

**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 .

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**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.*

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**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.villaifornari.it/>)**

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**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 Maeva 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

*TBA*

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**

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**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*