cleary<sup>1</sup>, Jacob Kooi<sup>2</sup>, Iretomiwa Esho<sup>1</sup>, Anthony C. Readhead<sup>1</sup>, Austin J. Minnich<sup>1</sup>*  
<sup>1</sup>Caltech, USA  ; <sup>2</sup>Jet Propulsion Laboratory, USA 

## We3E: New Advances in RF Circuits and Systems

Chair: John Papapolymerou, Michigan State University — Co-Chair: Linda Katehi, Texas A&M University

Room 1A - 1C, 13:30–15:10, Wednesday 22 June 2022

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*A. Gutierrez-Aitken, Northrop Grumman, USA* 
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*Thomas Hoffmann, Lars Schellhase, Wolfgang Heinrich, Andreas Wentzel, FBH, Germany* 
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*Devon T. Donahue, Philip Zurek, Zoya Popović, Taylor Barton, University of Colorado Boulder, USA* 
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*Stavros Vakalis, Jorge R. Colon-Berrios, Jeffrey A. Nanzer, Michigan State University, USA* 
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*Christian Bohn, Ahmet Çağrı Ulusoy, KIT, Germany* 

## We3F: Cognitive Radar

Chair: Joe Guerci, Information Systems Laboratories

Room 1D-1F, 13:30-15:10, Wednesday 22 June 2022

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*Kristine Bell, Benjamin Shapo, Metron, USA* 
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*Augusto Aubry, Sabrina De Fenza, Antonio De Maio, Università di Napoli Federico II, Italy* 
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*Justin Roessler<sup>1</sup>, Austin Egbert<sup>1</sup>, Trevor Van Hoosier<sup>1</sup>, Sarah Seguin<sup>1</sup>, Anthony Martone<sup>2</sup>, Charles Baylis<sup>1</sup>, Robert J. Marks II<sup>1</sup>*  
*<sup>1</sup>Baylor University, USA*  ; *<sup>2</sup>U.S. Army Research Laboratory, USA* 
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We3F-4      **Radar Concepts for Inline Non-Destructive Testing**  
*D. Nuessler, C. Krebs, A. Froehly, S. Gütgemann, Fraunhofer FHR, Germany* 

## We3G: mm-Wave and Terahertz Signal Generation

Chair: Richard Al Hadi, Alcatel — Co-Chair: Ahmed Gadallah, IHP

Room 4D-4F, 13:30-15:10, Wednesday 22 June 2022

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*Byeong-Taek Moon, Byeonghun Yun, Sang-Gug Lee, KAIST, Korea* 
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We3G-2      **A 250–300GHz Frequency Multiplier-by-8 Chain in SiGe Technology**  
*Ahmed Gadallah<sup>1</sup>, Mohamed H. Eissa<sup>1</sup>, Thomas Mausolf<sup>1</sup>, Dietmar Kissinger<sup>2</sup>, Andrea Malignaggi<sup>1</sup>*  
*<sup>1</sup>IHP, Germany*  ; *<sup>2</sup>Universität Ulm, Germany* 
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We3G-3      **61.5GHz Energy-Efficient Super-Regenerative Oscillator with Tunable Quench Duty Cycle**  
*Ali Ferschischi, Hatem Ghaleb, Corrado Carta, Frank Ellinger, Technische Universität Dresden, Germany* 
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We3G-4      **15 to 72GHz Closed-Loop Impairment Corrected mm-Wave Delay-Locked IQ Modulator for 5G Applications**  
*Isaac Martinez, Keysight Technologies, USA* 
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We3G-5      **A Coherent 233–243GHz Scalable 1D Array in 28nm Bulk CMOS Using Sub-Harmonic Inter-Element Leakage**  
*Sumeet Londhe, Eran Socher, Tel Aviv University, Israel* 



## We4A: Advances in mm-Wave Passive Components & Systems

Chair: Holger Maune, OvG Universität Magdeburg — Co-Chair: Srinivas Prasad Mysore Nagaraja, Jet Propulsion Laboratory  
Room 401-402, 15:40–17:00, Wednesday 22 June 2022

