Jacob Bringewatt

Theoretical Physicist
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SUMMARY STATEMENT

I'm a PhD candidate in theoretical physics and a Department of Energy Computational Science Graduate fellow. My research interests span many aspects of quantum information and quantum computing. Current areas of focus include adiabatic quantum computation, quantum information geometry in relation to parameter estimation, and quantum algorithms for nuclear theory.

EDUCATION

Doctoral Candidate
University of Maryland, College Park — 2018–Present
Advisor: Alexey Gorshkov

B.S. Physics
University of Maryland, College Park — 2014–2018
Cum laude with high honors in physics.

FELLOWSHIPS

Computational Science Graduate Fellow
US Department of Energy — 2018-2022

Lanczos Graduate Fellow
Joint Center for Quantum Information and Computer Science — 2018-2020

Banneker/Key Scholar
University of Maryland, College Park — 2014-2018

AWARDS

Communicate Your Science Essay Contest Winner
Krell Institute (Department of Energy Computational Science Graduate Fellowship) — 2019

PUBLICATIONS

(* denotes equal contribution.)

7. *J Bringewatt*, I Boettcher, P Niroula, P Bienias, A V Gorshkov. "Protocols for estimating multiple functions with quantum sensor networks: geometry and performance." Preprint. (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]

Service to Scientific Community

Referee for Quantum

Organizer of QuICS-JQI-CMTC Friday Seminar 2020–2021

Panelist at Conference for Undergraduate Underrepresented Minorities in Physics (cu2mip) 2021

Volunteer at University of Maryland Prospective Graduate Student Open Houses 2019-2021

Mentorship

Connor Mooney (George Mason University)
For summer research project on adiabatic quantum computation and sign problems. 2021

Akshita Gorti
For summer research project on quantum sensor networks. 2021

Victoria Adebayo (Howard University)
For GRAD-MAP Winter Workshop on adiabatic quantum computation and Monte Carlo methods. 2021

Timothy Qian (Montgomery Blair High School)
For a summer research project on quantum sensor networks. 2020
Outcome: Paper in PRA (Letter) and Regeneron Science Talent Search 5^{th} place winner.

Teaching Experience

Designed and wrote a self-study packet on quantum computing for high schoolers
Girls Talk Math Program, University of Maryland, College Park 2021

Math Tutor
University of Maryland, College Park 2016-2018

Teaching Assistant for Philosophy of Quantum Mechanics
University of Maryland, College Park Fall 2016

Martial Arts Instructor
Lake Norman Martial Arts Academy 2010-2018

Education-Related Training and Workshops

Workshop on Relationships Among Intuition, Reasoning, and Conceptual Understanding in Physics
American Association of Physics Teachers 2021

Physics Education Research Seminar Course
University of Maryland, College Park Fall 2020

Workshop on Science Communication
Skype a Scientist organization 2020

Outreach

Skype a Scientist
Talked to 3rd graders about magnetism 2021

Writing for Non-scientific Audience
Selected writing (see website for more):

- “Spherical cows: Using barnyard animals to understand quantum computing.” (2019) – won Communicate Your Science Essay Contest, published in Deixis Magazine (magazine on computational science at DoE national labs)

Professional Memberships

American Physical Society (APS)

American Association of Physics Teachers (AAPT)

Invited Talks

2. “Lattice data in the JAM framework." Amherst Center for Fundamental Interactions (ACFI) Workshop on QCD Real-Time Dynamics and Inverse Problems. (Oct. 2020) Invited Talk.
1. “Confronting lattice parton densities with global QCD analysis." AI for Nuclear Physics Workshop. (Mar. 2020) Invited Talk.

Other Talks

9. “Optimal measurement of field properties with quantum sensor networks." March Meeting 2021. (Mar. 2021) Talk.
8. “Estimating multiple functions with quantum sensor networks." Gorshkov Group Meeting. (Jan. 2021) Talk.
7. “Effective gaps are not effective." Gorshkov Group Meeting. (April 2020) Talk.
6. “Confronting lattice parton densities with global QCD analysis." DNP2019. (Oct. 2019) Talk.
5. “Quantum sensor networks and Fisher information." Gorshkov Group Meeting. (Aug. 2019) Talk.
4. “Confronting lattice parton densities with global QCD analysis." Jefferson Lab Theory Seminar. (July 2019) Talk.
3. “Diffusion monte carlo approach versus adiabatic computation for local Hamiltonians." Gorshkov Group Meeting. (Aug. 2018) Talk.
2. “Diffusion monte carlo approach versus adiabatic computation for local Hamiltonians." University of Maryland Undergraduate Research Showcase. (May 2018) Talk.
1. “Diffusion monte carlo approach versus adiabatic computation for local Hamiltonians." Undergraduate Thesis Defense. (May 2018) Talk.

Posters

8. “Optimal measurement of field properties with quantum sensor networks." QuICS Admitted Students Days. (Apr. and May 2021) Poster.
7. “Optimal measurement of field properties with quantum sensor networks." QuICS Stakeholder Day. (Mar. 2021) Poster.
6. “Estimating multiple functions with quantum sensor networks." QuICS 5 Year Anniversary Symposium. (Jan. 2020) Poster.
5. “Effective gaps are not effective." FARQC Kickoff Meeting. (Nov. 2019) Poster.
4. “Polynomial time algorithms for estimating spectra of adiabatic Hamiltonians." DOE Computation Science Graduate Fellowship Annual Program Review. (July 2019) Poster.
3. “Polynomial time algorithms for estimating spectra of adiabatic Hamiltonians." QIP2019. (Jan. 2019) Poster.
2. “Polynomial time algorithms for estimating spectra of adiabatic Hamiltonians." STAQ Kickoff Meeting. (Nov. 2018) Poster.
1. “Diffusion monte carlo approach versus adiabatic computation for local Hamiltonians." QIP2018. (Jan. 2018) Poster.