Jacob Bringewatt

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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 and quantum annealing, quantum metrology, 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.)
Highlights:
6 first author papers (1 joint authorship)
1 Physical Review Letters, 1 Physical Review A Letter, 1 Editor's Suggestion
Total citations: 60+, h-index: 5 (Google Scholar)

9. T C Mooney, *J Bringewatt*, L T Brady. "Lefschetz Thimble Quantum Monte Carlo for Spin Systems." Preprint. (2021) [arXiv:2110.10699]

8. A Ehrenberg*, *J Bringewatt**, A V Gorshkov. "Minimum entanglement protocols for function estimation." Preprint. (2021) [arXiv:2110.07613]

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]

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 research project on Lefshetz thimble methods for sign problems.	2021
	Akshita Gorti (Cornell University)	
	For a research project on quantum sensor networks.	2021
	Victoria Adebayo (Howard University)	
	For GRAD-MAP Winter Workshop on adiabatic quantum computation.	2021
	Timothy Qian (Montgomery Blair High School)	
	For a research project on quantum sensor networks.	2020
	Outcome: Paper in PRA (Letter) and Regeneron Science Talent Search 5th 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 (Kanshin Ryu Kempo Karate) Instructor	
	Lake Norman Martial Arts Academy	2010-2018
EDUCATION-RELATED TRAINING AND WORKSHOPS	**Seminar Course on Physics Education Research on Teaching Quantum Mechanics**	
	University of Maryland, College Park	Fall 2021
	Workshop on Relationships Among Intuition, Reasoning, and Conceptual Understanding in Physics	
	American Association of Physics Teachers	2021
	Seminar Course on Introduction to Physics Education Research	
	University of Maryland, College Park	Fall 2020
	Workshop on Science Communication	
	Skype a Scientist organization	2020

OUTREACH	**Skype a Scientist**
	Conversations with elementary and middle schoolers on physics. 2020-Present
	Writing for Non-scientific Audience
	"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

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

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.

CONTRIBUTED TALKS

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

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

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

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

SEMINAR TALKS

10. "Lefschetz thimble quantum Monte Carlo for spin systems." USC Condensed Matter Seminar. (Nov. 2021) Talk.

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

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

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

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