

# Alberto Ruiz-Biestro

BSc Engineering Physics – [Photonics & Quantum Systems](#)  
[Nano & Microstructures RG](#)

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## EDUCATION

**B.S. Engineering Physics** (expected) Monterrey Institute of Technology **Aug 2020 – Jun 2024**  
Current GPA: 3.8 (Percent Grade: 95.95)  
**TOEFL iBT** Score: 108 ([contact me](#) for a .PDF copy) CEFR equivalence: C1

## EXPERIENCE

**Quantum Hackathon Awardee** [International Centre for Theoretical Physics & Quantinuum](#) **April 2023**  
Advisor: Nathan Fitzpatrick [ID](#) ([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 using TKET and the InQuanto quantum chemistry platform.
- Collaborated with graduate students from various backgrounds. Our team received the *Best Team Project* award.
- Attended lectures on Quantum Adiabatic Computation, Quantum Error Correction, Quantum Chemistry, and ZX calculus.

**Undergraduate Research Assistant** *ITESM, Photonics and Quantum Systems* **(ongoing)**  
Advisors: Julio C. Gutierrez-Vega [G](#)

- Research focused on efficient implementation of a Boundary Wall Method for Lippmann-Schwinger (scattering) Equation in different geometries.

**Undergraduate Research Experience** *ITESM, Physics Department* **2021 – 2022**  
Advisors: Dr. Antonio Ortiz-Ambriz [ID](#) Dr. Gerardo Fox [ID](#) Dr. Servando López [ID](#)

- 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).
- Numerical simulation of the travelling-salesman-problem through simulated annealing. Other work includes working with continuous-time Markov processes and the Lenz-Ising model.
- Experience with *Genetic algorithms* and *Neural Networks* (see my [website](#)).

## SKILLS

- **Computational** (*alphabetically*): basic C/C++, COMSOL, Git, advanced Julia,  $\LaTeX$ , Linux shell, Matlab (GA & NN), Object-Oriented-Programming, and advanced Python (incl. Pandas and other libraries). Working knowledge of HTML and CSS.
  - **Quantum Software**: TKET (pytket), Qiskit.
- **Experimental**: Arduino and microcontrollers; Optics laboratory equipment (HeNe lasers, waveplates and polarizers, holography, etc.); XRD and Bruker software; AFM; UV-VIS, FTIR, RAMAN spectrometers, thin-film deposition.
- **Soft Skills**: Research skills, leadership, adaptability, teamwork, attention to detail.

## TEACHING / LEADERSHIP

- Undergraduate **Quantum Computing Club** co-founder and VP **2022 –**
  - Founded the group with the intent of teaching areas of quantum mechanics and quantum computing to interested students that may not have had similar classes. Organized seminars, including one with [Dr. Benjamín Perez-García](#) on the implementation of Deutsch's algorithm with linear optics, as well as 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.

- Co and teaching of workshops in collaboration 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.
- Undergraduate *Mathematical Methods for Physics* course assistant 2023
- Given talks and short courses on Julia, Python,  $\text{\LaTeX}$  2022 – 2023
- [SPIE](#) Student Chapter President and [OSA](#) member 2023
  - Provided sponsorship opportunities for the **International Physics Symposium**.
- Undergraduate Electrodynamics course assistant 2022 – 2023
- Virtual poster presentation 2021
  - Presented a Raman spectrometer design for biosignature detection in a rover for the National Space Activity Congress ([CONACES](#)), organized by the Mexican Space Agency.
- Academic Merit Scholarship recipient from Monterrey Institute of Technology (ITESM) 2020
- Mathematics course tutor to a group of 20 kids in secondary school 2020.

## ACTIVITIES AND INTERESTS

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<i>Social Services</i>	Teaching at low income communities in Mexico.
<i>Sports</i>	Former state rugby player (long ago).
	Enjoy hiking, biking, avid bouldering and rock climbing, and the outdoors.
<i>Other activities</i>	Often enjoy playing the piano and making music.