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THE FIRST WORKSHOP ON

Beam Engineering for 6G Communications and Sensing Systems

CALL FOR PAPERS

30 MAY - 3 JUNE 2027 | WASHINGTON, DC, USA

SCOPE & MOTIVATION

In the evolution toward sixth-generation (6G) wireless networks, extremely high frequencies (e.g., millimeter-wave and terahertz), extremely large-scale antenna arrays, reconfigurable metasurfaces, and holographic apertures promise ultra-high data rates and centimeter-level sensing. Conventional far-field steering and near-field focusing, however, rely on predefined wavefronts that can be mismatched to the propagation region or intercepted by obstacles, causing severe received-power degradation and limited coverage in complex environments. Beam engineering offers a paradigm shift from conventional beamforming to tailored electromagnetic energy propagation. By shaping aperture amplitude, phase, and polarization, it enables non-diffracting, self-healing, and self-bending wavefronts and extends propagation control beyond conventional straight-line beams. Bessel beams can reconstruct after partial obstruction, while Airy and caustic beams follow prescribed curved trajectories to circumvent obstacles. These properties open opportunities for blockage-resilient and non-line-of-sight links, coverage extension, spatial multiplexing, fine-grained localization, imaging, and integrated sensing and communications.

Despite these benefits, practical beam engineering remains in its infancy. Key challenges include finite-sized apertures, physically realizable bending trajectories, wideband/THz beam squint and dispersion, RF hardware impairments, realistic channel models, and low-overhead acquisition and tracking of unconventional beams, trajectory-domain codebooks, and hardware-efficient transceiver architectures. It is essential to quantify which electromagnetic advantages persist under realistic hardware and bandwidth constraints and to develop experimentally validated system-level designs. The workshop brings together researchers in electromagnetics, antennas, communications, signal processing, sensing, and AI to address these open problems and advance beam-engineered 6G networks.

IMPORTANT DATES

Paper submission	**17 January 2027**
Acceptance notification	**7 March 2027**
Camera-ready	**21 March 2027**

TOPICS OF INTEREST

- Fundamentals and performance limits of beam engineering
- Beam design for bending beams with prescribed trajectories and caustic structures
- Airy, Bessel, Mathieu, Weber, and other structured beam designs with finite-sized arrays
- Beam engineering with metasurfaces, holographic arrays, and reconfigurable antennas
- Channel measurement and modeling for curved links and obstructed scenarios
- Beam trajectory optimization and trajectory-domain codebook design
- Channel estimation, beam training, and beam tracking for beam-engineered wireless systems
- AI/ML and physics-informed learning for beam and trajectory designs
- Holographic beamforming and beam-based MIMO Multiple
- access and interference management with beam engineering
- Beam engineering for blockage avoidance and coverage extension in obstructed environments
- Secure, robust, and resilient communications through beam engineering
- Beam engineering enabled sensing, localization, and imaging
- Integrated sensing and communications with beam engineering
- Beam engineering under hardware impairments Hardware
- design, prototyping, experimental demonstrations, and field tests for beam engineering
- Standardization activities for beam-engineered systems

INVITED KEYNOTE SPEAKERS

Prof. Linglong Dai | Tsinghua University

Prof. Josep Miquel Jornet | Northeastern University

WORKSHOP ORGANIZERS

Prof. Xianghao Yu | City University of Hong Kong

Prof. Angeliki Alexiou | University of Piraeus

Prof. Yasaman Ghasempour | Princeton University

Prof. Chong Han | Shanghai Jiao Tong University

Dr. Xiaofeng Li | Intel Corporation

Prof. Weidong Mei | University of Electronic Science and Technology of China

SUBMISSION LINK: TO BE ANNOUNCED

Contact: alex.yu@cityu.edu.hk

Workshop date: to be confirmed

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