

Seth W. Musser

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in Seth Musser

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Education

- 2018 – current **Ph.D. cand., Massachusetts Institute of Technology** Condensed Matter Theory
Advisor: Senthil Todadri.
- 2017 – 2018 **MASt, University of Cambridge** *with distinction* in Applied Mathematics.
Essay title: *Particle Vortex Duality: a review and numerical investigation.*
- 2013 – 2017 **B.A., University of Chicago** *with honors* in Physics.
B.S., University of Chicago *with honors* in Mathematics.

Honors and Awards

- 2018 – 2019 **Thomas Frank Scholar**, Massachusetts Institute of Technology
- 2017 – 2022 **NSF Graduate Fellow**, Massachusetts Institute of Technology
- 2017 – 2018 **Churchill Scholar**, University of Cambridge
- 2017 **John Haeseler Lewis Prize**, best graduating physics student, University of Chicago
Enrico Fermi Institute Undergraduate Research Award, University of Chicago
James Franck Institute Undergraduate Research Award, University of Chicago
- 2016 **Goldwater Scholar**, University of Chicago
Selove Prize, University of Chicago
Phi Beta Kappa, University of Chicago

Publications








Journal Articles

- 1 **S. Musser**, Y.-H. Zhang, D. Sheng, and T. Senthil, “Exact diagonalization of the fermionic dimer model”, *in preparation*, 2023.
- 2 **S. Musser**, H. Goldman, and T. Senthil, “Observable signatures of Hall viscosity in lowest Landau level superfluids”, Oct. 2023, arXiv:2310.04495. 📄 URL: <http://arxiv.org/abs/2310.04495>.
- 3 **S. Musser** and T. Senthil, “Metal to wigner-mott insulator transition in two-leg ladders”, *Physical Review B*, vol. 106, p. 235 148, Dec. 2022. 📄 DOI: 10.1103/PhysRevB.106.235148.
- 4 **S. Musser**, T. Senthil, and D. Chowdhury, “Theory of a continuous bandwidth-tuned wigner-mott transition”, *Physical Review B*, vol. 106, p. 155 145, Oct. 2022. 📄 DOI: 10.1103/PhysRevB.106.155145.
- 5 **S. Musser**, D. Chowdhury, P. A. Lee, and T. Senthil, “Interpreting angle-dependent magnetoresistance in layered materials: Application to cuprates”, *Physical Review B*, vol. 105, p. 125 105, Mar. 2022. 📄 DOI: 10.1103/PhysRevB.105.125105.
- 6 **S. Musser**, D. Proment, M. Onorato, and W. T. Irvine, “Starting flow past an airfoil and its acquired lift in a superfluid”, *Physical Review Letters*, vol. 123, p. 154 502, Oct. 2019. 📄 DOI: 10.1103/PhysRevLett.123.154502.

Writing

- 1 **S. Musser**, *Particle vortex duality: A review and numerical investigation*, May 2018.
- 2 **S. Musser**, *Weyl's law on riemannian manifolds*, Aug. 2016.
- 3 **S. Musser**, *From hamiltonian systems to poisson geometry*, Aug. 2015.
- 4 **S. Musser**, *Weakly nonlinear oscillations with analytic forcing*, Aug. 2014.

Talks

- 1 *Condensed matter theory: An introduction through stories*, Center for Security and Emerging Technology, DC, May 2023.
- 2 *Novel probes of emergent phenomena*, EPiQS symposium for postdoctoral scholars, Austin, TX, Apr. 2023.
- 3 *Odd viscosity in rotating bose einstein condensates*, APS March Meeting, Mar. 2023.  URL: <https://meetings.aps.org/Meeting/MAR23/Session/Y25.7>.
- 4 *Theory of a continuous bandwidth-tuned wigner-mott transition*, APS March Meeting, Mar. 2022.  URL: <https://meetings.aps.org/Meeting/MAR22/Session/G63.7>.
- 5 *Theory of a continuous bandwidth-tuned wigner-mott transition*, Cornell Quantum Theory Seminar, Dec. 2021.  URL: <https://www.youtube.com/watch?v=5RRMUWDiIhY>.
- 6 *The semiclassical and quantum kitaev model*, Chowdhury group meeting, Cornell, Oct. 2021.
- 7 *Interpreting angle-dependent magnetoresistance (admr) measurements in pseudogapped cuprates*, APS March Meeting, Mar. 2021.  URL: <https://meetings.aps.org/Meeting/MAR21/Session/V57.10>.
- 8 *Quantum spin liquids: Kitaev model*, MIT Journal Club 101, Oct. 2020.  URL: <https://www.youtube.com/watch?v=5YT7cA-LPjc&t=1s>.
- 9 *Quantum spin liquids: Disorder and frustration*, MIT Journal Club 101, Sep. 2020.  URL: <https://www.youtube.com/watch?v=MCLa9pp9AYE>.
- 10 *Flying in a superfluid*, APS Division of Fluid Dynamics, Nov. 2019.  URL: <https://meetings.aps.org/Meeting/DFD19/Session/B08.1>.
- 11 *Particle-vortex duality*, Non-equilibrium statistical mechanics (NESM) journal club, Jan. 2018.
- 12 *Vortex nucleation in superfluids*, Churchill scholars journal club, Nov. 2017.
- 13 *Poisson geometry with applications to the hamiltonian formulation of inviscid fluid mechanics*, Chicago mathematics REU, Aug. 2015.

Teaching Experience

2022	8.231 , undergraduate solid state course, MIT, TA under instructor: Prof. Xiao-Gang Wen
2021	8.06 , undergraduate quantum III course, MIT, TA under instructor: Prof. Maxim Metlitski
2018 – 2022	8.223 , Lagrangian mechanics course, MIT, TA under instructor: Prof. Michael Williams
2014 – 2017	MATH 13000s , intro calculus sequence, University of Chicago, TA under graduate students.

Service Activities

2023 – current	Project SHORT , mentor for this 501(c)(3) nonprofit that offers <i>pro bono</i> mentoring for graduate school admissions to diversify the admissions pool
2023	Lunch with physicists , worked with MIT's society of physics students to expose incoming first years to life in physics
	Spoke to policymakers , discussed condensed matter theory and related technology with policymakers at the Center for Security and Emerging Technology
2020, 2023	Directed reading program , mentored two undergraduates on projects in high-T _c and Hall viscosity, MIT
2020 – 2021	Physics mentor , mentored undergraduates through COVID disruption, MIT
2020	Journal club 101 , founded a remote journal club for beginning graduate students in CMT during COVID disruption, MIT

Programming

Languages	L ^A T _E X, python, Mathematica, FORTRAN, OpenCL, CUDA, C, LabVIEW
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