Jacob Bringewatt

Curriculum Vitae
Sept. 13, 2023

University of Maryland, College Park
Department of Physics
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EDUCATION

University of Maryland, College Park
Ph.D., Physics, 2024 (expected)

University of Maryland, College Park
B.S., Physics, *cum laude* with high honors in physics, 2018

FELLOWSHIPS

Charles T. Husar Fellowship in Physics, University of Maryland, 2023
Graduate Fellow, Kavli Institute for Theoretical Physics, 2022
Computational Science Graduate Fellow (CSGF), United States Department of Energy, 2018-22
Lanczos Graduate Fellow, Joint Center for Quantum Information and Computer Science, 2018-20
Banneker/Key Scholar, University of Maryland, 2014-18

AWARDS AND HONORS

Board of Visitors Outstanding Graduate Student Award, University of Maryland, 2023
Invention of the Year Finalist, University of Maryland, College Park, 2023
Three Minute Thesis (3MT) Finalist, University of Maryland, College Park, 2022
Communicate Your Science Contest Winner, Krell Institute, 2019

GRANTS

Seed Grant, Joint Center for Quantum Information and Computer Science, 2022-23
Seed Grant, Institute for Robust Quantum Simulation, 2022-23

PUBLICATIONS

* denotes equal contribution, † denotes alphabetical order

14. *J Bringewatt*, J Kunjummen, N Mueller. "Randomized measurement protocols for lattice gauge theories." Preprint. (2023) [arXiv:2303.15519]

13. *J Bringewatt**, Michael Jarret*, T C Mooney*.† "On the stability of solutions to Schrodinger's equation short of the adiabatic limit." Preprint. (2023) [arXiv:2303.13478]

12. A Ehrenberg*, *J Bringewatt**, A V Gorshkov. "Minimum entanglement protocols for function estimation." Phys. Rev. Research. Accepted. (2023) [arXiv:2110.07613]

11. *J Bringewatt*, Z Davoudi. "Parallelization techniques for quantum simulation of fermionic systems." Quantum 7, 975 (2023) [arXiv:2207.12470]

10. L P García-Pintos, L T Brady, *J Bringewatt*, Y-K Liu. "Lower bounds on quantum annealing times." Phys. Rev. Lett. 130, 140601 (2023) [arXiv:2210.15687]

9. T C Mooney, *J Bringewatt*, N C Warrington, L T Brady. "Lefschetz thimble quantum Monte Carlo for spin systems." Phys. Rev. B 106, 214416 (2022) [arXiv:2110.10699]

8. *J Bringewatt*, L T Brady. "Simultaneous stoquasticity." Phys. Rev. A 105, 062601 (2022) [arXiv:2202.08863]

7. *J Bringewatt*, I Boettcher, P Niroula, P Bienias, A V Gorshkov. "Protocols for estimating multiple functions with quantum sensor networks: geometry and performance." Phys. Rev. Research 3, 033011. (2021) [arXiv:2104.09540]

6. T Qian, *J Bringewatt*, I Boettcher, P Bienias, A V Gorshkov. "Optimal measurement of field properties with quantum sensor networks." Phys. Rev. A (Letter) 103, L030601. (2021) [arXiv:2011.01259]

5. *J Bringewatt*, N Sato , W Melnitchouk, J Qiu, F Steffens, M Constantinou. "Confronting lattice parton distributions with global QCD analysis." Phys. Rev. D. 103, 016003 (2021) [arXiv:2010.00548]

4. *J Bringewatt**, M Jarret*.† "Effective gaps are not effective: quasipolynomial classical simulation of obstructed stoquastic Hamiltonians." Phys. Rev. Lett. 125, 170504 (2020) [arXiv:2004.08681]

3. *J Bringewatt*, W Dorland, SP Jordan. "Polynomial time algorithms for estimating spectra of adiabatic Hamiltonians." Phys. Rev. A 100 (3), 032336 (2019) [arXiv:1905.07461]. Editors' Suggestion.

2. *J Bringewatt*, W Dorland, SP Jordan, A Mink. "Diffusion Monte Carlo approach versus adiabatic computation for local Hamiltonians." Phys. Rev. A 97 (2), 022323 (2018) [arXiv:1709.03971]

1. K Pushkin, C Akerlof, D Anbajagane, J Armstrong, M Arthurs, *J Bringewatt*, T Edberg, C Hall, M Lei, R Raymond, M Reh, D Saini, A Sander, J Schaefer, D Seymour, N Swanson, Y Wang, W Lorenzon. "Study of radon reduction in gases for rare event search experiments." Nucl. Instrum. Methods Phys. Res., Sect. A 903, 267-276 (2018) [arXiv:1805.11306]

PATENTS/PROVISIONAL PATENTS

3. T. Qian, J. Bringewatt, I. Boettcher, P. Bienias, A. V. Gorshkov, Systems and Methods for Measurement of Field Properties Using Quantum Sensor Networks, U.S. Patent Application 17/978,420, filed Aug. 17, 2023.

2. A. Ehrenberg, J. Bringewatt, A. V. Gorshkov, Minimum Entanglement Protocols for Function Estimation, U.S. Provisional Patent Application 63/397546, filed August 12, 2022.

1. J. Bringewatt, I. Boettcher, P. Niroula, P. Bienias, A. V. Gorshkov, Measurement of Multiple Functions with Quantum Sensor Networks, U.S. Provisional Patent Application 63/363171, filed April 18, 2022.

INVITED TALKS

8. "Randomized measurement protocols for lattice gauge theories." Glancy/Knill Group Meeting, NIST Boulder. July 2023.

7. "Towards (spin) coherent resolutions of the sign problem." George Mason University Quantum Computing Seminar. Apr. 2023.

