

CALL FOR PAPERS

IEEE Journal of Selected Topics in Signal Processing

Recent Advances in Wideband Signal Processing for Classical and Quantum Synthetic Apertures

Synthetic aperture (SA) systems are deployed in a variety of applications to make high-resolution spatial or temporal measurements with hardware that is inherently capable of much lower resolution. Examples include synthetic aperture radar (SAR), holographic cameras in optics, channel sounders in 5G communications or 6G channel sensing, magnetic resonance imaging (MRI), distributed radio telescopes in astronomy and many more. While the size of the synthetic aperture will ultimately determine angle resolution performance, it is the system bandwidth that determines delay resolution and not all synthetic apertures are created equal with respect to bandwidth. The bandwidth capabilities of synthetic apertures are grouped into the following four categories of interest for the purposes of this special issue: 1) instantaneously wideband system; 2) synthetic apertures that synthesize wide bandwidths from many discrete and instantaneously narrowband signals; 3) synthetic apertures that operate over several contiguous but disjoint frequency bands; and 4) synthetic apertures that have no inherent bandwidth but can still implement delay estimation using image reconstruction techniques or inverse problem solutions and machine learning. We would like to solicit high-quality manuscripts that describe new engineering or theoretical approaches that exploit bandwidth in classical synthetic apertures, or that compensate for the lack of available bandwidth, as well as new approaches describing spatial or temporal super-resolution techniques for quantum synthetic apertures. Topics of interest include but are not limited to:

- Quantum apertures and arrays based on atomic sensors that measure electric fields
- Wideband automotive SAR, mmWave and THz SAR, Wideband polarimetric SAR
- Fourier ptychography
- Wideband over-the-air calibration using SAs
- Light-field imaging and computational imaging techniques for optical SAs
- Depth estimation in optical images using machine learning
- Tensor processing for high-dimensional, wideband, synthetic-aperture data
- Hardware de-embedding approaches for wideband signal regimes
- Wideband inverse problems, deconvolution, denoising, and image reconstruction
- Wideband interference cancelation and uncertainty analysis for SAs
- Wideband experimental demonstrations and prototypes
- Broadband reconfigurable metasurfaces
- Wideband synthetic aperture sonar and ultrasonics/ultrasound
- Synthetic aperture magnetometry, MRI, CT, k-space image reconstruction
- Quantum information engineering for super-resolution in SAR

We also welcome creative papers outside the areas listed above but related to the overall scope of the special issue. Prospective authors can contact the Guest Editors to ascertain interest on topics that are not listed and should visit <http://www.signalprocessingsociety.org/publications/periodicals/jstsp/> for information on paper submission. Manuscripts should be submitted using the Manuscript Central system at <http://mc.manuscriptcentral.com/jstsp-ieee> and will be peer-reviewed according to the standard IEEE process.

Important Dates

Submissions due: 4/15/22

First review due: 7/01/22

Revised manuscript due: 8/01/22

Second review due: 9/15/22

Final manuscript due: 11/01/22

Publication date: 1/23

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