

## Special Issue on Physics-Driven Machine Learning for Computational Imaging

Recent years have witnessed a rapidly growing interest in next-generation imaging systems and their combination with machine learning. While model-based imaging schemes that incorporate physics-based forward models, noise models, and image priors laid the foundation in the emerging field of computational sensing and imaging, recent advances in machine learning, from large-scale optimization to building deep neural networks, are increasingly being applied in modern computational imaging. A wide range of machine learning techniques can be applied to enhance the effectiveness and efficiency of computational imaging systems, thus redefining the state-of-the-art computational imaging algorithms. On the other hand, different from image restoration problems, computational imaging involves physics-based imaging processes, physics-based properties of underlying data (e.g., characterized by partial differential equations or PDEs), and domain knowledge, which need to be exploited and combined with various data-driven approaches to benefit applications from sensing to image reconstruction. There are compelling challenges for such interdisciplinary research that remain to be addressed, ranging from learning theory to imaging applications. This special issue invites tutorial on recent works on novel imaging pipelines such as smart imaging system design, machine learning and related methods, and task and data-driven imaging system hardware and algorithm design that are tightly combined with imaging physics. Besides, this special issue will promote recent works on learning theory for computational imaging, including performance guarantees, convergence analysis, learning model analysis, etc., which are critical for reliable and interpretable computational imaging systems.

### Topics of interest include but are not limited to:

- Novel Learning-Driven Computational Imaging Systems
- Learning-based Modeling and Algorithms for Imaging
- Learning Theory for Computational Imaging
- Computational Imaging Applications
- Ethics and Social Impacts of Learning for Computational Imaging

### Important Dates

White paper due (extended): 8 December 2021

Invitation notification: 1 January 2021

Full manuscripts due: 1 March 2022

First review to authors: 1 May 2022

Revision due: 1 July 2022

Second review completed: 1 September, 2022

Final manuscript due: 1 October 2022

Publication: 1 January 2023

### White papers are required, and full articles will be invited

**based on the review of white papers.** The white paper format is up to 4 pages in length, including the proposed article title, motivation and significance of the topic, an outline of the proposed paper, and representative references. An author list with contact information and short bios should also be included. Submitted articles must be of tutorial/overview/survey nature, in an accessible style to a broad audience, and have a significant relevance to the scope of the Special Issue. Submissions should not have been published or be under review elsewhere, and should be made online at <https://mc.manuscriptcentral.com/sps-ieee>. For submission guidelines, see the Information for Authors at <https://signalprocessingsociety.org/publications-resources/ieee-signal-processing-magazine/information-authors-spm>.

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