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We4A-1      **A 300-GHz Band Chip-to-Waveguide Transition on Proton-Irradiated Standard 65nm CMOS Si Substrate for Flip-Chip Packaging Implementation**  
*Hans Herdian<sup>1</sup>, Takeshi Inoue<sup>2</sup>, Masatsugu Sogabe<sup>2</sup>, Atsushi Shirane<sup>1</sup>, Kenichi Okada<sup>1</sup>*  
<sup>1</sup>Tokyo Tech, Japan  ; <sup>2</sup>SHI-ATEX, Japan 
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We4A-2      **A Ka-Band Wideband Monolithically Metallic 3-D Printed Turnstile Junction Orthomode Transducer with Shaped Internal Profile**  
*Sicheng Chen, Jin Li, Zhihong Xu, Tao Yuan, Shenzhen University, China *
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We4A-3      **A Dual-Band Feed Network for Highly Integrated K-/Ka-Band Phased Array Front-Ends**  
*Kevin Erkelenz, Noah Sielck, Arne F. Jacob, Technische Universität Hamburg, Germany *
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We4A-4      **Dual-Resonance mmWave Antenna Matching Network Comprised of Separated Ground Layers and Via Posts for Adjustable Return Current Path Modification**  
*Youngno Youn<sup>1</sup>, Jaehyun Choi<sup>2</sup>, Bumhyun Kim<sup>1</sup>, Woonbong Hwang<sup>1</sup>, Wonbin Hong<sup>1</sup>*  
<sup>1</sup>POSTECH, Korea  ; <sup>2</sup>LG Innotek, Korea 

## We4B: Advanced Manufacturing and Novel Substrates

Chair: Premjeet Chahal, Michigan State University — Co-Chair: Valentina Palazzi, Università di Perugia  
Room 403-404, 15:40–17:00, Wednesday 22 June 2022

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We4B-1      **Integrated and Miniaturized Quasi Yagi D-Band Antenna in Glass Interposer**  
*Serhat Erdogan, Kyoung-Sik Jack Moon, Mohanalingam Kathaperumal, Madhavan Swaminathan, Georgia Tech, USA *
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We4B-2      **Flexible and Scalable Additively Manufactured Tile-Based Phased Arrays for Satellite Communication and 5G mmWave Applications**  
*Kexin Hu, Genaro Soto-Valle, Yepu Cui, Manos M. Tentzeris, Georgia Tech, USA *
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We4B-3      **Additively Manufactured Slotted Waveguides for THz Applications**  
*A. Hofmann, K. Lomakin, M. Sippel, G. Gold, FAU Erlangen-Nürnberg, Germany *
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We4B-4      **3D Printed Wideband High-Power X-Band Radial Combiner**  
*N. Lopez<sup>1</sup>, Aly E. Fathy<sup>2</sup>, Mohamed D. Abouzahra<sup>1</sup>, J. Blandford<sup>1</sup>, R. Kazemi<sup>2</sup>, Chandler J. Bauder<sup>2</sup>, Christopher Eckert<sup>3</sup>*  
<sup>1</sup>MIT Lincoln Laboratory, USA  ; <sup>2</sup>University of Tennessee, USA  ; <sup>3</sup>MIT, USA 

## We4C: Advanced System Architectures and Concepts

Chair: Kavita Goverdhanam, U.S. Army CCDC C5ISR Center — Co-Chair: Ruochen Lu, University of Texas at Austin  
Room 501-502, 15:40–17:00, Wednesday 22 June 2022








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We4C-1      **2–8GHz Interference Detector with 1.1 $\mu$ s Response**  
*Mohammad Abu Khater, Dimitrios Peroulis, Purdue University, USA* 
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We4C-2      **A 140–500GHz CMOS THz Spectroscope with 1MHz Resolution Based on Multi-Branch Rotational Symmetric Sensing Surface**  
*Changting Pi, Huizhen Jenny Qian, Tianyi Wang, Jie Zhou, Zhixian Deng, Yiyang Shu, Xun Luo, UESTC, China* 
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We4C-3      **Noninvasive Continuous Blood Pressure Monitoring Based on Wearable Radar Sensor with Preliminary Clinical Validation**  
*Li Wen<sup>1</sup>, Shuqin Dong<sup>1</sup>, Zhi Zhang<sup>2</sup>, Changzhan Gu<sup>1</sup>, Junfa Mao<sup>1</sup>*  
*<sup>1</sup>SJTU, China* ; *<sup>2</sup>Shanghai General Hospital, China* 
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We4C-4      **Measurement of Displacement Motions Based on Unsynchronized Bandpass Sampling with a Low-IF Doppler Radar**  
*Fei Tong, Jingtao Liu, Changzhan Gu, Junfa Mao, SJTU, China* 

