

# High Performance Computing and Quantum Computing – Seventh Edition

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HPCQC Organizing Committee

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*Day One: 12/12/2024*

## **09:30 – 10:30 Registration**

- 10:30 – 10:45 Sanzio Bassini – CINECA  
*Welcome*
- 10:45 – 11:30 Ivano Tavernelli – IBM Quantum  
Keynote – *Quantum computing in the utility era*
- 11:30 – 11:50 Daniele Ottaviani – CINECA  
*Quantum Computing Lab Update*

Session 1: CINECA partners for Quantum Computing – Chairperson: Daniele Ottaviani

- 11:50 – 12:15 Hermanni Heimonen – IQM  
*IQM Radiance – the quantum computer for HPC centers*
- 12:15 – 12:40 Vincent Martin – Pasqal  
*Presentation of Pasqal quantum computer: from neutral atoms to use cases*
- 12:40 – 13:05 Axel Daian – D-Wave  
*Quantum Computing for Practical Applications*

## **13:05 – 15:00 Lunch + Tour of the Technopole**

Session 2: QC Made in Italy I – Chairperson: Sara Marzella

- 15:00 – 15:25 Giacomo Cappellini – EniQuantic  
*TBD*
- 15:25 – 15:50 Francesco Tafuri – University of Naples Federico II  
*Superconducting hardware of a quantum computer: physics, implementation, operation and perspectives*
- 15:50 – 16:15 Simone Cialdi – University of Milan  
*TQ4C - a loop-architecture photonic quantum computer*

## **16:15 – 16:35 Coffee Break**

Session 3: QC Made in Italy II – Chairperson: Anita Camillini

- 16:35 – 17:00 Roberto Osellame – Ephos Inc./CNR  
*Integrated quantum photonic processors, a path toward a photonic quantum computer*
- 17:00 – 17:25 Fabio Sciarrino – University of Rome “Sapienza”  
*Photonics platform for quantum computing: hardware and applications*
- 17:25 – 17:50 Roberto Siagri – Rotonium  
*Edge-Centric Quantum Computing: The Next Frontier*

## Day Two: 13/12/2024

### Session 4: Universities and Research Centers I – Chairperson: Enrico Prati

- 09:30 – 09:50 Lorenzo Pisani – CRS4  
*Vehicle Routing Problems (VRP) for urban transport applications solved by means of adiabatic quantum computers*
- 09:50 – 10:15 Domenico Bonanni – University of L'Aquila  
*Molecular Structure Generation and Docking with Quantum Computing*
- 10:15 – 10:50 Rebecca Casati – University of Milan  
*Adiabatic Quantum Computing and Hybrid quantum-classical methods for Job Shop Scheduling problems*
- 10:50 – 11:10 Coffee Break**
- 11:10 – 11:35 Antonio Policicchio – NTT DATA  
*Application of variational circuits to a Soft Actor-Critic framework for continuous control tasks*
- 11:35 – 12:00 Elisabetta Boella – E4  
*SmartHPC.QC: evaluating the impact of malleability for HPC-QC integration*
- 12:00 – 12:25 Vito Palmisano – CINECA/ParTec  
*High-Performance Quantum Emulation: Benchmarking Statevector and Tensor Network Emulators on Leonardo and Introducing QMatchaTEA's Capabilities*
- 12:25 – 12:50 Francesco Monzani – University of Milan  
*Leveraging non-unital noise for gate-based quantum reservoir computing*
- 12:50 – 14:00 Lunch**

### Session 5: Universities and Research Centers II – Chairperson: Paolo Zentilini

- 14:00 – 14:25 Francesco Turro – Leonardo Labs  
*Solving Fluid dynamics on a quantum computer*
- 14:25 – 14:50 Leonardo Guidoni – University of L'Aquila  
*Quantum Information and State preparation in Quantum Chemistry*
- 14:50 – 15:10 Michele Vischi – University of Trieste  
*Simulating photonic devices with noisy optical elements*
- 15:10 – 15:35 Giorgio Panichi – University of Milan  
*Embodiment of quantum physics informed neural networks to solve differential equation over a continuous-wave quantum computer*
- 15:35 – 15:55 Emiliano Poli – University of Padua  
*Performance assessment of different Variational Quantum Eigensolver algorithms via Matrix Product States powered quantum computer emulator*
- 15:55 – 16:15 Coffee Break**

### Session 6: Universities and Research Centers III – Chairperson: Luca Nigro

- 16:15 – 16:40 Paolo Zentilini – University of Milan  
*Emulation of QAOA via graph neural networks*
- 16:40 – 17:00 Federico Gallina – University of Padua  
*Simulating Non-Markovian Dynamics in Multidimensional Electronic Spectroscopy via Quantum Algorithm*
- 17:00 – 17:20 Domenico Del Prete – University of Naples Federico II  
*An Interoperability Middleware between Two Computing Universes: HPC and Quantum Computing (HPC-QC)*
- 17:20 – 17:40 Gianluca Teza – Max Planck Institute for the Physics of Complex Systems  
*Finite temperature criticality in a quantum annealer*
- 17:40 – 18:00 Marco De Pascale – LRZ  
*TBD*

