Quantum Computing and High Performance Computing

CINECA 18 Dicembre 2018 – Casalecchio di Reno (BO)

Organizers: *Stefano Carretta (Uniparma), Carlo Cavazzoni (CINECA), Rosa Di Felice (CNR-Modena), Leonardo Guidoni (Univaq), Chiara Macchiavello (Unipv)*
Local Organizers: *Francesco Benfenati (Univaq), Daniele Ottaviani (CINECA)*

Program

10:00-10:20 **Registration**

10:20-10:30 **Welcome** (Organizers)

10:30-11:30 *Hardware: Quantum Computers and Quantum Simulators*

- **Quantum Computing for the Real World Today**
  Andy Mason (D-Wave)
- **IBM Q: quantum computers for research and business**
  Federico Mattei (IBM-Italia)
- **Atos Quantum Learning Machine**
  Ivano Pullano (Atos-Italia)

11:30-11:50 Coffee Break

11:50-12:50 *Quantum Machine Learning and Quantum Internet*

- **Quantum Machine Learning of Quantum properties**
  Vittorio Giovannetti (Scuola Normale Superiore di Pisa)
- **An artificial neuron model implemented on the IBM quantum processor**
  Dario Gerace (Università di Pavia)
- **Towards the Quantum Internet: a multidisciplinary effort**
  Carlo Forestiere (Università di Napoli Federico II)

12:50-14:00 Lunch

14:00-15:00 *Applications on Quantum Annealers*

- **Application of D-Wave Two X to machine learning on protein-DNA binding data**
  Rosa Di Felice (CNR - Center S3 - Modena)
- **QUBO formulation for the job shop scheduling**
  Davide Caputo (Data Reply)
- **Quantum Annealing with continuous variables: an application to Matrix Factorization**
  Daniele Ottaviani (CINECA)

15:00-15:20 Coffee Break

15:20-16:20 *Applications in Physical Sciences*

- **Quantum computing and its applications in chemistry and physics**
  Ivano Tavernelli (IBM-Zurigo)
- **Quantum Simulation of spin models on IBM Quantum Computers**
  Stefano Carretta (Università di Parma)
- **Quantum simulations of lattice gauge theories**
  Simone Montangero (Università di Padova)

16:20-17:20 **Round Table Discussion**
Stefano Carretta (Uniparma), Carlo Cavazzoni (CINECA), Rosa Di Felice (CNR-Modena), Leonardo Guidoni (Univaq), Chiara Macchiavello (Unipv), Simone Montangero (Unipd), Fabio Sciarrino (UniSapienza)

Link to workshop web page (eventi.cineca.it): https://goo.gl/RL3jZw
The workshop has no registration fee but, because of limitations of the lecture hall **reservation is mandatory** through the website. The entire event will be also broadcasted in live streaming.