## We4D: Advances in Low-Power CMOS Low Noise Amplifiers (LNAs)

Chair: Shirin Montazeri, Google — Co-Chair: Edward Niehenke, Niehenke Consulting  
Room 503-504, 15:40–17:00, Wednesday 22 June 2022

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We4D-1      **A 3.2mW 2.2–13.2GHz CMOS Differential Common-Gate LNA for Ultra-Wideband Receivers**  
*Li Zhang<sup>1</sup>, Nguyen L.K. Nguyen<sup>1</sup>, Jingjun Chen<sup>1</sup>, Omeed Momeni<sup>1</sup>, Xiaoguang Liu<sup>2</sup>*  
*<sup>1</sup>University of California, Davis, USA* ; *<sup>2</sup>SUSTech, China* 
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We4D-2      **Design and Implementation of a 3.9-to-5.3GHz 65nm Cryo-CMOS LNA with an Average Noise Temperature of 10.2K**  
*Sayan Das, Sanjay Raman, Joseph C. Bardin, UMass Amherst, USA* 
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We4D-3      **Sub-mW 30GHz Variable-Gain LNA in 22nm FDSOI CMOS for Low-Power Tapered mm-Wave 5G/6G Phased-Array Receivers**  
*Michele Spasaro, Domenico Zito, Aarhus University, Denmark* 
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We4D-4      **Ultralow Power E-Band Low-Noise Amplifier with Three-Stacked Current-Sharing Amplification Stages in 28nm CMOS**  
*Liang Qiu<sup>1</sup>, Jiabing Liu<sup>1</sup>, Qianyi Dong<sup>1</sup>, Zhihao Lv<sup>1</sup>, Kailong Zhao<sup>1</sup>, Shengjie Wang<sup>1</sup>, Yen-Cheng Kuan<sup>2</sup>, Qun Jane Gu<sup>3</sup>, Xiaopeng Yu<sup>1</sup>, Chunyi Song<sup>1</sup>, Zhiwei Xu<sup>1</sup>*  
*<sup>1</sup>Zhejiang University, China* ; *<sup>2</sup>NYCU, Taiwan* ; *<sup>3</sup>University of California, Davis, USA* 

## We4F: Advanced Radar Imaging and Signal Processing

Chair: Suresh Venkatesh, Princeton University — Co-Chair: Rudy Emrick, Northrop Grumman

Room 1D-1F, 15:40-17:00, Wednesday 22 June 2022

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We4F-1      **A 75GHz Dynamic Antenna Array for Real-Time Imageless Object Detection via Fourier Domain Filtering**  
*Daniel Chen, Stavros Vakalis, Jeffrey A. Nanzer, Michigan State University, USA* 
- N/A  
We4F-2      **Incoherent Point Spread Function Estimation and Multipoint Deconvolution for Active Incoherent Millimeter-Wave Imaging**  
*Jorge R. Colon-Berrios, Stavros Vakalis, Daniel Chen, Jeffrey A. Nanzer, Michigan State University, USA* 
- N/A  
We4F-3      **Received Signal Strength Estimation in Indoor Environment Using High Frequency Rytov Approximation**  
*Amartansh Dubey, Samruddhi Deshmukh, Dingfei Ma, Ross Murch, HKUST, China* 
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We4F-4      **A 300-1300MHz Single Antenna Digital-FMCW Ground Penetrating Radar for the Mars Science Helicopter with Switched-Gain Calibration to Improve Dynamic Range**  
*Adrian Tang, Emmanuel Decrossas, Yonggyu Gim, Robert Beauchamp, Stanislav Culaclii, Jet Propulsion Laboratory, USA* 
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We4F-5      **Thickness Profile Estimation of Fluid-Carrying Non-Metallic Pipes**  
*Maharshi B. Shah, Yuki Gao, Maryam Ravan, Reza K. Amineh, NYIT, USA* 

## We4G: mm-Wave and Terahertz Integrated Circuits and Components

Chair: Theodore Reck, Virginia Diodes — Co-Chair: Lei Liu, University of Notre Dame

