# NICHOLAS A. EZZELL

Quantum Information Scientist, Los Angeles, CA

naezzell@gmail.com ◇ https://naezzell.github.io/ ◇ 424-857-0415

## EDUCATION

**University of Southern California, Advisors: Itay Hen and Daniel Lidar** *2025*
Ph.D. Physics, DOE Computational Science Graduate Fellow
Dissertation: *Theory and design of algorithms for quantum systems*

**Mississippi State University** *2019*
B.S. in Physics and Mathematics, *summa cum laude*, Presidential Scholar

## PROFESSIONAL EXPERIENCE

**HRL Laboratories, Malibu CA** 2025 — Present
*Quantum Information Scientist advancing exchange-only spin qubit theory and technology*

- Derived reduced models of exchange-only qubits that improved noise characterization efficiency by $50\times$
- Coordinated cross-institutional collaboration (HRL–Sandia National Laboratories) on leakage quantification and mitigation, reducing computational leakage by $100\times$
- Created quadratic program to generate efficient stochastic Clifford simulations for exchange-only qubits

**DOE Computational Science Graduate Fellow** 2019 — 2024
*Los Alamos National Laboratory Intern and University of Southern California Ph.D. Fellow*

- Optimized dynamical decoupling strategies for superconducting qubits, supporting quantum advantage demonstrations and beyond break-even surface code implementations on IBM devices
- Formulated and solved the quantum low-rank approximation problem, providing analytic characterizations of optimal low-rank quantum state approximations.
- Extended quantum Monte Carlo to estimate arbitrary operators, enabling phase-transition detection in non-local, strongly correlated models

## SELECTED PUBLICATIONS

**N. Ezzell**, L. Barash, and I. Hen, "A universal black-box quantum Monte Carlo approach to quantum phase transitions," npj Computational Materials (2025).

**N. Ezzell**, B. Pokharel, L. Tewala, G. Quiroz, and D. A. Lidar, "Dynamical decoupling for superconducting qubits: a performance survey," Physical Review Applied 20, 064027 (2023).

**N. Ezzell**, E. M. Ball, A. U. Siddiqui, M. M. Wilde, A. T. Sornborger, P. J. Coles, and Z. Holmes, "Quantum mixed state compiling," Quantum Science and Technology 8, 035001 (2023).

M. C. Caro, H.-Y. Huang, **N. Ezzell**, J. Gibbs, A. T. Sornborger, L. Cincio, P. J. Coles, and Z. Holmes, "Out-of-distribution generalization for learning quantum dynamics," Nature Comm. 14, 3751 (2023).

Q. Zeng, **N. Ezzell**, Arman Babakhani, Itay Hen, and Lev Barash, "Inequalities, identities, and bounds for divided differences of the exponential function," arXiv preprint arXiv:2510.10724 (2025).

## SKILLS

| | |
|---|---|
| **Programming Languages/ Software** | Python, Julia, C++, Bash, Mathematica, Emacs |
| **Versioning and documentation** | GitHub, continuous integration, conda, Docker, LaTeX |
| **High performance computing** | Slurm, OpenMP, MPI |
| **Libraries** | Numpy, Qiskit, QuTiP, DifferentialEquations.jl, HOQST.jl |