

Esteban Alonso Rodríguez Mena

Theoretical Physicist | Scientific Computing Developer

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i November 6th 1993, Punta Arenas, Chile

I am a theoretical physicist with a strong focus on computational data analysis and the development of tools for solving complex quantitative problems. My scientific career has equipped me with deep analytical thinking, solid teamwork experience, and a proven ability to communicate complex ideas clearly. I have effectively conveyed intricate concepts through numerous talks and lectures worldwide. Passionate about new technologies and sound software development practices, I am driven by the challenge of uncovering the stories hidden within data.

Present Position

Feb. 2022 to Sept. 2026	Ingénieur Chercheur (Postdoctoral Researcher), CEA, Grenoble, France > Theoretical and numerical modeling of silicon/germanium spin quantum bits: study of structural and electronic properties. > Principal Investigator: Yann-Michel Niquet (CEA Grenoble).
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Skills

Languages	Spanish (native), English (fluent), French (conversational)
Programming	Python, Fortran90, C, Bash, HTML, CSS, HPC computing, notions of web development
Python ecosystem	matplotlib, numpy, pandas, scipy, sci-kit, asyncio, plotly/dash, quarto, mpi4py
Coding tools	Visual Studio Code, VIM, git, JupyterLab
Operating systems	Linux, MS Windows, Mac OS
Office Software	MS Office Suite, Latex, Lyx
Analytical Skills	advanced statistics, advanced calculus, partial differential equations, advanced linear algebra

Education

2017 - 2021	PhD in Physics. Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile (FCFM - DFI), Santiago, Chile
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Professional experience

Mar. 2014 Jul. 2020	Teaching assistant, DFI-FCFM, Universidad de Chile, Santiago, Chile Taught in courses of: classical mechanics, thermodynamics, electromagnetism, quantum mechanics, solid state physics.
Aug. 2020 Nov. 2020	Doctoral Internship, Budapest University of Technology and Economics, Budapest, Hungary International internship for PhD candidates sponsored by <i>Agencia Nacional de Investigación y Desarrollo</i> (ANID, Chile). Numerical modeling of quantum transport in Floquet topological phases. Principal Investigator: János Asbóth.
Mar. 2017 Dec. 2021	PhD Student, DFI-FCFM, Universidad de Chile, Santiago, Chile Sponsored by <i>Agencia Nacional de Investigación y Desarrollo</i> (ANID, Chile). Numerical modeling of quantum transport in Floquet topological phases in 2D materials. Principal Investigator: Luis E. F. Foa Torres.

Selected publications

2021	Spin-Polarized Tunable Photocurrents, Nano Lett. 21, 3177, Matías Berdakin*, Esteban A. Rodríguez Mena* and Luis E. F. Foa Torres (*Equal contribution)
2022	Hole spin manipulation in inhomogeneous and nonseparable electric fields, Physical Review B 106, 235426, Biel Martínez*, José Carlos Abadillo-Uriel*, Esteban A. Rodríguez-Mena* , and Yann-Michel Niquet (*Equal contribution)

- 2023 | **Hole spin driving by strain-induced spin-orbit interactions, Physical Review Letters 131, 097002,**
José Carlos Abadillo-Uriel, **Esteban A. Rodríguez-Mena**, Biel Martinez and Yann-Michel Niquet
- 2023 | **Linear-in-momentum spin orbit interactions in planar Ge/GeSi heterostructures and spin qubits, arXiv:2307.10007,**
Esteban A. Rodríguez-Mena, José Carlos Abadillo-Uriel, Gaëtan Veste, Biel Martinez, Jing Li, Benoît Sklénard and Yann-Michel Niquet
Accepted for publication in Physical Review B
- 2024 | **Optimal operation of hole spin qubits, arXiv: 2412.13069 (accepted for Nature Physics),**
Marion Bassi, **Esteban A. Rodríguez-Mena**, Boris Brun, Simon Zihlmann, Thahn Nguyen, Victor Champain, José Carlos Abadillo-Uriel, Benoît Bertrand, Heimanu Niebojewski, Romain Maurand, Yann-Michel Niquet, Xavier Jehl, Silvano De Franceschi and Vivien Schmitt
- 2024 | **A two-dimensional 10-qubit array in germanium with robust and localised qubit control, arXiv: 2412.16044 (accepted for Nature Communications),**
Valentin John, Cécile X. Yu, Barnaby van Straaten, **Esteban A. Rodríguez-Mena**, Mauricio Rodríguez, Stefan Oosterhout, Lucas E. A. Stehouwer, Giordano Scapucci, Stefano Bosco, Maximilian Rimbach-Russ, Yann-Michel Niquet, Francesco Borsoi and Menno Veldhorst

Selected talks

- Dec. 2021** | **Spin-Polarized Tunable Photocurrents**
> Quantum2021 Conference, Phantom Foundation, Bilbao, Spain.
- Mar. 2023** | **Hole spin manipulation in inhomogeneous and non-separable electric fields**
> American Physical Society - March Meeting, Las Vegas, United States of America.
- Jul. 2023** | **Manipulation of the hole spin qubits in germanium heterostructures quantum dots**
> Theoretical and Computational Nanoscience Seminars, Institut Català i Nanotecnologia (ICN2), Universitat Autònoma de Barcelona (UBA), Barcelona, Spain.
- Sep. 2024** | **Geometry of the dephasing sweet spots of spin-orbit qubits**
> Presented at Silicon Quantum Electronics Workshop (SiQEW 2024), Davos, Switzerland.
- Sep. 2025** | **Hole spin qubits in unstrained Germanium layers**
> Presented at Qtech'25, Hungarian Academy of Sciences, Budapest, Hungary.