Room 4D-4F, 15:40-17:00, Wednesday 22 June 2022

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- N/A  
We4G-1      **High-Gain 670GHz Amplifier Circuits in InGaAs-on-Insulator HEMT Technology**  
*Laurenz John, Axel Tessmann, Arnulf Leuther, Thomas Merkle, Hermann Massler, Sébastien Chartier, Fraunhofer IAF, Germany* 
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We4G-2      **Wideband Switchable-Capacitor Loaded Differential Phase Shifter with Lattice Structures**  
*Sungwon Kwon<sup>1</sup>, Minjae Jung<sup>2</sup>, Byung-Wook Min<sup>1</sup>*  
*<sup>1</sup>Yonsei University, Korea*  ; *<sup>2</sup>University of California, San Diego, USA* 
- PAGE 742  
We4G-3      **A New 77GHz Sampling Mixer in 28nm FD-SOI CMOS Technology for Automotive Radar Application**  
*Alexandre Flete<sup>1</sup>, Christophe Viallon<sup>2</sup>, Philippe Cathelin<sup>1</sup>, Thierry Parra<sup>2</sup>*  
*<sup>1</sup>STMicroelectronics, France*  ; *<sup>2</sup>LAAS-CNRS, France* 
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We4G-4      **A 190-to-220GHz 4-Bit Passive Attenuator with 1.4dB Insertion Loss and Sub-0.4dB RMS Amplitude Error Using Magnetically Switchable Coupled-Lines in 0.13 $\mu$ m CMOS Technology**  
*Nengxu Zhu, Fanyi Meng, Tianjin University, China* 

## WeIF2 : Wednesday Interactive Forum Session

Chair: Akim A. Babenko, Justus A. Brevik, Robert D. Horansky, NIST

Room 2A-2B, 15:10-17:00, Wednesday 22 June 2022

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N/A WeIF2-1	<b>Plenary Poster: Earth Observation with Microwave Radiometers — Miniaturization and AI-Based Solutions</b> <i>Pekka Kangaslahti<sup>1</sup>, Shannon Brown<sup>1</sup>, Javier Bosch-Lluis<sup>1</sup>, Sid Misra<sup>1</sup>, Sharmila Padmanabhan<sup>1</sup>, Bill Deal<sup>2</sup></i> <sup>1</sup> JPL, USA  ; <sup>2</sup> Northrop Grumman, USA 
PAGE 750 WeIF2-2	<b>Accumulative Mill Rolled Pd Foil Based H<sub>2</sub> Getter for Improving Microwave Device Reliability</b> <i>Hua Xia, Jeffrey Vriens, David DeWire, Hermetic Solutions Group, USA </i>
PAGE 753 WeIF2-3	<b>A Flexible Implementation of Ka-Band Active Phased Array for Satellite Communication</b> <i>Xiaolin Wang<sup>1</sup>, Dongwon You<sup>1</sup>, Xi Fu<sup>1</sup>, Hojun Lee<sup>1</sup>, Zheng Li<sup>1</sup>, Daisuke Awaji<sup>2</sup>, Jian Pang<sup>1</sup>, Atsushi Shirane<sup>1</sup>, Hiraku Sakamoto<sup>1</sup>, Kenichi Okada<sup>1</sup></i> <sup>1</sup> Tokyo Tech, Japan  ; <sup>2</sup> Fujikura, Japan 
PAGE 757 WeIF2-4	<b>Tunable MMIC Negative Group Delay Transversal Filter-Based Negative Capacitor in 0.1-<math>\mu</math>m GaAs pHEMT Technology</b> <i>next page ...</i> <i>Minning Zhu<sup>1</sup>, Austin Ying-Kuang Chen<sup>2</sup>, Chung-Tse Michael Wu<sup>1</sup></i> <sup>1</sup> Rutgers University, USA  ; <sup>2</sup> California State University, Northridge, USA 
PAGE 761 WeIF2-5	<b>Compact Asymmetrical Voltage-Mode Doherty PA with 30% Bandwidth and 80Watt Output Power</b> <i>Eduard Heidebrecht, Renato Negra, RWTH Aachen University, Germany </i>

