Jacob Enrique Uribe

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Education

University of Wisconsin-Madison Madison, WI
M.S. Physics: Quantum Computing *Dec 2025*

- **GPA**: 3.6/4.0
- **Relevant Coursework**: Advanced Quantum Computing (PHYS 779), Quantum Computing Laboratory (PHYS 707), Optics (PHYS 625), Electrodynamics (PHYS 721)

University of Wisconsin-Madison Madison, WI
B.S. Physics, Certificate in Computer Science *May 2024*

- **Relevant Coursework**: Discrete Mathematics, Numerical Linear Algebra, Circuits & Electronics, Atomic & Quantum Physics

Skills

Programming: Python (NumPy, SciPy, Pandas, Matplotlib, Torch, JAX), C, C#, C++, SQL, MATLAB, Mathematica, R, Java
Software Engineering: Git, CI/CD Pipelines, Azure DevOps, Azure Resource Manager, Structured Testing & Documentation
Quantum Computation & Simulation: State-Vector & Tensor Network Simulation, QuTiP (Lindblad dynamics, mesolve), Qiskit, ARTIQ Quantum OS, COMSOL Multiphysics, PyZX, TKET
Lab & Hardware: Magneto-Optical Trapping (MOT), NI Analog & Digital DAQ, Laser Cavity Analysis, PDH Locking, Fiber Optics

Research Experience

University of Wisconsin-Madison (Saffman SNAQ Lab) Madison, WI
Quantum Networking Research Assistant *Jan 2024 – Dec 2025*

- Developed and maintained hardware control tooling in Python using the ARTIQ quantum OS; designed and documented internal APIs.
- Built automated data pipelines for experimental parameter extraction (trap depth, loading rate, single-atom fidelity), replacing manual workflows and enabling systematic benchmarking of system performance.
- Automated polarization drift correction in SM fiber optics via Python feedback loop reading analog photodiode data through NI DAQ, replacing manual calibration and increasing experimental uptime.
- Designed electromagnetic field simulations at 6.8GHz, in COMSOL, for hardware-aware validation of trap geometry configurations prior to deployment.

University of Wisconsin-Madison (Yavuz Lab) Madison, WI
Graduate Research Assistant *Oct 2025 – Present*

- Developing analytic solutions to the superradiance problem in neutral atom ensembles, modeling collective decay in multi-atom systems where exponential state-space scaling drives the need for compressed representations; designing the next phase of the simulation pipeline around tensor network methods on GPU-capable libraries (PyTorch, JAX) to enable CUDA-backed acceleration as system sizes grow.
- Transforming research prototypes into structured Python library code: building a package for Pauli String Hamiltonian summation and exponentiation (ZXW Calculus framework.) Used version control, and some automated testing.

Professional Experience

Milliman Brookfield, WI
Application Development Intern *Jun 2022 – Aug 2022*

- Developed production backend infrastructure for client applications in C# and SQL, conforming to code review and style requirements.
- Managed CI/CD pipelines and cloud resource deployment using Azure DevOps, Azure Resource Manager, and Azure Data Factory.
- Conducted QA testing with structured test plans; compiled release documentation for production deployment.

Academic Projects

Stern-Gerlach Experiment Simulation (PHYS 707) | *Python (NumPy, SciPy, Matplotlib)*

- Built a custom Finite Difference Method solver in Python to simulate the Stern-Gerlach effect, replacing proprietary commercial software with a modular, accessible toolchain; validated results against historical experimental data.
- Optimized particle propagation using Monte Carlo simulation with Boltzmann velocity distribution, processing ∼19,000 trajectories with systematic noise characterization and curve fitting.

Dissipative State Preparation & Topological Error Correction (PHYS 779) | *Python, QuTiP*

- Implemented a dissipative encoder for the Toric Code using the Lindblad master equation in QuTiP, benchmarking logical fidelity under error mitigation protocols (>99% in noise-free regimes).
- Characterized protocol robustness against parameter errors (up to ±15%) through systematic noise analysis, achieving ∼92% singlet-state preparation fidelity.

Awards

Dean's List: Fall 2020 (UW-Madison)

National Hispanic Merit Scholar: Fall 2019

Athletic Honors: 4-time Letterman (Wrestling), 2-time Mike Cronan Award (Hardest Working Athlete).