

Saverio Monaco

COMPUTATIONAL PHYSICIST · (QUANTUM) MACHINE LEARNING RESEARCHER

Hamburg, Germany

✉ saverio.monaco@desy.de |  [SaverioMonaco](#) |  [saverio-monaco](#)

Education

RWTH Aachen University & DESY

PHD IN QUANTUM GENERATIVE MODELS FOR HIGH ENERGY PHYSICS (ENGAGE)

- Marie Skłodowska-Curie PhD Fellowship
- Thesis: Detector Simulation and Jet Clustering for HL-LHC with Quantum Computing

Hamburg, Germany

Mar. 2024 - Present

University of Padua

M.Sc. IN COMPUTATIONAL PHYSICS

- Thesis: Study of Quantum Correlations in LHCb Simulated Heavy Flavour Jets
- Honors: Magna cum laude

Padua, Italy

Sep. 2020 - Sep. 2023

University of Catania

B.Sc. IN PHYSICS

- Thesis: Phase-Space Formulation of Quantum Mechanics

Catania, Italy

Sep. 2016 - Jul. 2020

Experience

Research Secondment

PARITYQC

- Compared performance of training quantum generative models on IBM machines and the QSea machine.

Hamburg, Germany

Sep. 2025 - Dec. 2025

Quantum Machine Learning Intern

CERN

- 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.

Geneva, Switzerland

Apr. 2022 - Aug. 2022

Skills

Quantum Computing

PennyLane, Qiskit, Quimb, Yao.jl

Programming Languages

Python, Julia, C/C++, SQL, R, VHDL, Agda, LaTeX, Nix, JavaScript, Rust

Machine Learning

JAX, PyTorch, Keras

Other Libraries

Pandas, NumPy, Matplotlib, BeautifulSoup

Tools

Git, Docker, Vim, Linux, Sphinx, ReadTheDocs, Weights & Biases

Languages

Italian (native), English (C1, IELTS Academic 7.0), German (C1/B2, Goethe-Zertifikat B2), French (B2/B1, EsaBac Diploma)

Publications

2026 An IQP Born Machine for Calorimeter Image Generation at 64 Qubits with Compiled-IQP Deployment

J. Slim, S. **Monaco**, F. Rehm, D. Krücker, K. Borrás

arXiv pre-print

2026 Quantum Feature Amplification Network (QFAN) as An Autoregressive Quantum Generative Model

J. Slim, S. **Monaco**, F. Rehm, D. Krücker, K. Borrás

arXiv pre-print

2025 Symbolic Pauli Propagation for Gradient-Enabled Pre-Training of Quantum Circuits

S. **Monaco**, J. Slim, F. Rehm, D. Krücker, K. Borrás

arXiv pre-print

2025 Quantum Generative Modeling for Calorimeter Simulations on Noisy Quantum Devices

S. **Monaco**, J. Slim, F. Rehm, M. Scham, D. Krücker, K. Borrás

PoS ACAT2025

2025 Quantum Generative Modeling for Calorimeter Simulations on Noisy Quantum Devices

S. **Monaco**, J. Slim, F. Rehm, M. Scham, D. Krücker, K. Borrás

PoS EPS-HEP2025 p. 639

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. Editrice Compositori srl
- 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

Presentations

- 2026** Talk: “Training Quantum Generative Models for High Energy Physics”
FHSciComp 2026 (DESY), Hamburg, Germany
- 2026** Talk: “Symbolic Pauli Propagation for Gradient-Enabled Pre-Training of Quantum Circuits”
CERN QTI Journal Club (CERN), Geneva, Switzerland
- 2025** Poster: “Precise Quantum Angle Generator Designed for Noisy Quantum Devices”
ACAT 2025 (University of Hamburg), Hamburg, Germany
- 2025** Poster: “Precise Quantum Angle Generator Designed for Noisy Quantum Devices”
EPS 2025 (Palais du Pharo), Marseille, France
- 2025** Poster: “Precise Quantum Angle Generator Designed for Noisy Quantum Devices”
QT4HEP 2025 (CERN), Geneva, Switzerland
- 2024** Poster: “Precise Quantum Angle Generator Designed for Noisy Quantum Devices”
QTech 2024 (Freie Universität Berlin), Berlin, Germany
- 2023** Poster: “Quantum Machine Learning for data analysis at LHCb”
IFAE 2023 (University of Catania), Catania, Italy
- 2023** Poster: “Quantum phase detection generalization from marginal quantum neural network models”
QIP 2023 (Ghent University), Ghent, Belgium

Extracurricular Activity

Junction Quantum Hack 2026

Espoo, Finland

HACKATHON PARTICIPANT

2026

- Project: “Quantum Machine Learning for Finance”.
- Goal: Implementation of a quantum algorithm to speed up derivative pricing beyond Black-Scholes.

PennyLane Code Camp 2023

Online

HACKATHON PARTICIPANT

Nov. 2022

- Team placed 7th out of 500+ teams in a coding challenge on Quantum Machine Learning with PennyLane.

Computer Science Committee, College of Merit “Don Nicola Mazza”

Padua, Italy

LECTURER, L^AT_EX COURSE

2021 - 2023

- Taught a three-lesson course spanning fundamentals to advanced topics (bibliography, TikZ, custom commands).

Writing

PennyLane (Xanadu)

Online

PENNYLANE TUTORIAL - AUTHOR

May 2025

- Authored the tutorial “Supervised and Unsupervised Quantum Machine Learning Models for the Phase Detection of the ANNNI Spin Model” (pennylane.ai/qml/demos/tutorial_annni).

Certificates

- 2021 **IELTS Academic: Score 7.0 (English, C1)**, British Council
- 2016 **Goethe-Zertifikat B2 (German, B2)**, Goethe-Institut
- 2016 **EsaBac Diploma (French-Italian dual diploma)**, Ministère de l'Éducation nationale / MIUR