PAGE 765 WeIF2-6	<b>Ultra-Wideband Microstrip to Substrate Integrated Waveguide (SIW) Vertical Transition</b> <i>Abdelkader Zerfaine, Tarek Djerafi, INRS-EMT, Canada </i>
PAGE 768 WeIF2-7	<b>A Novel High Power Plastic Quad Flat No-Lead Package Structure for RF GaN Applications</b> <i>Shao-Cheng Hsiao, Jui-Chieh Chiu, Po-Kie Tseng, You-Cheng Lai, Chih-Wen Huang, WIN Semiconductors, Taiwan </i>
PAGE 771 WeIF2-8	<b>Reducing FDD MMU Form Factor with Active Cancellation</b> <i>Khurram Muhammad<sup>1</sup>, Jin Yuan<sup>1</sup>, Shaomin Zhang<sup>2</sup>, Chance Tarver<sup>1</sup>, Xinguang Xu<sup>1</sup>, Yu Liu<sup>1</sup>, Jie Li<sup>2</sup>, Junghwan Moon<sup>3</sup>, Matthew Tonnemach<sup>1</sup>, Gary Xu<sup>1</sup>, Jianzhong Zhang<sup>1</sup></i> <sup>1</sup> Samsung, USA  ; <sup>2</sup> Samsung, China  ; <sup>3</sup> Samsung, Korea 
PAGE 775 WeIF2-9	<b>10W High Efficiency GaN-Si MMIC Power Amplifier for 17.3-20.2GHz Onboard Satellite Use</b> <i>Paolo Colantonio<sup>1</sup>, Mariano Lopez<sup>2</sup>, Lorena Cabria<sup>2</sup>, Fabio Vitobello<sup>3</sup>, Rocco Giofrè<sup>1</sup></i> <sup>1</sup> Università di Roma "Tor Vergata", Italy  ; <sup>2</sup> TTI Norte, Spain  ; <sup>3</sup> REA, Belgium 
PAGE 778 WeIF2-10	<b>Characterization and Estimation of EVM Hump Based on Transmitter AM-AM and AM-PM Characteristics</b> <i>Saeed Farsi<sup>1</sup>, Yaochen Wang<sup>2</sup>, Walid Y. Ali-Ahmad<sup>2</sup></i> <sup>1</sup> Meta, USA  ; <sup>2</sup> Samsung, USA 
PAGE 781 WeIF2-11	<b>Analysis and Experiments of the Impact of Frequency Ramp Nonlinearity on Range Resolution and Accuracy in LFM CW Radars</b> <i>Zesheng Zhang, Jingtao Liu, Changzhan Gu, Junfa Mao, SJTU, China </i>

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**5.8GHz Highly Sensitive and Linear Doppler Radar Using Digital Self-Injection-Locking Technology**

*Wei-Chih Su, Chia-Hao Chang, Tzyy-Sheng Horng, Shiang-Hwua Yu, National Sun Yat-sen University, Taiwan* 

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**Cost-Efficient Baseband DPD for Hybrid MIMO Systems with Shallow Learning Artificial Neural Networks**

*Patrick Jueschke<sup>1</sup>, Thales Stedile-Ribeiro<sup>1</sup>, Georg Fischer<sup>2</sup>*  
<sup>1</sup>Nokia, Germany  ; <sup>2</sup>FAU Erlangen-Nürnberg, Germany 


**Th1A: Microwave Interaction and Characterization of Biological and Semiconductor Materials**

*Chair: Chung-Tse Michael Wu, Rutgers University — Co-Chair: Malgorzata Celuch, QWED*  
*Room 401-402, 08:00-09:40, Thursday 23 June 2022*

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**Effect of Treatment for Abandoned DBS Leads on RF-Induced Heating During 1.5T MRI**

*Ran Guo, Wei Hu, Jianfeng Zheng, Caleb J. Ballard, Daniel Herrera, Ji Chen, University of Houston, USA* 



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Th1A-2

**Dosimetry Performances of a MultiWell-Plate-Based Near-Field RF Applicator for the Investigation of EM Impact on Biological Cells**

*Ali Moscatiello<sup>1</sup>, Benjamin Cerdan<sup>1</sup>, Camille Gironde<sup>2</sup>, Christophe Furger<sup>2</sup>, David Dubuc<sup>1</sup>, Katia Grenier<sup>1</sup>*  
<sup>1</sup>LAAS-CNRS, France  ; <sup>2</sup>Anti Oxidant Power, France 


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Th1A-3

**Measuring Yeast Cell Heterogeneity with a Microwave Flow Cytometer**

*Neelima Dahal<sup>1</sup>, Jeffrey Osterberg<sup>1</sup>, Thomas Caldwell<sup>1</sup>, Ralu Divan<sup>2</sup>, Sarah Harcum<sup>1</sup>, Pingshan Wang<sup>1</sup>*  
<sup>1</sup>Clemson University, USA  ; <sup>2</sup>Argonne National Laboratory, USA 

