

# Andrea Cacioppo

*Curriculum vitae - November 15, 2024*

## Education

- pres. Ph.D. in Physics**, *Sapienza University of Rome, Italy*  
Nov 2022 *Topics:* quantum generative models and physics-informed optimization algorithms  
*Group:* Fisica AI&QC group  
*Supervisors:* Stefano Giagu, Fabio Sciarrino
- Nov 2021 **Ph.D. in Computer Engineering**, *Technical University of Munich, Germany*  
Nov 2020 *Topics:* classical-quantum compound channels and algorithms for the automatic generation  
(interrupted) of quantum graph states  
*Group:* Theoretical quantum system design group  
*Supervisors:* Janis Nötzel, Jonathan Finley
- May 2020 **M.Sc. in Theoretical Physics**, *Sapienza University of Rome, Italy*  
Oct 2016 *Thesis:* "Deep learning for the parameter estimation of tight-binding Hamiltonians"  
*Supervisors:* Stefano Giagu, Stefan Bauer  
*Grade:* 109/110
- Oct 2016 **B.Sc. in Physics**, *Sapienza University of Rome, Italy*  
Sep 2013 *Thesis:* "Hidden Markov model"  
*Supervisor:* Luciano Pietronero  
*Grade:* 110/110 with honors

## Work Experience

- pres. ML Consulting**, *Individual clients, Italy*  
Jan 2022 *Topics:* training NNs to solve PDEs in finance - implementation of diffusion models - training NNs on incomplete datasets - invoice reconciliation through the ChatGPT API
- Nov 2023 **ML Consulting**, *Hypercube SA, Lugano, Switzerland*  
Sep 2023 *Topic:* application of ML techniques to the detection of time series anomalies
- Aug 2023 **ML Consulting**, *Primis Group SRL, Milan, Italy*  
Dec 2022 *Tasks:* determine best ML solutions tailored to LiDAR and satellite data, design of an anomaly detection algorithm for LiDAR data (contract of *Rete Ferroviaria Italiana SPA*)
- Dec 2022 **Tutoring**, *Individual clients, Italy*  
Jan 2022 *Topics:* mathematics and physics lessons for university students
- Nov 2021 **Tutoring**, *Technical University of Munich, Germany*  
Nov 2020 *Task:* assisting students of the "Quantum networking" class
- Oct 2020 **Research Internship**, *Max Planck Institute for Intelligent Systems, Tübingen, Germany*  
Sep 2019 *Topics:* Deep learning for estimating tight-binding Hamiltonians, quantum machine learning models and their connection with kernel methods

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## Awards and grants

- Nov 2024 **Research grant**, *Sapienza University of Rome*, Italy  
Nov 2023 "Development of quantum machine learning algorithms" - 1000 €  
Oct 2016 **Excellence program for honor students**, *Sapienza University of Rome*, Italy

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## Academic Contributions

- Oct 2024 **Quantum Computing @ INFN, Padova, Italy**, Talk  
"Quantum diffusion models for quantum data learning"  
Oct 2024 **38° cycle PhD seminar, Rome, Italy**, Talk  
"Quantum machine learning and physics-informed deep learning algorithms"  
Apr 2024 **EuCAIFCon2024, Amsterdam, Netherlands**, Flash Talk  
"Quantum diffusion models"  
Feb 2024 **Communication Physics, Nature Publishing Group**, Reviewer  
Nov 2023 **QTML2023 Conference, Geneva, Switzerland**, Poster  
"Parameterised quantum circuits for anomaly detection and generative tasks"  
Nov 2023 **QAIxIAQ2023 Workshop, Rome, Italy**, Talk  
"Quantum diffusion models using parameterized quantum circuits for data denoising"  
Oct 2023 **Quantum Computing and Simulation Workshop 2023, Venice, Italy**, Poster  
"Parameterised quantum circuits for anomaly detection and generative tasks"  
July 2021 **ISIT, 2021 IEEE International Symposium on Information Theory**, Talk  
"Compound channel capacities under energy constraints and application"  
Mar 2021 **EACN 2021: Entanglement Assisted Communication Network**, Organization  
Feb 2021 **BeyondC: Quantum Information Systems Beyond Classical Capabilities**, Poster  
"Quantum receiver design"  
Jun 2020 **BiGmax: Big data driven material science**, Poster  
"Deep learning for the parameter estimation of tight-binding Hamiltonians"

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## Languages

- Native Italian  
Fluent English  
Beginner German

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## Software

- Advanced Python, PyTorch  
Good Tensorflow, GitHub, Linux,  $\text{\LaTeX}$   
Basic C, HTML

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## Publications

- [1] Andrea Cacioppo, Lorenzo Colantonio, Simone Bordoni, and Stefano Giagu. Quantum Diffusion Models. *arXiv preprint arXiv:2311.15444*, 2023.
- [2] Andrea Cacioppo, Janis Nötzel, and Matteo Rosati. Compound Channel Capacities under Energy Constraints and Application. In *2021 IEEE International Symposium on Information Theory (ISIT)*, pages 640–645. IEEE, 2021.
- [3] Andrea Cacioppo. Deep learning for the parameter estimation of tight-binding Hamiltonians. Master's thesis, Sapienza Università di Roma, Italy, 2020.
- [4] Lorenzo Colantonio, Andrea Cacioppo, Federico Scarpati, and Stefano Giagu. Efficient graph coloring with neural networks: A physics-inspired approach for large graphs. *arXiv preprint arXiv:2408.01503*, 2024.