Saverio **Monaco**

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Education

RWTH Aachen University & DESY — Hamburg, Germany
PhD in Quantum Generative models for High Energy Physics - ENGAGE Marie Skłodowska-Curie PhD — *Mar. 2024 – Present*
- ***Thesis**: Detector Simulation and Jet Clustering for HL LHC with Quantum Computing*

University of Padua — Padua, Italy
M.Sc. in Computational Physics — *Sep. 2020 – Sep. 2023*
- ***Thesis**: Study of Quantum Correlations in LHCb simulated heavy flavour jets*
- ***Honors**: Magna cum laude*

University of Catania — Catania, Italy
B.Sc. in Physics — *Sep. 2016 – Jul. 2020*
- ***Thesis**: Phase-Space Formulation of Quantum Mechanics*

Experience

Quantum Machine Learning Intern — Geneva, Switzerland
CERN — *Apr. 2022 – Aug. 2022*
- Explored Quantum Machine Learning techniques for phase detection in the ANNNI spin model.
- Developed and implemented supervised and unsupervised architectures for phase detection.
- Published a Python package under the CERN-IT organization.
- Authored and published a paper on the implemented techniques.

Technical Skills

Quantum Computing tools: Pennylane, Qiskit, Quimb, YAOML.jl
Programming languages: Python, Julia, C/C++, SQL, R, VHDL, Agda, TeX, Nix
Machine Learning libraries: Jax, Pytorch, Keras
Other libraries: Pandas, NumPy, Matplotlib, BeautifulSoup
Other Tools: Git, Docker, Vim, Linux, Sphinx, ReadTheDocs

Languages Spoken

Mother tongue: Italian
Other languages:

	Understanding	Speaking	Writing	Certificate
English	C1	C1	C1	IELTS Academic: score 7
German	C1	B2	B2	Goethe-Zertifikat: B2
French	B2	B1	B2	EsaBac Diploma

Presentations

- **Poster presentation** @ QT4HEP 2025 (CERN) — Geneve, Switzerland
  "Precise Quantum Angle Generator Designed for Noisy Quantum Devices" — *Jan. 2025*
- **Talk** @ The Helmholtz "Matter and the Universe" Days 2024 (DESY) — Hamburg, Germany
  "Quantum Group @ DESY: Quantum Machine Learning for Calorimeter Simulation" — *Dec. 2024*
- **Poster presentation** @ QTech 2024 (Freie Universität Berlin) — Berlin, Germany
  "Precise Quantum Angle Generator Designed for Noisy Quantum Devices" — *Sep. 2024*
- **Poster presentation** @ IFAE 2023 (University of Catania) — Catania, Italy
  "Quantum Machine Learning for data analysis at LHCb" — *Apr. 2023*
- **Poster presentation** @ QIP 2023 (Ghent University) — Ghent, Belgium
  "Quantum phase detection generalization from marginal quantum neural network models" — *Feb. 2023*

Outreach

- **Pennylane Tutorial** *Mar. 2025*
  "Quantum Machine Learning models for the phase detection of the ANNNI spin model"
  link : TODO
- **Pennylane Code Camp 2023** Online
  Participation in a coding challenge on QML with Pennylane's library *Nov. 2022*
  Team placed 7th place over among 500 other teams
- **Lecturer of LaTeX course** Padua, Italy
  Computer Science Commitee - "College of Merit Don Nicola Mazza" *Years 2021, 2022, 2023*
  Courses were held in three lessons spanning from the fundamental principles to more advanced subjects (bibliography, TikZ) and commands

Publications

2024 Exploring the Phase Diagram of the quantum one-dimensional ANNNI model
M. Cea, M. Grossi, **S. Monaco**, E. Rico, L. Tagliacozzo, S. Vallecorsa
arXiv pre-print

2024 Quantum Machine Learning for data analysis at LHCb
A Gianelle, D Lucchesi, **S Monaco**, D Nicotra, L Sestini, D Zuliani
Il Nuovo Cimento C: colloquia and communications in physics 47.3 p. 127

2023 Quantum phase detection generalization from marginal quantum neural network models
S. Monaco, O. Kiss, A. Mandarino, S. Vallecorsa, M. Grossi
Phys. Rev. B 107 (8) p. L081105. American Physical Society

2023 Study of quantum correlations in LHCb simulated heavy flavour jets
S. Monaco, D. Lucchesi, D. Zuliani, L. Sestini
thesis.unipd.it