

## 105th ARFTG Microwave Measurement Conference

Challenges in Microwave Measurements under Cryogenic Conditions



### Friday, June 20<sup>th</sup>

|                                                             |                                                                                                                                                                                                                        |
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| ♀ <b>Moscone Center, Room 303-304, 3<sup>rd</sup> Level</b> |                                                                                                                                                                                                                        |
| <b>7:50<br/>– 8:00</b>                                      | <b>Welcome to the 105<sup>th</sup> ARFTG Microwave Measurement Conference</b><br><br>Conference Co-Chairs: Dennis Lewis, Dominique Schreurs<br><br>TPC Co-Chairs: Chong Li and Apolinar Reynoso-Hernández              |
| ♀ <b>Moscone Center, Room 303-304, 3<sup>rd</sup> Level</b> |                                                                                                                                                                                                                        |
| <b>8:00<br/>– 9:40</b>                                      | <b>Session A: Challenges on Cryogenic Measurements</b><br><br>Session Chair: Rusty Myers   Keysight Technologies                                                                                                       |
| 8:00<br>– 8:40                                              | <b>Keynote:</b> Superconductive Electronics for Quantum-based Signal Synthesis and Measurements<br><br>A1 S. P. Benz   National Institute of Standards and Technology (NIST)                                           |
| 8:40<br>– 9:00                                              | Microwave Design and On-Wafer Characterization of Cryogenic Quantum-Well Infrared Photodetectors<br><br>A2 Akim Babenko*; Emma Wollman; Choonsup Lee; Mahmood Bagheri; Arezou Khoshakhlagh   Jet Propulsion Laboratory |
| 9:00<br>– 9:20                                              | On-Wafer Cryogenic RF Noise Measurement Techniques<br><br>Jean-Olivier Plouchart*; Daniil Frolov; Utku Soyulu; Alberto Valdes-Garcia   IBM Research                                                                    |
| A3                                                          |                                                                                                                                                                                                                        |

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| 9:20<br>– 9:40                                              | Minimizing System Drift in mmWave Wafer-Level Testing with Active Thermal Management                                              |
| A4                                                          | Shania Hsieh; Matt Lu; Hung Che Fu, Stojan Kanev, and Andrej Rumiantsev*   MPI Corporation                                        |
| 9:40<br>– 10:40                                             | <b>Break – Exhibits, Interactive Forum</b>                                                                                        |
| <b>♀ Moscone Center, Room 303-304, 3<sup>rd</sup> Level</b> |                                                                                                                                   |
| 10:40<br>– 11:40                                            | <b>Session B: Microwave Measurements on Noise and Disturbances</b><br>Session Chair: James Skinner   National Physical Laboratory |
| 10:40<br>– 11:00                                            | Calibration of A Digital Correlator for Noise-Parameter Measurements                                                              |
| B1                                                          | Xifeng Lu*; Dazhen Gu; Daniel Kuester   National Institute of Standards and Technology (NIST)                                     |
| 11:00<br>– 11:20                                            | VNA-based In-Band Spectral Purity Assessment For MM-Wave Frequency Extenders                                                      |
| B2                                                          | Carmine De Martino*; Marco Spirito   Delft University of Technology                                                               |
| 11:20<br>– 11:40                                            | On the performance of true-differential/true-mode stimulus methods at higher mm-wave frequencies                                  |
| B3                                                          | Jon Martens *   Anritsu                                                                                                           |

♀ **Moscone Center Room, 301-302, 3<sup>rd</sup> Level**

**11:40  
– 13:00**

**ARFTG-105 Awards Luncheon**

ARFTG President: Rusty Myers, ARFTG Awards: David Blackham

♀ **Moscone Center Room, 303-304, 3<sup>rd</sup> Level**

**13:00  
– 14:40**

**Session C: Nonlinear Devices and Measurements**

Session Chair: Patrick Roblin | The Ohio State University

13:00  
– 13:20

Performance Characterization of Power Amplifier Integrated into D-band Front-end with Different Modulation Schemes

C1

Piyaphat Phukphan\*; Mikko Hietanen; Nuutti Tervo; Aarno Pärssinen; Marko Leinonen | University of Oulu

13:20  
– 13:40

**Student Paper:** Digital Predistortion with ROVA

C2-S

Amedeo Varano\*<sup>1</sup>; Adam Cooman<sup>2</sup>; Piet Wambacq<sup>1,2</sup>; Gerd Vandersteen<sup>1,2</sup>; Yves Rolain<sup>1</sup>; Dries Peumans<sup>1,2</sup> | <sup>1</sup>Vrije Universiteit Brussel, <sup>2</sup>IMEC

13:40  
– 14:00

**Student Paper:** On-Wafer Oscilloscope-Based Nonlinear Characterisation: Benchmarking Against NVNA Measurements

C3-S

Daanish Smellie\*<sup>1,2</sup>; Rana ElKashlan<sup>2</sup>; Bertrand Parvais<sup>1,3</sup>; Dominique Schreurs<sup>1</sup> | <sup>1</sup>KU Leuven, <sup>2</sup>IMEC, <sup>3</sup>Vrije Universiteit Brussel

14:00  
– 14:20

Optimal Design of Multisine Excitations with Non-Overlapping Intermodulation Using Minimal-Length Bh sets

C4

Alberto Maria Angelotti\*; Gian Piero Gibiino | University of Bologna

14:20  
– 14:40

An Experimental Procedure for Assessing EVM Performance of VNA-based Measurement Systems

C5

Mattia Mengozzi; Alberto Maria Angelotti; Gian Piero Gibiino\* | University of Bologna

