

Machine Learning – 2025
Machine Learning Methods for Complex and Quantum Systems
Scientific Program

Timeline of each talk: 25' talk + 5' discussion.

European Central Time zone (Italian time), GMT +2

Venue: Polo Informatico “Carla Lodovici” B, Via Madonna delle Carceri, 7, Science Campus, University of Camerino .

Wednesday 4 June (14:30 to 18:30)

13:00-14:30 Welcome reception with light lunch

14:30-15:00 Opening

Graziano Leoni, Rector of the University of Camerino, Italy

Michele Loreti, Director of the School of Advanced Studies and Steering Committee member, University of Camerino, Italy

Gianni Sagratini, Director of the School of Pharmacy, University of Camerino, Italy

David Vitali, Director of the School of Science and Technology, University of Camerino, Italy

Rita Bissoonauth, UNESCO Liaison Office of the African Union, Addis Ababa, Ethiopia

Address from the Scientific Committee

15:00-16:00 **Plenary + Introduction** Alfio Quarteroni, Professor Emeritus – Politecnico di Milano, Italy and EPFL - École Polytechnique Fédérale de Lausanne , Switzerland.

Scientific Machine Learning: Bridging Artificial Intelligence and Fundamental Sciences.
Introduction by Lorella Fatone, University of Camerino, Italy

16:00-16:30: Gianluca Lagnese, Jožef Stefan Institute, Ljubljana, Slovenia

Positive Operator Valued Measures Neural Networks for simulation of light-matter coupled systems

16:30-17:00: Pere Mujal, ICFO - The Institute of Photonic Sciences, Spain

Harnessing quantum back-action for time-series processing

17:00-17:30 – Drink and Snack Break

17:30-18:00: Francesco Zamponi, "Sapienza" University of Rome, Italy

Neural Network architectures for efficient sampling of statistical physics models

18:00-18:30: Adriano Barra, "Sapienza" University of Rome, Italy

Shallow Neural Networks: artificial vs biological and distributed vs selective paradigms.

Thursday 5 June (09:30 to 19:00)

09:30-10:00: Rita Bissoonauth, UNESCO Liaison Office of the African Union, Addis Ababa, Ethiopia

The African Union Continental Strategy on AI, with a focus on the implications of AI in higher education and science.

10:00-10:30: Marcin Płodzień, ICFO - The Institute of Photonic Sciences, Spain

Enhancing quantum state tomography via resource-efficient attention-based neural networks

10:30-11:00 Giuseppe A. Falci, University of Catania and INFN - Catania section, Italy
Noise Classification in small Quantum Networks by Supervised Learning: time, space and energy correlation.

11:00-11:30 – Coffee Break

11:30-12:00: Marco Gori, Siena Artificial Intelligence Lab, University of Siena, Italy
An introduction to Cognidynamics

12:00-12:30: Stefano Melacci, Siena Artificial Intelligence Lab, University of Siena, Italy
Collectionless AI: The UNaIVERSE Project

12:30-13:00: Grant Rotskoff, Stanford University, USA
Two Approaches to Molecular Representation Learning

13:00-14:30 – Lunch Break

14:30-15:00: Nicola Lo Gullo, University of Calabria, Italy
Predicting fermionic densities using a Projected Quantum Kernel method

15:00-15:30: Jan A. Krzywda, Leiden University, the Netherlands
Reinforcement Learning for Adaptive Qubit Control

15:30-16:00: Alexander Kordyuk, Kyiv Academic University, Ukraine and IFW-Dresden, Germany
Unraveling Electron Interaction Mechanisms in Photoemission Spectra with Machine Learning

16:00-16:30 – Drink and Snack Break

16:30-17:00: Andrea Della Valle, University of Camerino, Italy
Machine learning recognition of Volatile Organic Compounds absorption spectra based on experimental and synthetic data

17:00-17:30: Flavio Gerosa, University of Camerino, Italy
Spatio-temporal Graph Neural Networks for DAM prices forecasting

17:30-19:00 – Poster session

20:00 - Conference dinner at Villa Fornari Hotel (<https://www.villaforinari.it/>)

Friday 6 June (09:30 to 16:30)

09:30-10:00: Samuel Partey, UNESCO Regional Bureau for Science and Culture in Europe
Machine learning and quantum frontiers: A multilateral approach to responsible innovation

10:00-10:30: Christopher Gies, University of Oldenburg, Germany
Open quantum systems as a platform for quantum machine learning

10:30-11:00: Alessandro Lovato, Argonne National Laboratory, USA
Variational Learning Quantum Wave Functions

11:00-11:30 Coffee Break

11:30-12:00: Estelle Maeve Inack, Perimeter Institute for Theoretical Physics, Waterloo, Canada
Variational Neural Annealing: Optimization in Physics, Biology, and Finance

12:00-12:30: Arnau Rios, University of Barcelona, Spain
Neural quantum states for one-dimensional & spin many-body systems

12:30-13:00: Marica Magagnini, University of Camerino, Italy
Understanding Machine Learning Decisions: Counterfactual Explanations for the k-Nearest Neighborhood Rule

13:00-14:30 – Lunch Break

14:30-15:00: Zoltán Zimborás. Algorithmiq Ltd, Finland and HUN-REN Wigner Research Centre for Physics, Budapest, Hungary

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15:00-15:30: Emanuele Costa, University of Barcelona, Spain
A Quantum Annealing Protocol to Solve the Nuclear Shell Model

15:30-16:00: Haichen Wang, Ruhr University Bochum, Germany
A non-orthogonal representation of the chemical space

16:00- 16:30 – Closing Remarks

Poster Session

Gabriele Belegni, University of Camerino, Italy
Denoising Diffusion Probabilistic Models for DAM Prices Forecasting

Luca Brodoloni, University of Camerino, Italy
Neural quantum Monte Carlo algorithms for quantum simulators

Simone Cantori, University of Camerino, Italy
Synergy between noisy quantum computers and scalable classical deep learning for quantum error mitigation

Andrea Della Valle, University of Camerino, Italy
Graph neural network for social behavioral analysis in rodents

Alessio Mancini, University of Camerino, Italy
Machine Learning Models for Predicting Multidrug-Resistant Infections and Identifying Features in Retained Introns.

Leonardo Mogianesi, University of Camerino and national doctorate LESDIT, Italy
Metahuman Tutor: An Inclusive and Customizable Virtual Assistant for University Education

Mateusz Molenda, Institute of Physics, Polish Academy of Sciences, Warszawa, Poland
Efficient tools for quantum nonlinear sensing with photodetection

Rosanna Mosetti, "Sapienza" University of Rome, Italy
Mid-Infrared Classification for post-consumer plastics combining Infrared spectroscopy and open-source data mining

Claudia Germoni, Rebecca Pettinari, Beatrice Fusini, University of Camerino, Italy
Probabilistic Forecasting of Corporate Time Series