Andrea Zingarofalo

Curriculum Vitae et Studiorum

About Me

Theoretical physicist with a strong interest in the foundational and information-theoretic aspects of quantum theory. My work focuses on quantum phenomena such as entanglement and nonlocality, and their implications for both fundamental physics and emerging technologies.

Personal Details

Name	Andrea Zingarofalo
Birth date	November 11, 2001
Address	Rue P. Baucq 126, Brussels, Belgium
Phone	(+39) 327 615 4487
Email	andreazingarofalo@gmail.com
Nationality	Italian

Education

Oct 2025 – Present
PhD in Quantum Information Theory, *Université libre de Bruxelles*
Thesis: *Self-Testing and Device-Independent Verification of Quantum Computation.*
Advisor: Prof. S. Pironio.

Oct 2020 – Nov 2025
Allievo del corso ordinario, *Advanced School ISUFI* (Excellence Program)
$\sim 10\%$ Acceptance rate for the Natural Sciences Class in 2020.
Key modules: Group Theory and Symmetries, Celestial Mechanics, Astroparticle Physics, Applied Physics I–II, Philosophy of Science, ICT for Research, Public Speaking, Scientific Writing.

Sep 2024 – Jan 2025
Erasmus program, *École normale supérieure*, Master ICFP (International Center for Fundamental Physics) M2, Theoretical Physics Track
Modules: General Relativity, Quantum Field Theory, Statistical Field Theory, Algorithms and Computations.

Oct 2023 – Jul 2025
MSc in Theoretical Physics, *University of Salento*, 110/110 cum laude, GPA: 29.8/30
Key modules: Quantum Field Theory I–II, Quantum Chromodynamics, Statistical Mechanics, Many-Body Physics, Quantum Information and Computing, Physics of Complex Systems, Data Analysis, Mathematical Methods for AI.
Research Thesis: *Exploring the Boundaries of Quantum Correlations: Bell Inequalities, Convex Duality, and Self-Testing.* Advisors: Prof. L. Martina and Prof. J.-D. Bancal

Sep 2020 – Oct 2023
BSc in Physics, *University of Salento*, 110/110 cum laude, GPA: 30/30
Electives: Nuclear Physics, Astronomy and Astrophysics, Foundations of Physics.
Research Thesis: *Study of One-Dimensional Quantum Integrable Systems via the Bethe Ansatz Techniques.* Advisor: Prof. L. Martina

Sep 2015 – Jun 2020
High School Diploma, *Liceo Scientifico V. Lilla*, Oria, Italy, 100/100 cum laude
Activities: Student ambassador

Experience

Oct 2025 – Present **Doctoral Researcher**, Laboratoire d'Information Quantique, Université libre de Bruxelles. Working on self-testing and device-independent protocols. My research aims to certify fundamental components of quantum computation, from multipartite entangled states and quantum channels to measurement-based architectures and error-correcting codes. Supervisor: Prof. S. Pironio

Mar – Jul 2025 **Research Intern**, Institut de Physique Théorique, CEA Paris-Saclay. Research internship within one of Europe's leading centres for theoretical physics, focused on quantum nonlocality.
- Investigated the geometric structure of the quantum set using analytical techniques and the Navascués-Pironio-Acín (NPA) hierarchy.
- Implemented SDP relaxations to compute quantum bounds of Bell inequalities.
- Presented results at the International MAQI School

Supervisor: Prof. Jean-Daniel Bancal

Mar – Jul 2024 **Research Intern**, Mathematical Physics Group, University of Salento, in collaboration with the University of Glasgow on the integrability of nonlinear PDEs and soliton theory.
- Constructed the first multi-kink solutions for a generalized Fokker-Planck equation using Hirota's bilinear method.
- Developed automated MATHEMATICA scripts for the symbolic generation and verification of soliton solutions.
- Analyzed nonlinear wave dynamics and shock structures, extending analytical results to dissipative regimes.

Supervisor: Prof. Luigi Martina

2019 – Present **Private Tutor** in Mathematics, Physics, and Chemistry for high school and university students

Publications

Journal Articles

[1] F. Giglio, G. Landolfi, L. Martina, and **A. Zingarofalo**. Integrability properties and multi-kink solutions of a generalised Fokker-Planck equation. *Journal of Physics A: Mathematical and Theoretical*, 58(16):165202, April 2025.

Science Communication and Outreach

[2] **A. Zingarofalo**. Il conflitto tra meccanica quantistica e senso comune, 2024. Published on Il Chiasmo by Treccani - The Italian Encyclopaedia Institute.

[3] **A. Zingarofalo**. Il ruolo delle simmetrie nel problema di Keplero. In D. Avaro and F. Decataldo, editors, *Rete di Idee, Udine 2022*, pages 81–100, Udine, 2023. Forum Editrice.

