

Curriculum Vitae

PERSONAL INFORMATION

Brandon Barton
Graduate Research Assistant
Colorado School of Mines
Department of Applied Mathematics and Statistics
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EDUCATION

- 08/2022–05/2024 **M.Sc., Computational and Applied Mathematics**
Colorado School of Mines, Golden, CO, USA
Advisor: Dr. Lincoln Carr
Co-advisor: Dr. Cecilia Diniz Behn
- 06/2020–08/2022 **B.Sc., Computer Science**
Colorado School of Mines, Golden, CO, USA
- 08/2018–05/2020 **Progress towards B.Sc., Computer Science**
Case Western Reserve University, Cleveland, OH, USA

ACADEMIC EXPERIENCE

- 05/2022–Current **Graduate Research Assistant**
Department of Applied Mathematics and Statistics
Colorado School of Mines, Golden, CO 80401
Description: Quantum many-body theory, machine learning, graph theory.
- 09/2023–Current **Visiting Graduate Researcher**
Institute of Pure and Applied Mathematics (IPAM)
University of California, Los Angeles (UCLA), Los Angeles, CA 90095
Description: Long program on Mathematics and Computational Challenges in Quantum Computing (QCQ) including various topics in quantum computing.

- 06/2021–12/2021 **Undergraduate Research Assistant**
 Department of Computer Science
 Colorado School of Mines
 Description: Non-equilibrium quantum dynamics, dynamical quantum phase transitions, structure of multi-layer quantum entanglement networks.
- 08/2020–05/2021 **Undergraduate Research Scholar**
 Google Explore Computer Science Research (CSR) Program.
 Colorado School of Mines, Golden, CO
 Description: Human robot interaction, human computer interaction, robot cognitive architectures, graph representation learning.

PROFESSIONAL EXPERIENCE

- 12/2022–Current **The Coding School - Qubit by Qubit**
 Position: Teaching Assistant
 Description: Lead *Qubit by Qubit* (QxQ) quantum programming lab sections student group of high school and undergraduate students with diverse backgrounds. Lead future AI leaders program, *TRAIN*, programming lab sections to underrepresented faculty members at community colleges.

PUBLICATIONS

(† : Alphabetical)

Preprints

1. *Iterative optimization of hard spin glass problems with high frequency AC drives.* **BA Barton**, S Feeney, G Grattan, P Patnaik, JC Sagal, V Oganessian, LD Carr, and E Kapit. (2023 forthcoming).
2. *On the approximability of random-hypergraph MAX-3-XORSAT problems with quantum algorithms.* E Kapit, **BA Barton**[†], S Feeney, G Grattan, P Patnaik, JC Sagal, LD Carr, V Oganessian. (arXiv:2312.06104). 2023.
3. *Exponential acceleration of macroscopic quantum tunneling in a Floquet Ising model.* G Grattan, **BA Barton**[†], S Feeney, P Patnaik, JC Sagal, G Mossi, V Oganessian, LD Carr, and E Kapit. (arXiv:2311.17814). 2023.

Publications

1. *Unpretty Please: Ostensibly Polite Wakewords Discourage Politeness in both Robot-Directed and Human-Directed Communication.* R Wen, **BA Barton**, S Faure, T Williams. (Proceedings of

ICMI-MLMI 2022).

Contributed Talks

1. *Symphonic tunneling: A story of high frequency drives with applications to quantum optimization algorithms.* **IPAM QCQ**. Institute for Pure and Applied Mathematics Junior Researcher Seminar. Los Angeles, CA. Nov. 2023.
2. *What is it like to be a quantum particle?* **NSF NRT Annual Meeting**. Graduate Student Science Communication Workshop Series. Virginia Tech, VA. Oct. 2022.
3. *Characterizing dynamical quantum phase transitions in the transverse field ising model: a complex network theory approach.* **QMATH 15**. Mathematical Results in Quantum Information Theory. UC Davis, CA. Sept. 2022.

Posters

1. *IST-SAT: Iterative symphonic tunneling for satisfiability problems.* IPAM QCQ Workshop IV: Topology, Quantum Error Correction and Quantum Gravity, Los Angeles, CA. Nov 2023.
2. *Exponential acceleration of macroscopic quantum tunneling.* IPAM QCQ Workshop III: Many-body Quantum Systems via Classical and Quantum Computation, Los Angeles, CA. Nov 2023.
3. *Network-based methods to assess the robustness of neural network quantum states.* Quantum Simulation Conference (QSim), Telluride, CO. Aug 2023.
4. *Pairwise entanglement networks as a probe into non-equilibrium quantum dynamics.* Summer Undergraduate Research Symposium, Colorado School of Mines, Golden, CO. Oct 2022. *1st Place for Best Poster Presentation.*

OUTREACH AND ACTIVITIES

Colorado School of Mines

- **Carr Complexity Science Group** – Graduate student mentor
Mentored undergraduate students in independent study research projects. Provided reading materials, developed research questions, and worked with students on a regular basis. Led joint reviews of academic journal articles.
- **Society of Quantum Engineers** – Director and co-founder
Established club, organized graduate quantum seminar with over twenty industry and academic talks, formed industry partnerships for hackathon events, organized lab tours at national laboratories and local quantum start-ups. Held and attended outreach events at K-12 schools in the Denver-metropolitan area.

HONORS & AWARDS

Fellowships

- NSF QENRT Fellowship (2023-24) National Science Foundation, Quantum Engineering National Research Traineeship Fellowship program at the Colorado School of Mines.
- Summer Undergraduate Research Fellowship (SURF) (2022) Colorado School of Mines University Honors and Scholars Program.

Honors

- Honor's Distinction (2022) Undergraduate honors distinction, Department of Computer Science, Colorado School of Mines.
- Dean's High Honor's List (2021) Colorado School of Mines.
- UAA Academic All-American (2018-2020) University Athletic Association Men's Varsity Wrestling, Case Western Reserve University.
- Dean's High Honor's List (2018-2020) Case Western Reserve University.

SCHOOLS AND WORKSHOPS ATTENDED

- IPAM QCQ 2023 Long Program on Mathematical and Computational Challenges of Quantum Computing.
- QSim 2023 Quantum Simulation Conference and Summer School.
- IEEE QCE 2022 International Conference on Quantum Computing and Engineering (Quantum week).
- QMATH 15 2022 Mathematical Results in Quantum Information Theory.

PERSONAL INTERESTS

Running, Brazillian jiu-jitsu, reading.

LANGUAGES

English (native), French (basic).

REFERENCES

- Dr. Lincoln D. Carr** (M.Sc. advisor)
Professor at the Colorado School of Mines
Department of Physics, Department of Applied Mathematics and Statistics
1523 Illinois St, Golden, CO 80401
Email: lcarr@mines.edu
- Dr. Cecilia Diniz Behn** (M.Sc. co-advisor)
Associate Professor at the Colorado School of Mines
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Email: cdinizbehn@mines.edu
- Dr. Eliot Kapit** (Collaborator & Mentor)
Associate Professor at the Colorado School of Mines
Department of Physics
1523 Illinois St, Golden, CO 80401
Email: ekpait@mines.edu
- Dr. Zhexuan Gong** (Collaborator & Mentor)
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