Deval Deliwala

+1 (480) 734-9235 — devaldeliwala@berkeley.edu — in ⓖ ⊕

Education

B.A. in Astrophysics & Mathematics   *Aug 2022 – May 2026*
University of California, Berkeley. GPA: 3.7

Employment

⌂ NASA Quantum Intern   *Summer 2025*
Under Dr. Daniel R. Hart   *NASA Glenn Research Center*

- Derived, from first principles, the full spin physics governing silicon carbide (4H-SiC) spin-defect semiconductors subjected to magnetic field sweeps under an RF bias. Involved Zeeman + Hyperfine + Dipole-Dipole (Zero-Field Splitting) + Exchange Interaction terms for a 2-electron + 2-nuclei system.
- Wrote software for diagonalizing 16×16 Spin Hamiltonians for 4H-SiC; eigen-energy simulations to investigate spin-dependent recombination (SDR), and spin-dependent trap-assisted tunneling (SDTAT) quantum dynamics.
- Solved the Stochastic Liouville Equation for the 4H-SiC spin system to provide the first, full description of Electrically Detected Magnetic Resonance (EDMR) spectra for 4H-SiC.

⌂ Undergraduate Researcher   *Fall 2024 – Present*
Under Dr. Zahra Pedramrazi   *Berkeley Lab, Quantum Nanoelectronics Lab*

- Developed a custom software package for rendering superconducting chip layouts (GDS), inspired by Qiskit Metal but offering enhanced customization for fabrication exports. Features precise component geometry control with an intuitive "nodes" system for snapping components together easily.
- Designed and ran eigenmode simulations of 4-qubit fluxonium and transmon qubit architectures; some were fabricated.
- Performed coherence tests and data acquisition on chips using RF pulses; tested pulse-shape techniques to reduce leakage.

⬇ Undergraduate Researcher   *Fall 2022 – Present*
Under Professor Jessica Lu, Head of Astronomy   *Galactic Center (GC) Group, muLab*

- Applied Markov Chain Monte Carlo (MCMC) to fit compound Gaussian + Linear mixture models to red clump star photometric datasets; found complex Near-Infrared (NIR) extinction behavior over the central 120" × 120" GC region.
- Revealed statistically significant spatial variations in NIR extinction, up to 5σ deviations, from canon extinction models.
- Contributed to fixing models of GC line-of-sight dust geometry and improving photometric correction methods.

Projects

⌂ ManiQ – Animation Package for Visualizing Quantum Computing   *Ongoing*

- Developing an animation package shadowing Manim and Qiskit to visualize quantum circuits and states.
- Will rewrite in Rust, implement circuit/state evolution, entanglement, maybe even some error correction visualizations.

⌂ Dynamical Decoupling (DD) Optimization   *Fall 2024*

- Developed a circuit-stitching algorithm for building DD sequences on unique qubit wires with correct delays.
- Wrote a basic genetic algorithm to build and optimize DD sequences on noisy IBM hardware for error mitigation.

⌂ Quantum Image Encryption Algorithm   *Summer 2024*

- Encoded RGB pixels onto n-dimensional wave functions in a n-sphere via RBF interpolation.
- Reversibly scrambled wave functions using a sequence of noiseless large-depth circuits.
- Customize how much encryption vs. speed from # of qubits. This is done by %-maximizing shannon entropy.
- After benchmarks, performance was limited; may explore optimizations.

⬇ Undergraduate Quantum Mechanics Textbook   *Summer 2024*

- Authored a 150-page undergraduate quantum-mechanics textbook by compiling notes from coursework.

Skills & Relevant Coursework

Languages (All strong): Python · Rust · Java · Mathematica · SQL · LaTeX
Certifications: IBM Basics of Quantum · Quantum Cryptography · 2024 Quantum Challenge Achievement.
Relevant Coursework: Quantum Mechanics, Real Analysis, Data Structures, Algorithms, and more math/physics.