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." 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 summer research project on Lefshetz thimble methods for sign problems.	2021
	Akshita Gorti (Cornell University)	
	For summer 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 summer 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	**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)

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.

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

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.

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.