Sub-THz Reconfigurable Intelligent Surfaces, RF Front-Ends, and Channels for 6G Networks

Abstract

The sub-terahertz (sub-THz) frequency spectrum, typically between 100 GHz and 300 GHz, is of high interest for 6G networks due to its potential to enable ultra-fast wireless communication and advanced applications. This scientific workshop brings together leading researchers from five ongoing projects —TERRAMETA, TIMES, Tera6G, 6GTandem, and TeraGreen—funded by the Smart Networks and Services Joint Undertaking under the European Union's Horizon Europe research and innovation program. The participants will share their progress in developing key sub-THz technologies for 6G, including Reconfigurable Intelligent Surfaces (RIS), RF front-ends, and channel creation/characterisation/modelling. This workshop aims to benefit researchers interested in advancing 6G technologies through collaborative knowledge exchange.

Workshop outline

This workshop will begin with an introduction to the TERRAMETA, TIMES, Tera6G, 6GTandem, and TeraGreen. Following that, there will be five presentations—one from each project—each lasting 20 minutes followed by a 5-minute discussion. A 25-minute break will separate the first and second halves of the workshop. At the end of the workshop, there will be an interactive panel discussion, which allows a two-way discussion with the audience and the speakers. The speakers and their tentative presentaion titles are:

1. Dr Antonio Clemente, 'Sub-THz Reconfigurable Intelligent Surfaces: From the reconfigurable technology to Proof-of-Concept Demonstration' (TERRAMETA)
2. Prof. Thomas Kürner, 'Channel Measurements and Simulation of Reconfigurable Intelligent Surfaces at 300 GHz' (TIMES)
3. Prof. Guillermo Carpintero, 'Hybrid integrated millimeter-wave 2D antenna arrays' (Tera6G)
4. Prof. Liesbet Van der Perre, 'Sub-THz spectrum : novel deployment strategy to cope with the elephant in the room' (6GTandem)
5. Prof. Nuria Llombart, 'TeraGreen: Towards high efficient Tbps wireless links' (TeraGreen)
6. Panel: 'The way forward in sub-THz technologies: what can we expect from 6G?' Moderated by Luís Pessoa, Project Coordinator of Terrameta. Panel member: All speakers.

Speakers

Antonio Clemente received his B.S. and M.S. in telecommunication engineering from the University of Siena, Italy, in 2006 and 2009, and a Ph.D. in signal processing from the University of Rennes 1, France, in 2012. Since 2013, he has worked as a Research Engineer at CEA-Leti. His research focuses on reconfigurable antennas, millimeter-wave technology, and antenna measurement. Dr. Clemente has authored over 40 journal papers, 150 conference publications, and holds 30 patents. He is an Associate Editor of ⁎IEEE Transactions on Antennas and Propagation⁎ and currently serves as the EuRAAP delegate for Region 1. Dr. Clemente received sevearl awards such as the Young Scientist Award and the Best Paper Award from high-impact international conferences.

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Thomas Kürner (Fellow IEEE) received his Dipl.-Ing. degree in Electrical Engineering in 1990, and his Dr.-Ing. degree in 1993, both from University of Karlsruhe. From 1994 to 2003, he was with the radio network planning department at the headquarters of the GSM 1800 and UMTS operator E-Plus Mobilfunk GmbH & Co KG, Düsseldorf, where he was team manager radio network planning support responsible for radio network planning tools, algorithms, processes and parameters Since 2003 he is Full University Professor for Mobile Radio Systems at the Technische Universität Braunschweig. Currently he is chairing the IEEE 802.15 Standing Committee THz and the ETSI Industrial Specification Group THz.

Guillermo Carpintero is Professor at Carlos III University of Madrid, co-director of Optoelectronics and Laser Technology Group. Has pioneered the field of integrated microwave photonics for broadband communications for 5G and 6G links, having coordinated EU projects FP7 iPHOS, H2020 TERAmeasure and currently HORIZON 6G SNS TERA6G. Is also Principal Investigator of H2020 POLYNICES, H2020 SPRINTER, H2020 TERAWAY, H2020 TERAOPTICS. He has directed more than 8 PhDs, published more than 200 journal papers and conferences. Has received several awards, including the "Heather Williamson Young Investigator Award" in 2000 from the International Society for Optics and Photonics (SPIE), the UC3M Social Council Excellence Award 2009, and the Best European R&D Project Award in 2011 Cooperation of the MadrI+D Foundation. He is RF Photonics chapter coordinator of the IPRS roadmap.

Liesbet Van der Perre is Professor at the department of Electrical Engineering at the KU Leuven in Belgium and a guest Professor at the university of Lunc, Sweden. Dr. Van der Perre was with the nano-electronics research institute imec in Belgium from 1997 till 2015.
Prof. L. Van der Perre's main research interests are in wireless communication and embedded connected systems, with a focus on sustainable solutions. She has (co-)authored over 400 scientific papers and 4 books. She is the scientific coordinator of the European H2020 REINDEER and Horizon Europe SNS-6GTandem projects.

Nuria Llombart (Fellow, IEEE) received the master's degree in electrical engineering and the Ph.D. degree in electromagnetics from the Polytechnic University of Valencia, Valencia, Spain, in 2002 and 2006, respectively. In 2012, she joined the THz Sensing Group, Technical University of Delft, Delft, The Netherlands, where she has been a Full Professor since February 2018. She has coauthored more than 200 journal and international conference contributions in the areas of antennas and terahertz (THz) systems. Dr. Llombart is a Board Member of the IRMMW-THz International Society. In 2019, she became an IEEE Fellow for contributions to millimeter- and submillimeter-wave quasi-optical systems. She was a recipient of the H. A. Wheeler Award for the Best Applications Paper of 2008 in IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION, the 2014 THz Science and Technology Best Paper Award of the IEEE Microwave Theory and Techniques Society, several NASA awards, the 2014 IEEE Antenna and Propagation Society Lot Shafai Mid-Career Distinguished Achievement Award, and the European Research Council Starting Grant in 2015.

Contact: shortcourses-workshops@eucap2025.org