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| 14:40<br>– 15:30                                            | <b>Break – Exhibits, Interactive Forum</b>                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>♀ Moscone Center Room, 303-304, 3<sup>rd</sup> Level</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 15:30<br>– 16:50                                            | <b>Session D: Calibration Devices and Techniques</b><br>Session Chair: Xiaobang Shang   National Physical Laboratory                                                                                                                                                                                                                                                                                                                                            |
| 15:30<br>– 15:50<br><br>D1                                  | Standards Definition Impact on Impedance-Based VNA Calibration Methods<br><br>Arezoo Abdi*; Behrooz Rezaee; Lukas Ebner; Arash Arsanjani; Michael Ernst Gadringer; Jasmin Grosinger; Wolfgang Bosch   TU Graz                                                                                                                                                                                                                                                   |
| 15:50<br>– 16:10<br><br>D2-S                                | Automatic On-Wafer Probe Positioning System Based on Convolutional Neural Network Model<br><br><b>Student Paper:</b> Zerui Gao <sup>*1</sup> ; Alec Daalman <sup>1</sup> ; Faisal Mubarak <sup>2</sup> ; Chang Gao <sup>1</sup> ; Carmine de Martino <sup>3</sup> ; Steffen Lehmann <sup>4</sup> ; Marco Spirito <sup>1</sup>   <sup>1</sup> Delft University of Technology, <sup>2</sup> VSL, <sup>3</sup> Vertigo Technologies, <sup>4</sup> Global Foundries |
| 16:10<br>– 16:30<br><br>D3                                  | Comparison of Broadband Single-Sweep and Conventional Banded System On-Wafer S-Parameter Measurements up to 220 GHz<br><br>Liam Ausden <sup>*1</sup> ; Nick Ridler <sup>1</sup> ; Andrej Rumiantsev <sup>2</sup> ; Jon Martens <sup>3</sup> ; Xiaobang Shang <sup>1</sup>   <sup>1</sup> National Physical Laboratory, <sup>2</sup> MPI Corporation, <sup>3</sup> Anritsu                                                                                       |
| 16:30<br>– 16:50<br><br>D4                                  | Metrology for Time-Domain Transformed and Time-Gated S-parameters using PyDynamic<br><br>James Skinner <sup>*1</sup> ; Maximilian Gruber <sup>2</sup> ; Sascha Eichstädt <sup>2</sup> ; Roger Appleby <sup>3</sup> ; Nick Ridler <sup>1</sup>   <sup>1</sup> National Physical Laboratory, <sup>2</sup> Physikalisch-Technische Bundesanstalt, <sup>3</sup> RAMMW                                                                                               |
| 16:50<br>– 17:00                                            | <b>ARFTG-105 Conference Closing</b>                                                                                                                                                                                                                                                                                                                                                                                                                             |

♀ Moscone Center, Room 305-311, 3<sup>rd</sup> Level

9:40  
– 15:30

**Interactive Forum**

Session Chair: Dennis Lewis | The Boeing Company

P1 Nonlinear Millimeter Wave Power Amplifier Analysis with Hot S-Parameters

Patrick Umbach<sup>\*1</sup>; Joel Dunsmore<sup>2</sup>; Fabian Thome<sup>1</sup> | <sup>1</sup>Fraunhofer IAF, <sup>2</sup>Keysight Technologies

P2 Rethinking Microwave Power-Bar Characterization

Gianni Bosi<sup>\*1</sup>; Antonio Raffo<sup>\*2</sup>; Rocco Giofrè<sup>3</sup>; Valeria Vadalà<sup>1</sup>; Francesco Manni<sup>3</sup>; Reinel Marante<sup>4</sup>; Lorena Cabria<sup>4</sup>; Francisco de Arriba<sup>4</sup>; Paolo Colantonio<sup>3</sup>; Giorgio Vannini<sup>2</sup>  
| <sup>1</sup>University of Milano Bicocca, <sup>2</sup>University of Ferrara, <sup>3</sup>University of Roma Tor Vergata, <sup>4</sup>Celestia TTI;

P3 Loadpull Behavioral Modeling for Power Amplifiers Under Modulated Operating Conditions

Talley Amir<sup>\*</sup>; Jan Verspecht; Sam Kusano | Keysight Technologies

P4-S **Student Paper:** Design, Simulation and Characterization of an Ultrathin Dual-band Polarization-Insensitive Metamaterial Absorber

Lamyâ Ibili<sup>\*1</sup>; Thierry Lacrevez<sup>1</sup>; Grégory Houzet<sup>1</sup>; William Feuray<sup>2</sup>; Nicolas Corrao<sup>1</sup>; Tân-Phu Vuong<sup>1</sup> | <sup>1</sup>CROMA, <sup>2</sup>KNDS AMMO France

P5 Magneto-Dielectric Characterization of Materials using a Slow Wave CPW based Compact RF Sensor

Ankita Kumari<sup>\*</sup>; Prakrati Azad; M Jaleel Akhtar | Indian Institute of Technology Kanpur

P6-S **Student Paper:** Comparison of D-Band and G-Band On-Wafer Noise Figure Measurements

Nizar Messaoudi<sup>\*</sup>, <sup>1, 2</sup>; Shengjie Gao<sup>3</sup>; Muhammad Waleed Mansha<sup>4</sup>; Yves Baeyens<sup>4</sup>; Slim Boumaiza<sup>2</sup>; Bryan Hosein<sup>3</sup>; Shahriar Sahramian<sup>4</sup> | <sup>1</sup>Keysight Technologies, <sup>2</sup>University of Waterloo, <sup>3</sup>Focus Microwaves, <sup>4</sup>Nokia Bell Labs

P7 Design of a 3–20 GHz Broadband Quad-Ridged Horn Antenna with a Closed Boundary and a Partially Open Feeding Structure

Kyeong Min Na; Soon Soo Oh<sup>\*</sup> | Chosun University