

Mariano Caruso



Education

University

- 2013–2017 **PhD in Physics-Mathematics**, *University of Granada, Spain*. [topics] probability theory, stochastic processes, random matrices, machine learning, genetic algorithms. **Thesis** *The principle of least action in stochastic processes*. Calf.: **Cum Laude**.
- 2011–2012 **Master in Physics**, *University of Granada, Spain*. [topics] advanced statistics applied to particle physics, effective models, physics beyond the standard model. **Thesis** *Study of the triple interactions of neutral electroweak gauge bosons*.
- 2005–2010 **Degree in Physics**, *National University of La Plata, Argentina*. [topics] quantum mechanics, classical circuit theory. **Thesis** *Isomorphism between Schrödinger and Schrödinger dynamics and classical dynamics*.
- 2002–2004 **Senior Technician in Electronics**, *National Technological University, Argentina*.

High School

- 1997–2001 **Electronics Technician**, *Technical of Technical Education Escuela N°2 Paula Albaracín de Sarmiento, Argentina*.

Experience

- 2021–... **Research & Development**, *Centre for Technology Innovation Support, CaIT || Fundación I+D del Software Libre, FIDESOL, Spain*, [Google Scholar](#), [topics] **quantum physics**: shortcuts to adiabaticity, equivalence between quantum systems, classical simulation through electrical networks | **machine learning**: recurrent neural networks | **cryptography**: homomorphic encryption, random number generators, IoT communications.
- 2022–... **Professor**, *Master in Quantum Computing, University of La Rioja, UNIR, Spain*, [University faculty](#).
- 2022–... **Associate Researcher**, *Thermodynamics and Quantum Computation, group FQM-411-TCC. University of de Granada, Spain*, [topics] quantum machine learning.
- 2019–2021 **Acting Professor**, *University of Granada, Spain, Department of Mathematics. Statistics and Operations Research*

- 2019–2021 **Postdoctoral degree in Physics-Mathematics**, *Regional Centre for Genomic Studies*, CREG, National Council for Scientific and Technical Research | CONICET, Argentina. [*topics*] new stochastic methods for the study of gene expression.
- 2018–2019 **Postdoctorate degree in Mathematics**, *Ultrasonics Lab*, group TEP-959-UL, University of Granada, Spain. [*topics*] mechanics of continuous media, biomechanics, statistics, material wave propagation in non-linear soft tissues, cancer therapies..
- 2018–2019 **Contract Researcher**, *ibs.GRANADA*, Spain.
European Biomechanics Research Project.
- 2018–2019 **Contract Research**, *Public Foundation for Biomedical Research in Eastern Andalusia*, FIBAO, Spain. [*topics*] fundamentals of the theory of deformations in non-linear in non-linear media.
- 2016–2016 **International research**, *International Mobility Programme of the Proprietary Plan of the University of Granada*, Spain, National University of La Plata, Argentina. Research stay abroad.
- 2017–2017 **International research**, *International Research, Mobility Programme between Andalusian and Ibero-American Universities*, AUIP, Bilateral Cooperation: Spain – Argentina. Research stay abroad.
- 2011–2014 **EADIC–European Union**, *EADIC II Programme*, European Union–University of Granada, Department of Theoretical Physics.
- 2009–2010 **Scientific Research Commission** – CIC, National University of La Plata, Department of Physics, Argentina: [*topics*] quantum mechanics, classical circuit theory.
- 2005–2006 **Institute of Theoretical and Applied Physicochemical Research** – INIFTA, La Plata, Argentina: [*topics*] nanoscience, study of nanoparticles with synchrotron light.

Computational

Data	python, R
Scientific	C, C++, Mathematica, MATLAB, TeX
Quantum	qiskit, pennylane, cirq
Office autom.	Microsoft Office, OpenOffice, Mathpix, Overleaf, Canva
Op. Systems	Microsoft Windows, Linux

Languages

Spanish	Native
English	Advanced
Italian	Intermediate

Acknowledgements

- 2024 Patent on a privacy-preserving protocol for classical and quantum computing

2017 International Mention Doctorate UGR

2016 Royal Society Front Cover ([link](#)). Press releases [A](#), [B](#) and [C](#)

Extra

- Amateur musician: piano, guitar, and charango.
- Interested in philosophy, especially epistemology and philosophy of science.
- Avid consumer of literature and essays; good stories and good theories have something in common: both seek meaning.

NOTE

These lines aim to introduce some aspects of my training and experience in both the private and academic sectors. I developed a rigorous technical education, starting with a degree in Electronic Engineering, where I began working with programming languages, followed by a degree in Physics, both in Argentina. Later, I was hired to pursue postgraduate training in Europe, completing a Master's in Mathematical Physics and a PhD in Mathematical Physics at the University of Granada. I also conducted research stays at the Max Planck Institute for Physics in Munich, Germany, in collaboration with the University of Granada, and at the National University of La Plata, Argentina, to earn an international mention in my PhD.

I have applied these ideas in the field of Biomedicine at the [IBS](#) and [FIBAO](#), both in Granada. Regarding languages, it is worth mentioning that I can learn new ones, as having experience with several makes learning others easier.

Working in academia has allowed me to develop the ability to tackle problems for which, *a priori*, it is not even possible to know whether a solution exists. My experience in the private sector, on the other hand, has helped me become more efficient in the search for such solutions. In both settings, I have worked both as part of a team and independently, depending on the goals of the tasks.

My teaching experience, both at the university level (UNLP, UTN in Argentina, and UGR, UNIR in Spain) and at the secondary level, has helped me improve my communication skills. In fact, communicating ideas both in outreach (for expert audiences) and in popularization (for non-expert audiences) is something I genuinely enjoy.

I have experience developing analytical and/or algorithmic mathematical models for specific business situations, including more abstract contexts related to stochastic processes.

Regarding the interaction between different fields, I have worked on applying quantum-physics optimization techniques to control and catalyze chemical reactions, with the aim of contributing to improved protocols for cellular reprogramming and nitrogen fixation in soil. This line of work builds on ideas I developed during my doctoral studies. This research was initiated in collaboration with researchers from both worlds: academia and industry.

Throughout my professional experience, I have collaborated in both the private and academic sectors, and I am currently working at the intersection of machine learning and quantum physics. I consider myself a creative person when it comes to framing and solving complex problems, and I have the ability to manage stakeholders in deeply technical environments. In addition, I have worked both in teams and independently, depending on the objectives of the tasks, which has allowed me to strengthen my communication skills and contribute to joint projects in order to achieve established goals. I also have experience developing analytical and/or algorithmic

mathematical models for specific business situations, which would enable me to create tailored roadmaps for partners and ensure the proper execution of projects.

In summary, if I am asked about something outside my area of expertise, I can honestly say that I do not know—but they can be sure that I will find a way to learn it and provide answers.