Schools and Workshops

Domain-Specific

2025 **Workshop in honor of Ignacio Cirac and Peter Zoller**, Belgian Quantum Initiatives, Brussels, 3 Oct

2025 **Interdisciplinary Statistical Physics workshop**, University of Salento, Lecce, 18–19 Sep

2025 **Qiskit Global Summer School**, IBM, 7–22 Jul

2025 **Summer School "Mathematical Aspects of Quantum Information" (MAQI)**, Université Paris-Saclay and Institut Polytechnique, Paris, 16–20 Jun

2024 **Summer School "Theoretical Physics of Fundamental Interactions"**, Scuola Normale Superiore and Scuola Galileiana di Studi Superiori, Pisa, 27–31 May

2019 **Physics Summer School**, University of Salento, Lecce, 2–6 Sep

2018 **International Cosmic Day Masterclass**, INFN (Italian Institute of Nuclear Physics) and University of Salento, Lecce, 29 Nov

2018 **Stage at Asiago Astrophysical Observatory**, INAF (Italian Institute of Astrophysics) and University of Padua, Asiago, 9–13 Jul

2016 **Summer School on Astronomy**, INAF and SAIt (Italian Astronomical Society), Sant'Agata sui Due Golfi, 5–8 Jul

Others

2023 **Summer School "Reframing Sustainability: Bridging Environmental, Energy and Economical Challenges"**, Advanced School ISUFI, Otranto, 10–12 Sep

2023 **Winter School "Green and Digital Transition in Europe"**, ENCATC (European Network of Cultural Administration Training Centres), Brussels, 2–7 Dec

2019 **University Orientation School**, Scuola Normale Superiore and Accademia Nazionale dei Lincei, Rome, 8–13 Jul

Awards and Scholarships

2025 Winner of RIASISSU "Rete di Idee", XIII edition, Catania

2025 Selected among the **Top 100 STEM graduates in Italy (Class of 2025)**, by Almalaurea, the national consortium of Italian universities.

2025 Winner of the ISUFI "Research & Innovation" grant for international research mobility

2024 – 2025 Winner of a Cité Internationale Universitaire de Paris scholarship (accomodation)

2022 Winner of RIASISSU "Rete di Idee", X edition, Udine

2020 – 2025 Winnner of the ISUFI Scholarship at the University of Salento, awarded for academic excellence (full accomodation and a stipend)

2018 Senior finalist at XVI Italian Astronomy Olympiads, ranking **among the top 30 out of over 6000 participants** nationwide.

2016 – 2020 Participant at Italian, Mathematics, and Physics Olympiads, reaching the regional stage in all subjects.

Talks and Posters

2025 **Orthogonal Faces in the CHSH Scenario** (poster), MAQI School, Paris, 18 Jun

2025 **Exploring the Boundaries of Quantum Correlations** (talk), *IPhT Quantum Meetings*, Institut de Physique Théorique, CEA Paris-Saclay, Paris, 6 Jun

Technical Skills

Programming and Scientific Computing

Programming	Bash, C, C++ (intermediate), Python (advanced), Javascript, Julia
Computing	MATHEMATICA, MATLAB, `NumPy`, `SciPy`, `Matplotlib`
Data Analysis	ROOT framework for data analysis, `pandas`, `uncertainties`, basic knowledge of machine learning and neural networks using `scikit-learn` and `TensorFlow`
Quantum Libraries	`Qiskit` and `PennyLane` for quantum computing simulations; experience with semidefinite programming and quantum optimization workflows using `CVXPY`, `MOSEK`, and `ncpol2sdpa`.
Tools	LaTeX, Markdown, Version control (`git`), Microsoft Office Suite, Inkscape
Systems	Basic experience with UNIX-based systems, shell scripting, and system management.

Communication and Teamwork

Strong interpersonal and communication skills, demonstrated through collaborative research within international groups and presentation of complex theoretical work to both specialist and general audiences.

Languages

Italian	Native language
English	C1, Full professional proficiency
French	B2, Intermediate proficiency
German	A2, Elementary proficiency
Latin	Elementary proficiency

Memberships

Since 2025	Member of the IEEE Quantum Technical Community.
Since 2025	Member of the Quantum Flagship Community.
Since 2023	Member of the SIF (Italian Physical Society).
Since 2023	Member of RIASISSU (Italian Network of Students from Excellence Schools).

Additional Information

Music	Guitar Grade 2 (Distinction), Trinity College of London.
Personal Interests	Outside academia, I'm a tech enthusiast with a passion for music, history, and geopolitics, and for understanding how ideas shape the modern world. Amateur astronomer, speaker at *XXXVII Meeting Regionale degli Astrofili Pugliesi*.
Driving Licenses	AM, B