

## IEEE AWPL Special Cluster 2024 on “Electromagnetic Imaging and Sensing: from Innovative Antenna Designs and Processing Algorithms to Advanced Applications”

The use of electromagnetic waves for imaging and sensing applications at microwave, millimeter-wave (mmWave) and terahertz (THz) frequencies is becoming increasingly popular, benefiting from their capability to operate in all-weather conditions and to penetrate certain optically opaque materials. This trend is favored by the development of current and future communications generations and the advances in component technology, which are bringing a new set of opportunities and challenges. Modern antenna and metasurface designs are crucial to enable innovative imaging and sensing applications. Furthermore, advanced processing algorithms (with a robust growth in the adoption of artificial intelligence and machine learning) are also playing a key role for emerging applications.

This special cluster aims to present the latest advances in antennas (including metasurfaces and structures for electromagnetic beamforming), processing techniques and applications in the field of electromagnetic imaging and sensing. The main goal is to present state-of-the-art research conducted in this field and highlight emerging technologies and algorithms upon which the next generation of electromagnetic imaging and sensing systems will be built. Contributions are sought in, but not limited to, the following areas:

- Novel antenna designs for imaging and sensing (including antennas for MIMO systems, electronically scanned antennas, on-chip devices and 3-D printed designs).
- Metasurface apertures and reconfigurable antennas for imaging and sensing (including reconfigurable intelligent surfaces and holographic surfaces).
- Antennas and processing algorithms for computational imaging and compressive sensing.
- Advances in electromagnetic imaging algorithms (deterministic and stochastic inverse scattering algorithms) and techniques to deal with complex conditions (e.g., non-uniform acquisitions, interference, sensing in multilayer media, Doppler processing, etc).
- Artificial intelligence and machine learning techniques related to imaging (including image reconstruction, clutter mitigation, classification, super-resolution).
- Real-time processing techniques and enabling hardware technology (e.g., FPGAs, GPUs and/or parallel computing) for imaging and sensing.
- Near-field and far-field imaging and sensing techniques, including standoff detection, indoor/outdoor positioning and localization.
- Innovative applications and systems in the fields of defense and security, non-destructive testing, biomedical imaging.
- Portable imaging and sensing (e.g., automotive radar, freehand imaging, drone-mounted imaging systems).
- Other emerging applications (e.g., integrated sensing and communications, in-cabin sensing).

The Guest Editors of this Special Cluster are:

- Dr Maria Garcia-Fernandez, Queen’s University Belfast (UK), [m.garcia-fernandez@qub.ac.uk](mailto:m.garcia-fernandez@qub.ac.uk)
- Dr Guillermo Alvarez-Narciandi, Queen’s University Belfast (UK), [g.alvarez-narciandi@qub.ac.uk](mailto:g.alvarez-narciandi@qub.ac.uk)
- Dr Okan Yurduseven, Queen’s University Belfast (UK), [okan.yurduseven@qub.ac.uk](mailto:okan.yurduseven@qub.ac.uk)
- Prof Xiaoming Chen, Zhejiang University (China), [chen\\_xiaoming@zju.edu.cn](mailto:chen_xiaoming@zju.edu.cn)
- Prof Murat Torlak, University of Texas at Dallas (USA), [torlak@utdallas.edu](mailto:torlak@utdallas.edu)
- Prof Tie Jun Cui, Southeast University (China), [tjcu@seu.edu.cn](mailto:tjcu@seu.edu.cn)

Prospective authors are encouraged to contact the Guest Editors for any questions or to determine the suitability of their contribution for this special cluster. Papers should be prepared following the same submission instructions as for regular IEEE AWPL manuscripts (four-pages technical content maximum and one reference page, double-column, IEEE format), available via the [Information for Authors website](#). The authors should indicate in the cover letter to the Editor-in-Chief that the manuscript is being submitted in response to the Call for Papers for this special cluster. Prospective authors should refer to the timeline below for key dates.

### Key dates:

- Submission deadline: **March 31, 2024**
- First decision: May 15, 2024
- Revised manuscripts deadline: June 15, 2024
- Final decision: July 30, 2024
- Final manuscripts due by: September 1, 2024
- Online publication: Shortly after final manuscript submission
- Cluster publication: November (or December) 2024 issue of AWPL