Sofía Perón Santana

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Education

PHD in Physics, Universidad Nacional de Córdoba (UNC) - Facultad de Matemática, Astronomía, Física y Computación (FAMAF)   April 2023 – Present

- Research topic: Machine Learning techniques applied to Quantum Mechanics
- Funded by CONICET (National Scientific and Technical Research Council)
- Selected coursework: Quantum Computing, Parallel Computing, Neural networks

Data Science Diploma, Universidad Nacional de Córdoba (UNC) - Facultad de Matemática, Astronomía, Física y Computación (FAMAF)   March 2025 – December 2025

- Developed group projects on data bases (SQL), data exploration and visualization, and supervised and unsupervised learning.
- Mentorship "Distant readings of Argentinian songs" where my group developed a NLP pipeline to analyze and classify argentinian song lyrics.
- Selected coursework: Ethics in Data Science, Reinforcement Learning, Introduction to Amazon Web Services

Degree in Physics (5 years with thesis, equivalent to Msc), Universidad Nacional de Córdoba (UNC) - Facultad de Matemática, Astronomía, Física y Computación (FAMAF)   April 2017 – December 2022

- GPA: 8.86 (grade scale 0-10, equivalent to 3.54 in 4.0 scale).
- Relevant courses: Quantum Mechanics I and II, Solid State Physics, Thermodynamics and Statistical Mechanics I and II, Numerical Methods, Algebra I and II.
- Elective courses: Numerical Methods for Quantum Mechanics, Computational Physics
- Thesis title: "*Machine Learning techniques applied to the transmission of quantum states in spin chains*"

Publications

Quantum state transfer performance of Heisenberg spin chains with site-dependent interactions designed using a generic genetic algorithm Physica Scripta, (vol. 100 055110)   April 2025

Sofía Perón Santana, Omar Osenda, Martín Domínguez,
10.1088/1402-4896/adc76f ☑

Optimización de la transmisión de estados cuánticos en cadenas de qubits usando Deep Reinforcement Learning y algoritmos genéticos. JAIIO, Jornadas Argentinas De Informática, 11(16), 86-91.   August 2025

Sofía Perón Santana, Ariel Fiuri, Omar Osenda, Martín Domínguez,
https://revistas.unlp.edu.ar/JAIIO/article/view/19804 ☑

Solving the Qubit Transmission Problem with Biologically Inspired Neural Networks and Reinforcement Learning. SIMBig 2025, 12th International Conference on Information Management and Big Data   October 2025

Ariel Fiuri, Martín Domínguez, *Sofía Perón Santana*, Omar Osenda
Presented at conference, pending publication
See available manuscript ☑

Teaching experience

Physics and Math Professor   Jan 2022 – Present
- Leveling Course Professor at FAMAF.
- Numerical Methods course teaching assistant.
- Numerical Analysis, Calculus and Linear Algebra private tutor.

Scientific Presentations and Seminars

Argentine Physics Association Annual Meeting (AFA 2025) — Poster Presentation   La Plata, Argentina
Poster title: *Optimization of Quantum State Transfer in Qubit Chains using Deep Rein-   September 2025
forcement Learning and Genetic Algorithms.*   Poster (in spanish) ☑

Okinawa School in Physics: Coherent Quantum Dynamics — Poster Presentation   Okinawa, Japan
Presented at the **Okinawa Institute of Science and Technology (OIST)** as part of an   October 2024
international research school with expert lectures and presentation training.   Poster ☑
Poster title: *Quantum state transfer performance of Heisenberg spin chains with site-
dependent interactions designed using genetic algorithms.*

Argentine Physics Association Annual Meeting (AFA 2024) — Poster Presentation   San Luis, Argentina
Poster title: *Study of Quantum State Transfer in Heisenberg Spin Chains with Site-Dependent   September 2024
Interactions Designed using Genetic Algorithms.*
Event held jointly with the 104th IUVSTA and the Sixth Argentine Quantum Workshop
(CUANTOS 6).

Quantum Circuit Learning — Online Seminar   April 2024
Seminar presented as part of the talk series organized by the "Analysis and Processing   Link to video ☑
of Large Social and Semantic Networks" research group at FAMAF - UNC

Fifth Argentine Quantum Workshop (CUANTOS 5) — Poster Presentation   Córdoba, Argentina
Application of Machine Learning Techniques to Quantum State Transfer in Spin Chains.   September 2023

Machine Learning Applied to Quantum State Transfer — Online Seminar   October 2022
Seminar presented as part of the talk series organized by the "Analysis and Processing   Link to video ☑
of Large Social and Semantic Networks" research group at FAMAF - UNC

Workshops and Short Courses

Probabilistic Algorithm Analysis and **Introduction to Quantum Computing** — week   July 2025
long courses
Taken at the *School of Computer Science 2025*, University of Buenos Aires (Argentina).

Introduction to Genetic Algorithms — Intensive Workshop   October 2022
5-hour virtual workshop on genetic algorithms organized by the University of Las Pal-
mas de Gran Canaria (Spain).

Scientific Python — Applied Programming Course   August 2020
24-hour course on Python programming applied to physics problems, delivered at the
National University of Córdoba (UNC).

Technologies

Programming Languages: Python (advanced), Fortran, C (basic), Bash / Shell scripting
Machine Learning and Data Analysis: PyTorch, TensorFlow, scikit-learn, Pandas, SciPy, Seaborn, Plotly, Jupyter
Quantum Computing and Simulation: QuTiP, QuLacs, Qiskit
Version Control and Tools: Git, Linux, SSH, SLURM

Languages

- **Spanish**: Native;
- **English**: C1 (EF Cambridge English Level Test; First Certificate in English passed with Grade A)
- **German**: A2.2 (Goethe Institut, Goethe Society of Argentina, 2016)