

SW5 - Emerging mm-Wave and sub-THz antenna arrays: recent technological advances and applications

Abstract:

Future 6G networks will rely on millimeter-wave and sub-THz technologies to enable ultra-high-capacity links, joint communication-and-sensing, and new reconfigurable antenna and metasurface paradigms. This workshop brings together leading experts in integrated photonics, gradient and modulated metasurfaces, active and passive phased arrays, THz communications, and emerging measurement methodologies. Together, they will explore breakthroughs enabling scalable, energy-efficient, and high-resolution antenna systems from 90 GHz to 300 GHz and beyond. The workshop will highlight recent results from European research initiatives and discuss open challenges on hardware, system integration, and real-world deployment.

Workshop outline:

The workshop is structured around six invited talks from internationally recognized experts, and brings together results from 7 projects covering key antenna, metasurface, and measurement innovations for mm-wave and sub-THz systems. The session will address novel bonding strategies and on-chip metasurfaces, photonic-enabled phased arrays, gradient and modulated metasurfaces, THz communication hardware and measurements, high-capacity 300-GHz link architectures and ISAC design trade-offs. A concluding open panel will connect hardware, propagation, and system-level perspectives, identifying research challenges for future 6G nodes and sensing platforms.

SW5 - Emerging mm-Wave and sub-THz antenna arrays: recent technological advances and applications

Agenda:

Time	Speaker (Affiliation)	Title
08:00 – 08:15	Antonio Clemente (CEA Leti)	Bridging PCB and III–V Technologies: Novel Bonding Strategies and On-Chip Metasurfaces for D-band Antenna Arrays (TERRAMETA/SYSTERA/FUNTERA)
08:15 – 08:30	Luis Guerrero (UC3M)	Photonic-enabled Broadband Phase Array Antennas Operating in the Millimeter-Wave Range (Tera6G)
08:30 – 08:45	Ronan Sauleau (IETR/Université de Rennes)	Compact Sub-Terahertz Antennas Using Folded Flat Optics
08:45 – 09:00	Guillaume Ducournau (IEMN)	Measurements for THz Communications: Active Devices and RIS (FUNTERA/SYSTERA/TIMES)
09:00 – 09:15	Nuria Llombart (TU Delft)	Towards High Capacity and Efficient Communications Links at 300GHz (TeraGreen)
09:15 – 09:30	M. Sajjad Ahmad (Barkhausen Institut)	ISAC/JCAS, Antenna and Beamforming Challenges, Solutions, and Performance Trade-offs (6G-SENSES/HiCONNECTS)
09:30 – 09:40	Antonio Clemente (CEA Leti)	Wrap-Up and Outlook

SW5 - Emerging mm-Wave and sub-THz antenna arrays: recent technological advances and applications

Speakers:

Antonio Clemente – CEA Leti

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. Dr. Clemente received several awards such as the Young Scientist Award and the Best Paper Award from high-impact international conferences.

Guillermo Carpintero – University Carlos III of Madrid

Prof. Guillermo Carpintero leads the Optoelectronics and Laser Technology Group at UC3M and is a pioneer in integrated microwave photonics and photonic integrated circuits for broadband wireless links. He has coordinated major European projects (FP7/H2020), authored more than 80 journal papers and 250 conference papers, and supervised numerous doctoral theses. His work underpins the spin-off LEAPWAVE Technologies. He is the recipient of several international awards including the SPIE Heather Williamson Young Investigator Award.

David González-Ovejero – University of Rennes / CNRS

Dr. González-Ovejero is a CNRS tenured Researcher at IETR Rennes, working on computational electromagnetics, phased arrays, periodic structures, and metasurfaces for mm-wave/sub-THz antennas. He has held positions in Belgium, Italy, and at NASA JPL. He is the recipient of multiple best-paper awards, a Marie Curie Fellowship, and has served as Associate Editor and Track Editor for IEEE Transactions on Antennas and Propagation and IEEE Transactions on THz Science and Technology.

SW5 - Emerging mm-Wave and sub-THz antenna arrays: recent technological advances and applications

Speakers:

Guillaume Ducournau – University of Lille / IEMN

Prof. Guillaume Ducournau leads the THz wireless communications activity at IEMN, focusing on THz photomixers, electronic receivers, and mm-wave/THz characterization. He has participated in numerous European projects (THOR, TIMES, GRAPH-X, TERAOPTICS) and coordinated major French ANR initiatives. He has authored 250+ publications and received several awards including the 2020 ISAP Best Paper. His work spans THz converters, RIS-related measurements, and beyond-90-GHz building blocks for future xG networks.

Nuria Llombart – TU Delft

Professor Nuria Llombart is a world-leading expert in mm-wave and sub-THz quasi-optical antennas and systems. She has authored 200+ publications, held positions at TNO, JPL, Madrid, and Delft (Full Professor since 2018), and received major IEEE awards including the Lot Shafai Mid-Career Award. She is an IEEE Fellow and Editor-in-Chief of IEEE Transactions on THz Science and Technology. Her research focuses on high-capacity links at 300 GHz and advanced THz antenna architectures.

Ahmad Sajjad – Barkhausen Institut

Dr. Ahmad Sajjad is a Senior Researcher at the Barkhausen Institut, Germany. He specializes in radio communication systems, with prior industrial contributions to automotive, surveillance, and imaging radar platforms, as well as base-station antenna systems for Samsung and Ericsson. His expertise spans 5G MU-MIMO, multi-antenna systems, active/passive arrays, and satellite communications. He has organized and delivered workshops on Joint Communication and Sensing, presented demonstrations at the IEEE Chips and 6G Summit, and is an active IEEE contributor.