

DANIEL UZCATEGUI CONTRERAS

Postdoctoral Researcher in Quantum Information Theory

Universidad de Concepción - Millennium Institute for Research in Optics (MIRO)

Concepción, Chile

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EDUCATION

Ph.D. in Physics

Universidad de Antofagasta, Antofagasta, Chile (2017-2022)

Licenciado en Física

Universidad de los Andes, Mérida, Venezuela (2005-2014)

RESEARCH EXPERIENCE

Postdoctoral Researcher Grant (ANID)

Universidad de Concepción, Chile (Current)

Awarded the Postdoctoral Researcher grant from the Chilean Agencia Nacional de Investigación y Desarrollo ANID under grant number 3230427. Research focus on quantum information theory.

Postdoctoral Researcher

Millennium Institute for Research in Optics (MIRO), Concepción, Chile (January 2022 - April 2023)

Conducted research in quantum information theory with focus on machine learning applications to quantum problems.

Research Assistant - Quantum Information Theory

MINEDUC-UA projects ANT1956 (2020) and ANT20992 (2021), Chile

Participated in research projects focused on quantum information theory applications and theoretical developments.

TEACHING EXPERIENCE

Physics Instructor

University of Antofagasta, Chile (2017-2019)

- Physics 1 for Biology students (2019)
 - Electricity and magnetism for engineering students (2017)
 - Physics Lab (Optics) for engineering students (2018)
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PUBLICATIONS

[1] **Uzcátegui-Contreras, D.**, Guerra, A., Niklitschek, S., & Delgado, A. "Machine Learning Approach to Reconstruct Density Matrices from Quantum Marginals." *Machine Learning: Science and Technology*, June 2025. DOI: 10.1088/2632-2153/ade48d.

[2] Escandón-Monardes, Jorge, **Uzcátegui, D.**, Rivera-Tapia, M., Walborn, Stephen, Delgado, A. "Estimation of high-dimensional unitary transformations saturating the Quantum Cramér-Rao bound." *Quantum*. 8. 1405 (2024). DOI: 10.22331/q-2024-07-10-1405.

[3] **Daniel Uzcátegui Contreras**, Dardo Goyeneche. "Reconstructing the whole from its parts," arXiv:2209.14154 (2022).

[4] S. Gómez, **D. Uzcátegui**, I. Machuca, E. S. Gómez, S. P. Walborn, G. Lima, and D. Goyeneche. "Optimal strategy to certify quantum nonlocality." *Sci Rep* 11, 20489 (2021). DOI: 10.1038/s41598-021-99844-2.

[5] **D. Uzcátegui**, G. Senno and D. Goyeneche. "Fast and simple quantum state estimation." *J. Phys. A: Math. Theor.* 54 085302 (2021). DOI: 10.1088/1751-8121/abdba2.

[6] **D. Uzcátegui**, D. Goyeneche, O. Turek, and Z. Václavíková. "Circulant matrices with orthogonal rows and off-diagonal entries of absolute value 1." *Communications in Mathematics*, vol.29, no.1, 2021, pp.15-34. DOI: 10.2478/cm-2021-0005.

PROGRAMMING AND TECHNICAL SKILLS

Research Computing (Current Position at MIRO)

- Advanced numerical simulations and data analysis for quantum information theory research
- Machine learning applications to quantum problems using Python libraries: NumPy, SciPy, pandas, scikit-learn, Keras, PyTorch, Matplotlib
- Development of optimization algorithms for quantum state reconstruction and estimation

Software Development (TTC - <https://ttc.cl/>)

- GUI development using Python and PyQt framework
 - Database design and management with SQL (MySQL and PostgreSQL)
 - Computer vision applications: RealSense camera data analysis for truck load volume calculations
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CONFERENCE PRESENTATIONS

- **"Deep Learning approach for entanglement discrimination"** - Workshop on Gravity, Holography & Entanglement, Concepción, Chile (2025)
 - **"Quantum Machine Learning for Molecular Optimization"** - 1st Workshop on Molecular Optimization with Quantum Computers, Santiago de Chile (February 2025)
 - **"Machine Learning approach to the quantum marginal problem"** - Workshop MIRO 2024, Santiago de Chile (2024)
 - **"Optimal estimation of high-dimensional unitary transformations"** - Workshop MIRO 2023, Santiago de Chile (2023)
 - **"About the quantum marginal problem"** - Workshop MIRO 2022, Santiago de Chile (2022)
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PROFESSIONAL DEVELOPMENT

Recent Certifications (2023-2024)

- **Bayesian Statistics: Techniques and Models** - Coursera (April 2024)
- **Microsoft Power BI Data Analyst Specialization** - Coursera (February 2024)
- **Bayesian Statistics: From Concept to Data Analysis** - Coursera (February 2024)
- **Inferential Statistical Analysis with Python** - Coursera (May 2023)
- **Understanding and Visualizing Data with Python** - Coursera (February 2023)

Database and Programming (2021)

- **PostgreSQL Database Specialization (3 courses)** - Coursera (June-August 2021)
- **Introduction to Computational Thinking and Data Science** - MITx (May 2021)
- **An Intuitive Introduction to Probability** - Coursera (February 2021)

Machine Learning and Deep Learning (2020-2021)

- **Deep Learning Specialization (3 courses)** - DeepLearning.AI, Coursera (November 2020 - January 2021)

Foundational Courses (2016)

- **Introduction to Data Science in Python** - University of Michigan, Coursera (December 2016)
- **Algorithmic Toolbox** - University of California San Diego, Coursera (April 2016)