

## IEEE AWPL Special Cluster 2020 on “Space-Time Modulated Antennas and Materials”

The use of the time dimension as an additional variable to control the radiation characteristics of antennas has been known for over half a century. The pioneering works on 4D antennas and time-modulated arrays (*TMA*s) in the 1960ies have demonstrated the possibility of efficiently controlling and radiating multiple harmonics, each associated with a different spatial frequency. Despite promising features, *TMA*s did not substantially evolve thereafter, until the beginning of the new millennium. The driving factors of this renewed interest have been the ever-growing demand for lower cost and higher throughputs, as well as the attention towards new antenna systems providing unconventional radiation features. From the technological viewpoint, the availability of fast, robust, efficient, low-noise, and cheap radio-frequency switches and the diffusion of advanced optimization algorithms for electromagnetic engineering have played a key role. On a parallel line, metamaterials (*MTM*s) have emerged as a powerful paradigm in modern science and technology over the past twenty years. Although they have already led to uncountable research innovations, their study has been mainly limited to analyze the propagation, scattering, and radiation effects with exclusively spatial medium variations. The time variance as a systematic extra level of control has been introduced only recently into *MTM*s. Spacetime modulated metamaterials and metasurfaces are artificial materials whose constitutive parameters, typically the permittivity, are modulated in both space and time. They represent a promising emerging technology, currently at an embryonic stage but with great potential for antennas and propagation applications.

The aim of this special cluster issue is to highlight the recent developments, advances, and new frontiers in the framework of space-time modulated antennas and materials, to showcase their potential applications to antennas and propagation problems as well as to increase their visibility within the electromagnetic community.

This focused cluster of papers will consider the latest in research in, but not limited to, the following areas:

- Theoretical advances on spacetime-modulated antennas and materials.
- Spacetime-modulated metamaterials and metasurfaces: new topologies/analysis/design.
- Time-modulated antennas and arrays: new architectures/synthesis/control.
- Innovative programmable and digital metasurfaces and metamaterials.
- Novel solutions and devices for the spatio-temporal control of EM waves (from RF to light).
- Time-domain array signal processing and beam-forming techniques.
- New applications of spacetime-modulated antennas and materials.

The guest editors of this focused cluster are:

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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 (<http://awpl.eleceng.adelaide.edu.au/authors.htm>). 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 the focused cluster. Prospective authors should refer to the timeline below for key dates. The publication charges will be at the standard rates for AWPL.

### Key dates:

- Submission deadline: March 31, 2020
- First decision: May 15, 2020
- Revised manuscripts deadline: June 15, 2020
- Final decision: July 30, 2020
- Final manuscripts due by: September 1, 2020
- Online publication: shortly after final manuscript submission
- Cluster publication: November 2020 issue of AWPL