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Th1A-4

**Sensing of Muscular Mouse Cells C2C12 from Seed Out to Electroporation — A Conceptional Study**

*Markus Paravicini, Manuela Milden, Daniel Birnstengel, Martin Schüßler, Rolf Jakoby, M. Cristina Cardoso, Carolin Hessinger, Technische Universität Darmstadt, Germany* 

N/A  
Th1A-5

**Irradiated Silicon for Microwave and Millimeter Wave Applications**

*Jerzy Krupka<sup>1</sup>, Bartłomiej Salski<sup>1</sup>, Tomasz Karpisz<sup>1</sup>, Pawel Kopyt<sup>1</sup>, Leif Jensen<sup>2</sup>, Marcin Wojciechowski<sup>3</sup>*

<sup>1</sup>Warsaw University of Technology, Poland  ; <sup>2</sup>Topsil Semiconductor Materials, Denmark  ; <sup>3</sup>GUM, Poland 

**Th1B: Advances in SAW and Acoustic Components Technology**

*Chair: Pierre Blondy, XLIM (UMR 7252) — Co-Chair: Songbin Gong, University of Illinois at Urbana-Champaign*



*Room 403-404, 08:00-09:40, Thursday 23 June 2022*

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**A Reconfigurable SAW Resonator Using Monolithically Integrated Switches**

*Arash Fouladi Azarnaminy<sup>1</sup>, Aminat Oyiza Suleiman<sup>2</sup>, Mohamed Chaker<sup>2</sup>, Raafat R. Mansour<sup>1</sup>*

<sup>1</sup>University of Waterloo, Canada  ; <sup>2</sup>INRS-EMT, Canada 

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Th1B-2

**Acoustic Delay Lines in Thin-Film Lithium Niobate on Silicon Carbide**

*Sinwoo Cho, Yinan Wang, Jack Kramer, Kristi Nguyen, Ruochen Lu, University of Texas at Austin, USA *

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Th1B-3

**SAW Duplexer with High Isolation Based on Rejection Resonator and Cross Coupled Capacitor**

*Hao Xue, Yuandan Dong, UESTC, China *

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Th1B-4

**Silicon-SAW Resonators and Delay Lines Based on Sub-Micron Lithium Niobate and Amorphous Silicon**

*Yansong Yang<sup>1</sup>, Liuqing Gao<sup>2</sup>, Songbin Gong<sup>2</sup>*

<sup>1</sup>HKUST, China  ; <sup>2</sup>University of Illinois at Urbana-Champaign, USA 

## Th1C: Microwave and Terahertz Photonics

Chair: Mona Jarrahi, University of California, Los Angeles — Co-Chair: David Hareme, SUNY Polytechnic Institute  
Room 501-502, 08:00–09:40, Thursday 23 June 2022

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Th1C-1      **Terahertz Generation from a Bias-Free, Telecommunication-Compatible Photoconductive Emitter Realized on a Silicon Substrate**  
*Ping-Keng Lu, Yifan Zhao, Deniz Turan, Xinghe Jiang, Mona Jarrahi, University of California, Los Angeles, USA* **A**
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Th1C-2      **860 $\mu$ W Terahertz Power Generation from Graded Composition InGaAs Photoconductive Nanoantennas**  
*Ping-Keng Lu, Deniz Turan, Mona Jarrahi, University of California, Los Angeles, USA* **A**
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Th1C-3      **Fiber-Optic THz Wireless Uplink with Remote Down-Conversion by Optical Carriers Transmitted from Central Office**  
*Sungmin Cho<sup>1</sup>, Sang-Rok Moon<sup>2</sup>, Minkyu Sung<sup>2</sup>, Seung-Hyun Cho<sup>2</sup>, Ho-Jin Song<sup>1</sup>*  
<sup>1</sup>POSTECH, Korea **A** ; <sup>2</sup>ETRI, Korea **A**
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Th1C-4      **Photonic-Enabled Real-Time Spectrogram Analysis of Sub-Nanosecond Microwave Events Over a 40GHz Instantaneous Bandwidth**  
*Connor M.L. Rowe, Benjamin Crockett, José Azaña, INRS-EMT, Canada* **A**
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Th1C-5      **A Large Signal Equivalent Circuit Modeling and Enhanced RF Output Power of PIN Photodiodes**  
*Jiachao Li, Fei You, Mingming Ma, Ce Shen, Yu Wang, Yin Chen, Chenlin He, Xinyi Zhang, Songbai He, UESTC, China* **A**

