

Henry Shackleton

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Research Positions

- 07/2024 - Present **Pappalardo Postdoctoral Fellow**, *Massachusetts Institute of Technology*, Cambridge
- 01/2023 - 05/2023 **Pre-Doctoral Researcher**, *Flatiron Institute, Center for Computational Quantum Physics*, New York
Supervisor: Shiwei Zhang

Education

- 09/2018 - 05/2024 **PhD in Physics**, *Harvard University*, Cambridge
Thesis: *Fractionalization and disorder in strongly correlated systems*
Advisor: Subir Sachdev
- 09/2014 - 06/2018 **B.S's in Physics and Philosophy**, *Massachusetts Institute of Technology*, Cambridge
Thesis: *Diffusional Instabilities on Curved Manifolds*
Advisor: Mehran Kardar

Publications and Preprints

- Preprints:**
- M. Christos, **H. Shackleton**, S. Sachdev, and Z.-X. Luo, “Deconfined quantum criticality of nodal d -wave superconductivity, Néel order and charge order on the square lattice at half-filling,” (2024), [arXiv:2402.09502](https://arxiv.org/abs/2402.09502) [[cond-mat.str-el](https://arxiv.org/abs/2402.09502)].
- H. Shackleton** and S. Sachdev, “Sign-problem-free effective models of triangular lattice quantum antiferromagnets,” (2023), [arXiv:2311.01572](https://arxiv.org/abs/2311.01572) [[cond-mat.str-el](https://arxiv.org/abs/2311.01572)].
- Published:**
- L. E. Anderson, A. Laitinen, A. Zimmerman, T. Werkmeister, **H. Shackleton**, A. Kruchkov, T. Taniguchi, K. Watanabe, S. Sachdev, and P. Kim, “Magneto-thermoelectric transport in graphene quantum dot with strong correlations,” *Phys. Rev. Lett.* **132**, 246502 (2024), (*Editor’s Suggestion*).
- H. Shackleton**, L. E. Anderson, P. Kim, and S. Sachdev, “Conductance and thermopower fluctuations in interacting quantum dots,” *Phys. Rev. B* **109**, 235109 (2024).
- H. Shackleton** and M. S. Scheurer, “Exactly solvable dissipative spin liquid,” *Phys. Rev. B* **109**, 085115 (2024).
- M. Christos, Z.-X. Luo, **H. Shackleton**, Y.-H. Zhang, M. S. Scheurer, and S. Sachdev, “A model of d -wave superconductivity, antiferromagnetism,

and charge order on the square lattice,” *Proceedings of the National Academy of Sciences* **120**, e2302701120 (2023), [arXiv:2302.07885](#) .

H. Shackleton and S. Sachdev, “Anisotropic deconfined criticality in Dirac spin liquids,” *Journal of High Energy Physics* **2022**, 141 (2022), [arXiv:2203.01962](#) .

H. Shackleton, A. Thomson, and S. Sachdev, “Deconfined criticality and a gapless \mathbb{Z}_2 spin liquid in the square-lattice antiferromagnet,” *Phys. Rev. B* **104**, 045110 (2021), [arXiv:2104.09537](#) .

H. Shackleton, A. Wietek, A. Georges, and S. Sachdev, “Quantum phase transition at nonzero doping in a random t - J model,” *Phys. Rev. Lett.* **126**, 136602 (2021), [arXiv:2012.06589](#) .

H. Shackleton and M. S. Scheurer, “Protection of parity-time symmetry in topological many-body systems: Non-Hermitian toric code and fracton models,” *Phys. Rev. Research* **2**, 033022 (2020), [arXiv:2005.09668](#) .

Nivedita, **H. Shackleton**, and S. Sachdev, “Spectral form factors of clean and random quantum Ising chains,” *Phys. Rev. E* **101**, 042136 (2020), [arXiv:2001.06732](#) .

J. R. Frank, J. Guven, M. Kardar, and **H. Shackleton**, “Pinning of diffusional patterns by non-uniform curvature,” *Europhysics Letters* **127**, 48001 (2019), [arXiv:1901.09900](#) .

Presentations

- 12/04/2023 “Models of deconfined criticality on square and triangular lattice antiferromagnets,” Perimeter Institute seminar
- 11/29/2023 “Models of deconfined criticality on square and triangular lattice antiferromagnets,” University of Illinois Urbana-Champaign seminar
- 11/28/2023 “Models of deconfined criticality on square and triangular lattice antiferromagnets,” Harvard Kids seminar
- 11/15/2023 “Sign-problem-free effective models for triangular lattice antiferromagnets,” Flatiron Institute seminar
- 06/12/2023 “An exactly solvable dissipative spin liquid,” University of Innsbruck, group seminar
- 05/23/2023 “Variational wavefunctions for the pseudogap metal,” Flatiron Institute, predoctoral presentation
- 03/10/2023 “Sign-problem-free effective models of triangular lattice antiferromagnetism,” APS March Meeting 2023, contributed talk
- 02/08/2023 “Paramagnon fractionalization theory of the cuprate pseudogap,” Flatiron Institute, Quantum Monte Carlo seminar
- 11/06/2022 “Sign-problem-free effective models of triangular lattice antiferromagnetism,” Harvard University, group seminar

- 03/17/2022 “Deconfined criticality and gapless \mathbb{Z}_2 spin liquids in the square lattice antiferromagnet,” APS March Meeting 2022, contributed talk
- 03/19/2021 “Protection of parity-time symmetry in topological many-body systems,” APS March Meeting 2021, contributed talk
- 09/21/2020 “Numerical study of the random t - J model with all-to-all interactions,” Harvard University, group seminar
- 06/15/2020 “Protection of parity-time symmetry in topological many-body systems,” Harvard University, group seminar
- 06/16/2018 “Turing patterns on deformed surfaces,” Kardar-Fest, in celebration of Prof. Mehran Kardar’s 60th birthday, contributed talk

Posters

- 06/25/2022 “Deconfined criticality and a gapless \mathbb{Z}_2 spin liquid in the square-lattice antiferromagnet”, Correlated Electron Systems Gordon Research Conference
- 05/05/2022 “Deconfined criticality and a gapless \mathbb{Z}_2 spin liquid in the square-lattice antiferromagnet”, CIFAR Quantum Materials Summer School
- 07/08/2021 “Deconfined criticality and a gapless \mathbb{Z}_2 spin liquid in the square-lattice antiferromagnet”, IMPRS-MPHQ-BeyondC Summer School

Teaching experience

Teaching fellow at Harvard University for:

- 09/2022 - 12/2022 Physics 195A (Introduction to Solid State Physics)
- 01/2022 - 05/2022 Physics 153 (Electrodynamics)
- 01/2021 - 05/2021 Physics 153 (Electrodynamics)

Responsibilities: Recitation and review sessions (2 hours per week), office hours (2 hours per week)

Head teaching assistant at Massachusetts Institute of Technology for:

- 09/2017 - 12/2017 8.13 (Experimental Physics 1)

Responsibilities: Assisted students in conducting experiments (4 hours per week)