Ben McDonough
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EDUCATION

University of Colorado, Boulder *Boulder, CO (Doctorate in Physics expected May 2029)*
- **Honors***:* 2025 NDSEG Fellowship, Outstanding TA Award
- **Coursework:** Quantum Field Theory, Theory of the Solid State, Electromagnetic Theory I, Quantum Dynamics, Topology II

Yale University *New Haven, CT (Intensive Physics & Intensive Math B.S. May 2024)*
- **GPA**: 3.97/4.00
- **Honors:** Magna Cum Laude, Phi Beta Kappa, Hertz Foundation Fellowship Finalist, DeForest Pioneers Prize
- **Selected Coursework:** Quantum Many Body Theory (grad.); Quantum Optics (grad.); Atomic Physics (grad.); Quantum Mechanics I/II (grad.); Advanced Classical Mechanics (grad.); Lie Groups & Representation Theory (grad.); Differentiable Manifolds (grad.)

The McCallie School *Chattanooga, TN (Diploma: May 2020)*
- Cumulative GPA: 4.29/4.0 - Full Merit Scholarship - 1st in class of 300 (Valedictorian)
- Awards: John Philip Sousa Award, Burns Award for Modern Languages, John C. Johnson Spanish Award

EXPERIENCE

Research Experience

Research in Lucas Theory Group *Boulder, CO (September 2024-Present)*
- Derived novel mathematical bounds on nested commutators in systems with local interactions
- Submitted manuscript for publication: *Lieb-Robinson bounds with exponential-in-volume tails*

SULI Internship at AMES National Lab *Ames, IA (June 2024-Aug. 2024)*
- Carried out theoretical and computational investigation of operator entanglement dynamics in automaton quantum circuits
- Submitted manuscript for publication: *Bridging Classical and Quantum Information Chaos with the Operator Entanglement Spectrum*

Algorithms & Applications Intern 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, Co-chair of the Quantum Coalition *Online (September 2021-Present)*
- Founded the Quantum Coalition, a nonprofit organization of quantum computing student groups dedicated to building research community, and education outreach, and quantum computing workforce development at the undergraduate level (https://www.quantumcoalition.io/)
- Directed 3-day undergraduate-only online reach conference with presentations from 34 undergraduates and attendees from 12 universities

- Directed a weeklong online bootcamp and hackathon with over 500 participants from 69 different countries

President of Yale Undergraduate Quantum Computing *New Haven, CT (September 2022-May 2023)*
- Grew the Yale undergraduate quantum computing club from 6 to 55 members
- Spearheaded a collaborative, project based model; Designed and led an introductory quantum information mini-course for new members

MIT iQuHACK 1st Place *Cambridge, MA (January 2022/23)*
- Won first place in team of five with novel solution to scaling optimization problems on a Rydberg atom quantum computer, submitted to the MIT iQuHACK 2023 QuERA challenge
- Won first place in team of five with hardware-aware quantum error correction benchmarking software submitted to MIT iQuHACK 2022 QuTech challenge

Intel International Science & Engineering Fair (ISEF) 4th place *Los Angeles, CA (May 2017)*
- Designed and coded software using Java and OpenNI to provide computer accessibility to people with disabilities affecting dexterity through gesture recognition and tracking
- Presented project and research paper at international fair, competed against over 1,700 participants, won 4th in Systems Software Category

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

City Climb Belay Staff and Front Desk Manager *New Haven, CT (May 2021-May 2022)*
- Instructed belay and climbing classes; managed intake

Hispanic Family Foundation Volunteer (unpaid) *Nashville, TN (June 2019-August 2019)*
- Made phone calls in Spanish, managed payments over SalesForce, and created informational flyers to register over 20 families for *Baila* after school dance and music program
- Helped organize and assisted at community events such as a joint effort with the Nashville Metro Police Department to foster community engagement and trust attended by over 300 community members

SKILLS & INTERESTS

Computer skills
- Programming: Julia, QuTiP, scQubits, Python, C, Qiskit, PyQuil, Linux, Matlab, Mathematica, LaTeX
- Proficiency in programming languages: Julia, Python, QuTiP, scQubits, C, Qiskit, Matlab, Mathematica
- Software development: Object-oriented design and programming, High-performance computing, GitHub project management
- Linux hobbiest / Open-source software enthusiast

Other interests
- Language: Spanish - fluent; Hindi - intermediate proficiency
- Plays flute in the Grand Canonical Ensemble, a Physics Department classical music ensemble
- Rock Climbing