## Th1E: Compound Semiconductor Power Amplifiers

Chair: Charles F. Campbell, Qorvo — Co-Chair: Zoya Popović, University of Colorado Boulder  
Room 1A - 1C, 08:00–09:40, Thursday 23 June 2022

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Th1E-1      **A DC-170GHz InP Distributed Amplifier Using Transmission Line Loss Compensation Technique**  
*Phat T. Nguyen<sup>1</sup>, Nguyen L.K. Nguyen<sup>1</sup>, Alexander N. Stameroff<sup>2</sup>, Anh-Vu Pham<sup>1</sup>*  
<sup>1</sup>University of California, Davis, USA **A** ; <sup>2</sup>Keysight Technologies, USA **A**
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Th1E-2      **A Ku/K/Ka-Band GaAs MMIC Load-Modulated Amplifier with a Negative Group Delay Output Network**  
*Nicholas Mullins<sup>1</sup>, Yaniel Vega<sup>2</sup>, Timothy Sonnenberg<sup>1</sup>, Zoya Popović<sup>1</sup>*  
<sup>1</sup>University of Colorado Boulder, USA **A** ; <sup>2</sup>L3Harris, USA **A**
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Th1E-3      **2.8–3.8GHz Broadband InGaP/GaAs HBT Doherty Power Amplifier IC for 5G New Radio Handset**  
*Hansik Oh, Woojin Choi, Hyungmo Koo, Jaekyung Shin, Yifei Chen, Hyeongjin Jeon, Youngchan Choi, Hoseok Jung, Jiwon Hwang, Youngoo Yang, Sungkyunkwan University, Korea* **A**
- N/A  
Th1E-4      **Broadband 100W Ka-Band SSPA Based on GaN Power Amplifiers**  
*Philipp Neiningger<sup>1</sup>, Laurenz John<sup>1</sup>, M. Zink<sup>1</sup>, D. Meder<sup>1</sup>, M. Kuri<sup>1</sup>, Axel Tessmann<sup>1</sup>, C. Friesicke<sup>1</sup>, M. Mikulla<sup>1</sup>, Rüdiger Quay<sup>1</sup>, Thomas Zwick<sup>2</sup>*  
<sup>1</sup>Fraunhofer IAF, Germany **A** ; <sup>2</sup>KIT, Germany **A**
- N/A  
Th1E-5      **A 100W W-Band GaN SSPA**  
*Jason Soric<sup>1</sup>, Nicholas Kolias<sup>1</sup>, Jeffery Saunders<sup>1</sup>, Jeffery Kotce<sup>1</sup>, Andrew Brown<sup>1</sup>, Christopher Rodenbeck<sup>2</sup>, R.S. Gyurcsik<sup>1</sup>*  
<sup>1</sup>Raytheon Technologies, USA **A** ; <sup>2</sup>U.S. Naval Research Laboratory, USA **A**

## Th1F: Efficient Characterization and Test of Phased-Array Antenna Systems: Is it Really a Nightmare?

Chair: Marc Vanden Bossche, National Instruments — Co-Chair: Jan Fromme, National Instruments

Room 1D-1F, 08:00-09:40, Thursday 23 June 2022

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


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Th1F-1      **Keynote: Calibrating RF/Microwave Front Ends in Multichannel Receiver and Transmitter Systems**  
*Mike Jones, Analog Devices, USA* 
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*D. Booth, K. Nickerson, S. Bohaichuk, J. Erskine, J.P. Shaffer, Quantum Valley Ideas Laboratories, Canada* 
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Th1F-3      **A Novel OTA Near-Field Measurement Approach Suitable for 5G mmWave Wideband Modulated Tests**  
*Michael Löhning, Thomas Deckert, Vincent Kotzsch, Marc Vanden Bossche, National Instruments, USA* 
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*Michael D. Foegelle, ETS-Lindgren, USA* 
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Th1F-5      **Preliminary System Integration and Performance Features for an S-Band, Dual-Polarized, All-Digital Phased Array Radar**  
*Caleb Fulton, Nathan Goodman, Mark Yeary, Robert Palmer, Hjalti H. Sigmarsson, Jay McDaniel, University of Oklahoma, USA* 

## Th2A: Measurement and Instrumentation Techniques for Evolving Standards in Future Technologies

Chair: Jon Martens, Anritsu — Co-Chair: Gian Piero Gibiino, Università di Bologna