6. "The role of entanglement for function estimation with quantum sensor networks." Caltech/ AWS Seminar. Dec. 2022.

5. "The role of entanglement for function estimation with quantum sensor networks." George Mason University Quantum Computing Seminar. Feb. 2022.

4. "Lefschetz thimble quantum Monte Carlo for spin systems." USC Condensed Matter Seminar. Nov. 2021

3. "Lefschetz thimble quantum Monte Carlo for spin systems." MIT Computational Research in Boston and Beyond (CRIBB) seminar. Nov. 2021.

2. "Lattice data in the JAM framework." Amherst Center for Fundamental Interactions (ACFI) Workshop on QCD Real-Time Dynamics and Inverse Problems. Oct. 2020.

1. "Confronting lattice parton densities with global QCD analysis." AI for Nuclear Physics Workshop. Mar. 2020.

CONFERENCE TALKS

5. "Weighting God's dice: exploiting symmetry in randomized measurement protocols." DOE CSGF Annual Program Review. July 2023.

4. "Measuring functions with quantum sensor networks." 23rd Annual SQuInT Workshop. Oct. 2021.

3. "Effective gaps are not effective: quasipolynomial simulation of obstructed stoquastic Hamiltonians." DOE Computational Science Graduate Fellowship Annual Program Review. July 2021.

2. "Optimal measurement of field properties with quantum sensor networks." March Meeting 2021. Mar. 2021.

1. "Confronting lattice parton densities with global QCD analysis." DNP2019. Oct. 2019.

CAMPUS/DEPARTMENTAL TALKS

15. "Randomized measurement protocols for lattice gauge theories." Davoudi Group Meeting. Apr. 2023.

14. "The geometry and algebra of quantum Fisher information." Gorshkov Group Meeting. Mar. 2023.

13. "Quantum metrology: An introduction." Davoudi Group Meeting. Mar. 2023.

12. "Simultaneous stoquasticity." KITP Condensed Matter/Quantum Physics Seminar. Aug. 2022.

11. "The sign problem and quantum advantage." KITP Locals Lunch Seminar. Aug. 2022.

10. "Ultimate limits for function estimation in quantum metrology." Gorshkov Group Meeting. Jan. 2022.

9. "Minimum entanglement protocols for function estimation." QuICS/JQI Friday Quantum Seminar. Oct. 2021.

8. "Fermionic mappings, qubit architectures, and graph coloring." Davoudi Group Meeting. Aug. 2021.

7. "Estimating multiple functions with quantum sensor networks." Gorshkov Group Meeting. Jan. 2021.

6. "Effective gaps are not effective." Gorshkov Group Meeting. April 2020.

5. "Quantum sensor networks and Fisher information." Gorshkov Group Meeting. Aug. 2019.

4. "Confronting lattice parton densities with global QCD analysis." Jefferson Lab Theory Seminar. July 2019.

3. "Diffusion Monte Carlo approach versus adiabatic computation for local Hamiltonians." Gorshkov Group Meeting. Aug. 2018.

2. "Diffusion Monte Carlo approach versus adiabatic computation for local Hamiltonians." University of Maryland Undergraduate Research Showcase. May 2018

1. "Diffusion Monte Carlo approach versus adiabatic computation for local Hamiltonians." Undergraduate Thesis Defense. May 2018.

TEACHING EXPERIENCE

United States Naval Academy
- General Physics I, Fall 2023

University of Maryland, College Park
Math Tutor, 2016-18
Philosophy of Quantum Mechanics (Teaching Assistant), 2016

ADDITIONAL TRAINING/TEACHING

Seminar Course on Physics Education Research for Teaching Quantum Mechanics, 2021
Workshop on Intuition, Reasoning, and Conceptual Understanding in Physics, 2021
Seminar Course on Introduction to Physics Education Research, 2020
Workshop on Science Communication, 2020
Martial Arts Instructor, 2010-16

MENTORSHIP

Anisah Khattak, currently undergraduate at Notre Dame of Maryland University, 2023
Othello D. Gomes, currently undergraduate at University of Maryland, 2022-23
Tarushii Goel, currently undergraduate at MIT, 2022
Timothy (Connor) Mooney, currently graduate student at University of Maryland, 2021-22
Akshita Gorti, currently undergraduate at Cornell University, 2021-22
Timothy Qian, currently undergraduate at MIT, 2020
Ivy Liang, 2020

SERVICE TO THE PROFESSION

Journal referee for 10+ publications in:
ACM Transactions on Quantum Computing
npj Quantum Information
Physical Review Letters
Physical Review Applied
Quantum
Conference referee for:

QIP, 2022-23
TQC, 2022-23
Institute of Physics (IOP) Trusted Reviewer

DEPARTMENTAL SERVICE

Member, UMD Physics Department Graduate Student Colloquium Committee, 2021-23
Mentor and Panelist, GRAD-MAP Winter Workshop and Summer Scholars Programs, 2021-23
Co-organizer, Reading Group on Geometry of Quantum States, 2021-22
Organizer, QuICS-JQI-CMTC Friday Seminar, 2020-21
Panelist, Conference for Undergraduate Underrepresented Minorities in Physics (cu2mip), 2021
Volunteer, University of Maryland Prospective Graduate Student Open Houses, 2019-21

OUTREACH/COMMUNITY INVOLVEMENT

Podcast guest, Learn to Live podcast, hosted by University of Maryland undergrads, 2023
Judge for Communicate Your Science Essay Contest, Krell Institute, 2023
Various talks, Skype a Scientist, 2020-22
Proctor for U.S. Physics Olympiad F=ma exam, 2022