FONDAZIONE BRUNO KESSLER

ECT*
EUROPEAN CENTRE
FOR THEORETICAL STUDIES
IN NUCLEAR PHYSICS AND RELATED AREAS

WORKSHOP

Many-Body Quantum Physics with Machine Learning

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Abstract

Machine learning techniques have become standard scientific tools across several fields. Quantum many-body theory is no exception, with a recent explosion of applications in domains that range from spin systems, to quantum chemistry and nuclear physics. This workshop is devoted to discussing machine-learning tools that aim at directly solving the Schrödinger equation in a many-particle context. These tools typically exploit the outstanding variational properties of neural networks, including first- and second-quantized versions. We aim at bringing together quantum many-body practitioners, within and outside the nuclear domain, and physics-focused machine learning experts, to review past achievements and recent advances in solving quantum many-body problems with machine learning tools. By bringing together different communities, we want to take a global look at the state-of-the-art in the field; to identify new avenues and recent meaningful advances; and to stimulate cross-fertilisation among fields to consolidate the use of machine-learning tools in the many-body domain.

Organizers

Arnau **Rios Huguet** (University of Barcelona), Giuseppe **Carleo** (EPFL Switzerland), Estelle **Inack** (Perimeter Institute for Theoretical Physics & yiyaniQ Inc., Canada), Alessandro **Lovato** (ANL, USA)

Speakers

A. **Azzam** (University of Barcelona), C. **Barbieri** (Milan University), M. **Drissi** (TRIUMF), B. **Fore** (ANL), C. **Giuliani** (EPFL), M. **Holzmann** (LPMMC, CNRS & UGA Grenoble), J. **Keeble** (University of Surrey), D. **Linteau** (EPFL), E. **Parnes** (Hebrew University of Jerusalem), D. **Pfau** (Google DeepMind), S. **Pilati** (University of Camerino), P. **Pérez-Fernandez** (Universidad de Sevilla), A. **Rios Huguet** (University of Barcelona), J. **Rozalén** (University of Barcelona), A. **Saiz-Castillo** (Universidad de Sevilla), A. **Sinibaldi** (EPFL), F. **Vicentini** (Ecole Polytechnique Paris)

Director of ECT*: Professor Gert Aarts

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