Workshop on Quantum Artificial Intelligence

27-28 July 2023

Technical Program

The schedule is given in Central European Summer Time (CEST - UTC+02 ROME - ITALY)

Thursday 27 July 2023	
9:00 – 9:30	QAI 2023 - Opening
9:30 – 10:30	**Keynote Talk** *Quantum machine learning: technology and applications in the natural sciences and beyond* Speaker: Francesco Tacchino, IBM Research, Zurich, Switzerland
11:00 – 12:00	**Keynote Talk** *Training quantum machine learning models at scale* Speaker: Amira Abbas, University of Amsterdam, Netherlands
12:00 – 13:00	**Keynote Talk** *Figure of merit for quantum machine learning tasks: explicit and implicit models and losses* Speaker: Michele Grossi, CERN, Geneve, Switzerland
14:00 – 16:00	**Session I: *Quantum Machine Learning*** *Chair: Michele Grossi (CERN)* *14:00 – 14:20 "Using quantum supervised and unsupervised learning for binary classification in online setting"* Authors: Corrado Loglisci (Universita degli Studi di Bari "Aldo Moro"); Donato Malerba (Università degli Studi di Bari Aldo Moro) Speaker: *Corrado Loglisci* *14:20 – 14:40 "Implementation of Markov Decision Processes into quantum algorithms for reinforcement learning"* Authors: Manuel P. Cuellar (University of Granada) Speaker: *Manuel P. Cuellar* *14:40 – 15:00 "Parametrized quantum circuits for anomaly detection and generative tasks"* Authors: Stefano Giagu (Sapienza Università di Roma and INFN); Simone Bordoni (Sapienza Università di Roma and Technology Innovation Institute Abd Dhabi); Andrea Cacioppo (Sapienza Università di Roma); Lorenzo Colantonio (Sapienza Università di Roma) Speaker: *Stefano Giagu* *15:00 – 15:20 "Quantum Based Outlier Detection"* Authors: Anna Bernasconi (University of Pisa, Italy); Alessandro Berti (University of Pisa); Gianna Del Corso (University of Pisa); Alessandro Poggiali (University of Pisa) Speaker: *Alessandro Berti* *15:20 – 15:40 "Latent Style-based Quantum GAN for Image Generation"* Authors: Su Yeon Chang (CERN); Michele Grossi (CERN); Bertrand Le Saux (European Space Agency (ESA)); Sofia Vallecorsa (CERN) Speaker: *Michele Grossi* *15:40 – 16:00 "Unconventional Chemical Contributions to Quantum Artificial Intelligence"* Authors: Pier Luigi Gentili (Università degli Studi di Perugia) Speaker: *Pier Luigi Gentili*

16:30 – 18:30	**Session II: *Quantum Optimization*** *Chair: Autilia Vitiello (University of Naples Federico II)* *16:30 – 16:50 "Quantum Annealing for Constraint Satisfaction and Constrained Optimization Problems"* Authors: Philippe Codognet (JFLI) Speaker: *Philippe Codognet* *16:50 – 17:10 "A preliminary study on Genome Assembly using Quantum Annealing"* Authors: Carlos Cano (University of Granada) Speaker: *Carlos Cano* *17:10 – 17:30 "Quantum Algorithms for WMC, MPE and MAP"* Authors: Fabrizio Riguzzi (University of Ferrara) Speaker: *Fabrizio Riguzzi* *17:30 – 17:50 "Encoding Extension-based Problems in Argumentation to QUBO"* Authors: Marco Baioletti (University of Perugia); Francesco Santini (University of Perugia) Speaker: *Marco Baioletti* *17:50 – 18:10 "A Quantum Evolutionary Strategy for Optimisation Problems"* Authors: Vincenzo Lipardi (Maastricht University); Roberto Schiattarella (University of Naples Federico II); Giovanni Acampora (University of Naples Federico II) Speaker: *Vincenzo Lipardi* *18:10 – 18:30 "Application of Quantum Genetic Algorithms to Network Signal Setting Design"* Authors: Giovanni Acampora (University of Naples Federico II); Angela Chiatto (University of Naples Federico II); Stefano De Luca (University of Salerno): Roberta Di Pace (University of Salerno); Alfredo Massa (QuantumNet); Roberto Schiattarella (University of Naples Federico II); Autilia Vitiello (University of Naples Federico II) Speaker: *Alfredo Massa*
Friday 28 July 2023	
9:30 – 10:30	**Keynote Talk** *Title to be Announced* Speaker: Antonio Mezzacapo, IBM Research, New York, USA
11:00 – 12:00	**Keynote Talk** *Quantum Annealers for Computational Intelligence* Speaker: Amir Pourabdollah, Nottingham Trent University, United Kingdom
12:00 – 13:00	**Keynote Talk** *Quantum Evolutionary Algorithms* Speaker: Giovanni Acampora, University of Naples Federico II, Italy
14:00 – 16:00	**Session III: *Quantum Computing and Computational Intelligence*** *Chair: Giovanni Acampora (University of Naples Federico II)* *14:00 – 14:20 "Continuous Variable Quantum Physics-Informed Neural Networks"* Authors: Stefano Markidis (KTH) Speaker: *Stefano Markidis* *14:20 – 14:40 "Quantum optimization of Binary Neural Networks"* Authors: Pietro Torta (SISSA); Guglielmo Lami (SISSA) Speaker: *Pietro Torta* *14:40 – 15:00 "Compiling Quantum Circuits for the Graph Coloring Problem"*

	Authors: Angelo Oddi (ISTC-CNR); Riccardo Rasconi (CNR); Marco Baioletti (University of Perugia) Speaker: *Angelo Oddi* *15:00 – 15:20 "Multi-class classification based on quantum state discrimination"* Authors: Roberto Giuntini (University of cagliari); Giuseppe Sergioli (University of Cagliari) Speaker: *Giuseppe Sergioli* *15:20 – 15:40 "Quantum Fuzzy Inference Engine for Particle Accelerators Control"* Authors: Roberto Schiattarella (University of Naples Federico II); Giovanni Acampora (University of Naples Federico II); Michele Grossi (CERN); Michael Schenk (CERN) Speaker: *Roberto Schiattarella* *15:40 – 16:00 "Genetic Algorithms as Classical Optimizer for the Quantum Approximate Optimization Algorithm"* Authors: Giovanni Acampora (University of Naples Federico II); Angela Chiatto (University of Naples Federico II); Autilia Vitiello (University of Naples Federico II) Speaker: *Angela Chiatto*
16:30 – 17:30	**Tutorial** *Quantum Measurement Error Mitigation through Computational Intelligence* Speaker: Autilia Vitiello, University of Naples Federico II, Italy
17:30 – 18:30	**Workshop closing**