NICHOLAS A. EZZELL

Quantum Information Scientist

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EDUCATION

Ph.D. in Physics, University of Southern California   2025
    U.S. Department of Energy Computational Science Graduate Fellowship
    Advisors: Prof. Itay Hen & Prof. Daniel Lidar
    Dissertation: *Theory and design of algorithms for quantum systems*

B.S. in Physics and Mathematics, Mississippi State University   2019
    Summa cum laude | Goldwater Scholar | Presidential Scholar | Honors Thesis in Physics

EXPERIENCE

Quantum Information Scientist IV, HRL Laboratories   2025–Present
- Derived reduced models of exchange-only qubits that improved noise characterization efficiency by $50\times$
- Coordinated cross-institutional collaboration with 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

Doctoral Researcher, University of Southern California   2019–2025
- Identified empirically optimal dynamical decoupling strategies on superconducting qubits that challenged theory, enabling quantum advantage and beyond break-even surface code demonstrations
- Extended quantum Monte Carlo to estimate arbitrary operators, enabling phase-transition detection in previously intractable strongly correlated systems

Graduate Fellow, Los Alamos National Laboratory   2021–2023
- Formulated and solved the quantum low-rank approximation problem, providing analytic characterizations of optimal low-rank quantum state approximations
- Co-developed variational alternative to quantum state tomography achieving $1500\times$ memory and $56\times$ sample efficiency gains and demonstrated on superconducting hardware

Undergraduate Research Intern, Oak Ridge National Laboratory   2017–2018
- Characterized effective quench dynamics in D-Wave quantum annealers with phase-transition diagrams

SELECTED PUBLICATIONS

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

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

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

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

SKILLS

Programming Languages	Python, Julia, C++, Bash, Mathematica
Quantum & Physics Libraries	Qiskit, QuTiP, DifferentialEquations.jl, HOQST.jl
Development & Research Tools	Continuous integration, Docker, conda, GitHub, LaTeX
High-Performance Computing	Slurm, OpenMP, MPI