Room 401-402, 10:10-11:50, Thursday 23 June 2022

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Th2A-1      **3D Chip-Level Broadband Measurement Technique for Radiated EM Emission**  
*Yin-Cheng Chang<sup>1</sup>, Jiayou Wang<sup>2</sup>, Ta-Yeh Lin<sup>1</sup>, Chao-Ping Hsieh<sup>1</sup>, Yi Huang<sup>3</sup>, Shawn S.H. Hsu<sup>2</sup>, Da-Chiang Chang<sup>1</sup>*  
<sup>1</sup>NARLabs-TSRI, Taiwan ; <sup>2</sup>National Tsing Hua University, Taiwan ; <sup>3</sup>University of Liverpool, UK 
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Th2A-2      **Linearity Metrics and Signal Statistics — The Need for Standards**  
*Ricardo Figueiredo, Nuno Carvalho, Universidade de Aveiro, Portugal* 
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<sup>1</sup>NIST, USA ; <sup>2</sup>Teledyne Scientific & Imaging, USA 
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<sup>1</sup>NPL, UK ; <sup>2</sup>PTB, Germany ; <sup>3</sup>LNE, France 



## Th2B: Recent Advances in Acoustic Resonators and Filters

Chair: Amelie Hagelauer, Technische Universität München — Co-Chair: Brice Ivira, Broadcom

Room 403-404, 10:10–11:50, Thursday 23 June 2022











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## Th2C: Nano-Devices and their High Frequency Applications

Chair: Luca Pierantoni, Università Politecnica delle Marche

Co-Chair: Davide Mencarelli, Università Politecnica delle Marche




Room 501-502, 10:10–11:50, Thursday 23 June 2022

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<sup>1</sup>Polish Academy of Sciences, Poland  ; <sup>2</sup>KTH, Sweden  ; <sup>3</sup>Aalto University, Finland 

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<sup>1</sup>UCLouvain, Belgium  ; <sup>2</sup>imec, Belgium 

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<sup>1</sup>FBH, Germany  ; <sup>2</sup>Technion, Israel  ; <sup>3</sup>Brandenburgische Technische Universität, Germany 

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<sup>1</sup>Technische Universität Dresden, Germany  ; <sup>2</sup>IHP, Germany 

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Chair: Robin Garg, MediaTek — Co-Chair: Julio Navarro, Boeing

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Chair: Olga Boric-Lubecke, University of Hawaii at Manoa — Co-Chair: Tomislav Markovic, University of Zagreb

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Chair: John Ebel, AFRL — Co-Chair: Tejinder Singh, Dell

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Chair: Mark P. van der Heijden, NXP Semiconductors — Co-Chair: Arvind Keerti, Qualcomm

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*<sup>1</sup>SUTD, Singapore  ; <sup>2</sup>GlobalFoundries, Singapore  ; <sup>3</sup>Realtek Semiconductor, Taiwan *
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*<sup>1</sup>Technische Universiteit Delft, The Netherlands  ; <sup>2</sup>Ampleon, The Netherlands *

## Th3E: Reconfigurable RF Systems for 5G mm-Wave Communications

Chair: Holger Maune, OvG Universität Magdeburg — Co-Chair: Nathan Orloff, NIST

Room 1A - 1C, 13:30-15:10, Thursday 23 June 2022

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<sup>1</sup>Universidade de São Paulo, Brazil ; <sup>2</sup>Technische Universität Darmstadt, Germany ; <sup>3</sup>OvG Universität Magdeburg, Germany ; <sup>4</sup>RFIC-Lab (EA 7520), France 
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Chair: Jonathan P. Comeau, Anokiwave — Co-Chair: Najme Ebrahimi, University of Florida

Room 1D-1F, 13:30-15:10, Thursday 23 June 2022

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## ThIF3: Thursday Interactive Forum Sessions

Chair: Akim A. Babenko, Justus A. Brevik, Robert D. Horansky, NIST

Room 2A-2B, 13:30-15:30, Thursday 23 June 2022

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<sup>1</sup>University of Colorado Boulder, USA  ; <sup>2</sup>Aerospace, USA  ; <sup>3</sup>Colorado School of Mines, USA  ; <sup>4</sup>NIST, USA 
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<sup>1</sup>Università di Roma "Tor Vergata", Italy  ; <sup>2</sup>Politecnico di Torino, Italy 

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