High Performance Computing and Quantum Computing – Sixth Edition

Daniele Ottaviani[1], Enrico Prati[2], Riccardo Mengoni[1], Gabriella Bettonte[1], Sara Marzella[1]

HPCQC Organizing Committee

Local Organizers: Christian Fiori[1]

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Day One: 14/12/2023

09:30 – 10:30 Registration

10:30 – 10:45 Welcome

10:45 – 11:30 David DiVincenzo – JSC
Engineering the Quantum Computer

Session 1: European and Italian initiatives – Chairperson Daniele Ottaviani

11:30 – 12:00 Sabine Mehr – GENCI
EUROQHPC-I: European prospects for HPC-QC integration
12:00 – 12:30 Simone Montangero – University of Padova
Quantum Computing activities of the National Center - Fondazione ICSC

12:30 – 14:00 Lunch

Session 2: Building quantum computers – Chairperson: Riccardo Mengoni

14:00 – 14:25 Federico Mattei – IBM
IBM Quantum Computing: new steps towards quantum advantage
14:25 – 14:50 Andy Mason - D-Wave
Production Use Cases
14:50 – 15:15 Krisztian Benyo – Pasqal
How to get tangible results with a PASQAL machine today

15:15 – 15:45 Coffee Break

Session 3: Hybrid HPC-QC software and Quantum Start-ups – Chairperson: Sara Marzella

15:45 – 16:10 Julien Mellaerts – ATOS
Towards an High Performance Hybrid Computing
16:10 – 16:35 Esperanza Cuenca Gómez, Nvidia
Programming Quantum-Accelerated Supercomputers with CUDA Quantum
16:35 – 16:50 Guido Masella – Qperfect
Large scale quantum for everyone
16:50 – 17:05 Marco Arzeo – SeeQC
Chips-based Quantum Computing for better integration with High-Performance Computing

Day Two: 15/12/2023

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

09:30 – 09:45 Amer Delilbasic – Forschungszentum Jülich / University of Iceland
Quantum Computing for Earth Observation (QC4EO) Study
09:45 – 10:00 Gonzalo Ferro – CESGA
The NEASQC Benchmark Suite (TNBS)
10:00 – 10:30 Marco Govoni – University of Modena and Reggio Emilia
Simulating condensed systems on quantum computers with quantum embedding

10:30 – 11:00 Coffee Break

11:00 – 11:15 Matteo Flocco – LINKS Foundation/Polytechnic University of Turin
Solving Graph Coloring with 256 qubit neutral atoms platform
11:15 – 11:30 Sebastiano Corli – UniMi
A Max K-Cut Implementation for QAOA: comparing HPC simulation of gate-based and measurement-based quantum computing architectures
11:30 – 11:45 Manuel Peracci – Polytechnic University of Milan
Neutral atom quantum computing scheduling by deep reinforcement learning
11:45 – 12:00 Simone Tibaldi – University of Bologna
Bayesian Optimization for QAOA
12:00 – 12:30 Leonardo Guidoni – University of L'Aquila
Low-depth Variational algorithms for Chemistry
12:30 – 12:45 Filippo Caruso – University of Florence
Machine learning based noise characterization and correction on neutral atoms NISQ devices
12:45 – 13:00 Luca Asproni – Data Reply; Christian Mattia – Intesa Sanpaolo
Diversifying Investments and Maximizing Sharpe Ratio: a novel QUBO formulation

13:00 – 14:00 Lunch

Session 4: Universities and Research Centers II – chairperson: Gabriella Bettonte

14:00 – 14:15 Filippo Orazi – University of Bologna
Hybrid Quantum Technologies for Quantum Support Vector Machines
14:15 – 14:30 Matteo Vandelli – Leonardo S.p.a.
Challenges to gate-based quantum optimization algorithms for industrial use-cases
14:30 – 14:45 Gabriele Cenedese – University of Insubria & INFN Milano
Targeting quantum many-body scars with shallow variational quantum circuits
14:45 – 15:00 Luca Nigro – University of Milan
Application of hybrid quantum-classical computing algorithms for quantum simulation of nuclear physics processes
15:00 – 15:15 Tommaso Fioravanti – IBM
Towards An End-To-End Approach For Quantum Principal Component Analysis
15:15 – 15:30 Giuliana Siddi Moreau – CRS4
Two quantum adiabatic optimization use cases for the energy sector
15:30 – 15:45 Marco De Pascale – LRZ
Upscaling QC simulators on HPC Systems