

## Scientific and Physics-Informed Machine Learning for Industrial Applications

**Theme:** Nowadays, Scientific Machine Learning (SciML) is revolutionizing the academic and industrial world like a storm. It combines traditional scientific mechanistic modelling (differential equations) with the machine and deep learning methodologies. As it is well known, traditional Deep Learning suffers some issues like interpretability and enforcing physical constraints; combining such methodologies with numerical analysis and differential equations can bring to a new field of research through new methods, architectures and algorithms. SciML techniques aim to overcome the classical barriers of the data-driven approaches like (i) the significant amount of data required from data-driven models to identify and interpret events/signals, (ii) the generation and collection of data often not fitting the purpose. It can be stated that incorporating physical models will bring us many benefits to the machine learning approaches. By deeply looking at the industrial scenario, if we consider the manufacturing task, SciML is about applying physical principles and laws to process materials into useful products. Furthermore, a neural network cannot predict very rarely faults of a wind turbine; we need to include physical laws into the models to extrapolate trends. In this way, we can put machines to maximum efficiency.

**This special section will focus on (but not limited to) the following topics:**

- Physics-Informed Learning for Industry
- Theoretical Aspects of Scientific and Physics-informed learning for Industry
- Hybrid techniques for Scientific Machine Learning in Industry
- Applications of Scientific Machine Learning in Industry
- Quantum-based Machine Learning for Industrial context
- Scientific Machine Learning for multi-scale modelling in Industry
- Physics-based numerical simulations for Industry

### Manuscript Preparation and Submission

Follow the guidelines in “Information for Authors” in the IEEE Transaction on Industrial Informatics <http://www.ieee-ies.org/pubs/transactions-on-industrial-informatics> . Please submit your manuscript in electronic form through Manuscript Central web site: <https://mc.manuscriptcentral.com/tii> . On the submitting page #1 in popup menu of manuscript type, select: SS on **Scientific and Physics-Informed Machine Learning for Industrial Applications**

Submissions to this Special Section must represent original material that has been neither submitted to, nor published in, any other journal. Regular manuscript length is 8 pages.

**Note:** The recommended papers for the section are subject to final approval by the Editor-in-Chief. Some papers may be published outside the special section, at the EIC discretion.

<b>Timetable:</b>	<b>Deadline for manuscript submissions</b>	<b>April 30, 2022 (Extended to Jun. 30, 2022)</b>
	Expected publication date (tentative)	October 2022

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