Francesco **Scala**

PhD Student in Quantum Machine Learning

Pavia, Italy

(+39) 3406416189 | francesco.scala01@ateneopv.it | Work page: fisica.unipv.it/personale/Persona.php?ID=591 |

Personal page: fran-scala.github.io/ | fran-scala | fran-scala

Summary

I'm a third-year PhD student in Quantum Machine Learning at University of Pavia, interested in classical and quantum machine learning and their applications in different fields. My course of study has focused on quantum computing, quantum information, state-of-the-art quantum technologies and machine learning. Thanks to my collegiate and representative of PhD students experience, I have gained various soft transversal skills. Apart from the academic side, I'm an outgoing and active person enjoying sports, gardening and traveling.

Work Experience

Full-time

2021 - present | **PhD in Quantum Machine Learning** Università degli Studi di Pavia — *Pavia – Italy*

Quantum Computing, Quantum algorithms and Quantum Machine Learning for entanglement detection on state-of-the-art quantum hardware. My supervisor is Prof. Dario Gerace.

Part-time

Oct 2022-present | **Teaching assistant** Università degli Studi di Pavia — *Pavia - Italy*

- Lectures on General Physics (1st year course) at the single cycle degree program in Chemistry and Pharmaceutical Technologies

Jul 2022- Dec 2022 | **Intern** CINECA — *Casalecchio di Reno (BO) - Italy*

- Intern at Quantum Computing Lab at CINECA
- The project aim was the development of software tools for Variational hybrid Quantum Algorithms (VQAs) with a high level of parallelization allowing the exploitation of HPC infrastructures
- Programming language: Python

2018-2021 | **Part-time collaborator** Università degli Studi di Pavia — *Pavia - Italy*

- Collaboration and assistance for the operation and custody of IT structures
- From 2020 and 2021, management of various engineering department websites (WordPress) and email addresses
- Support to the exam committee during online entry-tests at the University of Pavia

Education

2019 - 2021 | **Master degree in Physics of Quantum Technologies** Università degli Studi di Pavia — *Pavia – Italy*

Graduation date: 23-09-2021
Thesis: "Witnessing Entanglement by Quantum Neural Networks"

2016 - 2019 | **Bachelor degree in Physics** Università degli Studi di Pavia — *Pavia – Italy*

Graduation date: 24-09-2019
Thesis: "Machine learning techniques applied to the quantum many-body problem"

Contributions: conferences, schools

Nov 2023 | **Quantum Techniques in Machine Learning (QTML) 2023** CERN — *Geneve-Switzerland*

Short Talk: A general approach to Dropout in Quantum Neural Networks

Oct 2023 | **Quantum Computing and Simulation Workshop** Istituto Veneto — *Venezia-Italy*

Poster: A general approach to Dropout in Quantum Neural Networks

Aug 2023 | **Superconducting Qubits and Algorithms (SQA) Conference** IQM Quantum Computers — *Munich, Germany*

Poster: Symmetrizing Quantum Machine Learning for Quantum Field Theory

Jun 2023 | **International Conference on Optics of Excitons in Confined Systems** Università del Salento *Lecce - Italy*

Talk: Quantum computing platform with polariton integrated circuits

Nov 2022 | **Quantum Techniques in Machine Learning (QTML) 2022** University Federico II *Napoli - Italy*

Poster: Quantum variational learning for entanglement witnessing

Ago - Sept 2022 | **VCQ & AppQInfo SummerSchool 2022** Universität Wien *Wien - Austria*

Student Talk: Quantum variational learning for entanglement witnessing

Jul 2022 | **World Congress On Computational Intelligence 2022** IEEE *Padova – Italy*

Talk: Quantum variational learning for entanglement witnessing

Jun 2022 | **Quantum Computing Hard- and Software Summer School 2022** EPFL, ETH zürich *Lausanne - Switzerland*

Poster: Quantum variational learning for entanglement witnessing

Extracurricular Activities

Apr 2023 - present | **Technical-scientific Committee Member** BeQuantum *Online - Italy*

- Production of technical posts
- General posts review

May 2023 | **1st Place** ETH Quantum Hackathon 2023 - IQM Challenge *Zurich - Switzerland*

- Topic: Exploiting symmetries in Quantum Machine Learning
- Tasks: TicTacToe (given), Schwinger model (our proposal) **[link]**

Apr 2022 - Jul 2022 | **Mentee** Quantum Open Source Foundation (QOSF) *Online*

- Implementation of krylov module within tequila Python package **[link]**
- Mentor: Prof. Jakob Kottmann

2022 - 2023 | **Phd Student representative** Università degli Studi di Pavia *Pavia - Italy*

Jan 2022 | **2nd Place** MIT iQuHACK 2022 - Micrsoft/IonQ division *Online*

- Topic: Quantum game with educational purposes
- Blackjack-inspired quantum game named QuHackJack **[link]**

Skills

- Programming skills: Python, C++(basic)
- Quantum programming skills: Pennylane, Qiskit, AWS Braket
- Mark-up: LaTeX
- Soft skills: predisposition to interpersonal relationships, teamwork, quick learner, proactive, time management

Languages

- Italian: Native
- English: Level C1
- French: Level A1

Publications

F. Scala et al. | **arXiv:2310.04120** A general approach to Dropout in Quantum Neural Networks *Preprint*

F. Scala et al. | **arXiv:2306.05072** Deterministic entangling gates with nonlinear quantum photonic interferometers *Preprint*

J. Kottmann, F. Scala | **arXiv:2302.10660** Compact Effective Basis Generation: Insights from Interpretable Circuit Design *Preprint*

F. Scala et al. | **IJCNN 2022 Proceedings** Quantum variational learning for entanglement witnessing *IEEE*