Ben McDonough
732 Alpine Avenue, Boulder CO 80304
benjamin.mcdonough@colorado.edu m: (615) 788-0221

EDUCATION

University of Colorado, Boulder *Boulder, CO (Doctorate in Physics expected May 2029)*
- **Coursework:** Quantum Field Theory, Theory of the Solid State, Electromagnetic Theory I

Yale University *New Haven, CT (Intensive Physics & Intensive Math B.S. May 2024)*
- **GPA:** 3.97 (Physics: 3.97, Mathematics: 3.97)
- **Honors:** Magna Cum Laude, Phi Beta Kappa, Hertz Foundation Fellowship Finalist
- **Selected Coursework:** Quantum Many Body Theory (grad.); Quantum Optics (grad.); Atomic Physics (grad.); Quantum Mechanics II (grad.); Quantum Mechanics I (grad.); Advanced Classical Mechanics (grad.); Lie Groups & Representation Theory (grad.); Differentiable Manifolds (grad.)

EXPERIENCE

Research Experience

Research in Lucas Theory Group *New Haven, CT (September 2024-Present)*
- Derived novel mathematical bounds on nested commutators in systems with local interactions
- Manuscript in preparation: *The Shape of Operators Outside the Lieb-Robinson Lightcone*

SULI Internship at AMES National Lab *(Ames IA, June 2024-Aug. 2024)*
- Applied random matrix theory and high-performance computing to study the entanglement spectrum of operators evolving under quantum automaton circuits
- Manuscript in preparation: *Operator Entanglement Spectrum and the Onset of Universal Operator Dynamics*

Summer Internship at QuEra Computing Inc. *Cambridge, MA (May 2023-August 2023)*
- Designed and executed experimental benchmarking of Rydberg-atom quantum simulator based on dynamical quantum chaos
- Coded numerical tools in Julia to simulate noisy evolution on quantum processor & integrated tools with QuEra Bloqade software toolchain

Fermilab SQMS Summer Internship Program *Evanston, IL (June 2022-August 2022)*
- Created novel quantum error mitigation scheme; Presented work at IEEE SC 22 conference
- B. McDonough, et al., "Automated quantum error mitigation based on probabilistic error reduction," in 2022 IEEE/ACM Third International Workshop on Quantum Computing Software

Activities and Leadership

Founder of the Quantum Coalition
- Founded the Quantum Coalition, an organization of quantum computing student groups dedicated to building research community and education outreach (https://www.quantumcoalition.io/)
- Directed a virtual six-week research-athon with 6 industry sponsors and 500 participants; Organized and directed a 3-day undergraduate-only online reach conference with presentations from 34 undergraduates and attendees from 12 universities; Planned and directed a weeklong virtual quantum computing bootcamp and hackathon with 9 industry sponsors and over 800 participants from 69 different countries

MIT iQuHACK 1st Place *Cambridge, MA (January 2022/23)*
- Won first place in team of five with submission to MIT iQuHACK 2023 QuERA challenge
- Won first place in team of five with submission to MIT iQuHACK 2022 QuTech challenge

Work Experience

Teaching Assistant (paid) Boulder CO *(September 2024-Present)*
- 1-on-1 student instruction in office hours, leads course sections, and proctors exams as teaching assistant for Introductory Physics 2

SKILLS & INTERESTS

- Programming: Julia, QuTiP, scQubits, Python, C, Qiskit, PyQuil, Linux, Matlab, Mathematica, LaTeX
- Language: Spanish - fluent; Hindi - intermediate proficiency
- Flute
- Rock Climbing