Alberto Ruiz-Biestro iD

Engineering Physics

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EDUCATION

2020 – 2024 **B.Sc. Engineering Physics**, *Monterrey Institute of Technology*. GPA: 3.6
TOEFL iBT Score: 108.

PUBLICATIONS

1. **Alberto Ruiz-Biestro** and Julio C. Gutierrez-Vega.
   "Solutions of the Lippmann-Schwinger equation for confocal parabolic billiards".
   Phys. Rev. E., Mar 2024. doi:10.1103/PhysRevE.109.034203.

CONFERENCE PRESENTATIONS

2. **Mexican Optics and Photonics Meeting**. Poster presentation.
   "Lippmann-Schwinger equation in parabolic geometries". Nov 2023.
1. **National Space Activity Congress** (CONACES). "Raman spectrometer design for biosignature detection" (virtual). Nov 2021.

AWARDS

Apr 2023 **Best Team Project**. *International Centre for Theoretical Physics* & *Quantinuum* Trieste, Italy. 2nd place in the quantum hackathon.

Aug 2020 **Academic Merit Scholarship**, *Monterrey Institute of Technology*.

SKILLS

Numerical Proficient in **Julia**, **MATLAB**, **Python**, and **Linux**. Proven skills in Mathematica, Bash and **Git**.
Experimental Experimental optics. Bruker X-ray diffractometer D2 Phaser and related software, FTIR, UV-VIS.
Soft skills Analytical thinking, problem solving, collaboration, scientific communication.

TEACHING EXPERIENCE

Aug 2023 – Dec 2023 **Course assistant for Mathematical Methods for Physics**.
Graded homework and exams; held weekly advisory sessions.

Aug 2022 – Jun 2023 **Course assistant for Modern Electrodynamics**.
Graded homework and exams; held weekly advisory sessions.

LEADERSHIP

2022 – 2023 **Quantum Computing Club** co-founder and VP.
- Organization of seminars, including one with Dr. Benjamín Perez-García on the implementation of Deutsch's algorithm with linear optics.

- Organization and construction of a variety of courses that gave undergraduate students tools to program and analyze quantum algorithms.
- Active participation in the organization of my institution's first **quantum hackathon**. Helped with dissemination and spreading the invitation to external faculty and students.
- Coordinated and teaching of workshops in colaboration with the *Physics Student Society* (AEF in Spanish) from Nuevo-Leon's Autonomous University (UANL).
- Organization, planning, and direction of quantum computing bootcamps, offering intensive courses to students from ITESM as well as from other universities.
- Our outreach has grown beyond the state of Nuevo León.

2023	SPIE Student Chapter President
2022 – 2023	Given talks and short courses on Julia, Python, and LaTeX.

RESEARCH EXPERIENCE

Sep 2023 – Present
Photonics and Mathematical Optics Group, *Monterrey, Mexico*
Advisors: Julio C. Gutierrez-Vega ♂
Implemented a Boundary Integral Method for solving the Lippmann-Schwinger (scattering) Equation.
Development of meshes for discretization and parallel computation.
Advanced theoretical methods and mathematical formulations for analytic results.

Apr 2023
International Centre for Theoretical Physics & Quantinuum. *Trieste, Italy*
Advisor: Nathan Fitzpatrick ⬤ (*Quantinuum*)
- Generated ground and excited state curves using a Quantum Krylov-subspace method along a reaction coordinate for an H_2 molecular Hamiltonian.
- Development of hybrid quantum-classical algorithms with TKET and the InQuanto quantum chemistry platform; aided team in setting up and using **Git** for version control.
- Collaborated with graduate students from diverse backgrounds. Our team received the *Best Team Project* award, along with second place.

Aug 2021 – Jun 2022
Photonics and Mathematical Optics Group, *Monterrey, Mexico*
Advisors: Dr. Antonio Ortiz-Ambriz ⬤ Dr. Gerardo Fox ⬤ Dr. Servando López ⬤
- Numerical simulation of the *Nonlinear Schrodinger Equation* through *pseudo-spectral method* (split-step Fourier) and numerical solutions of Boundary Value Problems (shooting method, finite differences, etc.).
- Developed audio-identification algorithm in order to identify an audio recording from a microphone (FFT and signal-processing methods).
- Analyzed the travelling-salesman-problem through simulated annealing; simulated the dynamics and critical points of the Lenz-Ising model.
- Developed **Genetic algorithms** and **Neural Networks**; Experience with **Agent Based Modeling**.