

# Huitao Shen

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<b>EDUCATION</b>	<b>Massachusetts Institute of Technology</b> <ul style="list-style-type: none"><li>Ph.D. in Theoretical Physics<ul style="list-style-type: none"><li>Cumulative GPA: 5.0/5.0.</li></ul></li></ul>	<b>Cambridge, MA</b> Sep 2016 – Mar 2020
	<b>Tsinghua University</b> <ul style="list-style-type: none"><li>B.Sc. in Physics<ul style="list-style-type: none"><li>Cumulative GPA: 3.99/4.00, Ranking: 1/108.</li></ul></li></ul>	<b>Beijing, China</b> Aug 2012 – Jun 2016
<b>HONORS</b>	<ul style="list-style-type: none"><li>Visiting Graduate Fellowship, Perimeter Institute for Theoretical Physics</li><li>Highest Honors for Undergraduate Students, Tsinghua University Awarded to 10/3500 students per class.</li></ul>	Jan 2020 – Feb 2020 Nov 2015
<b>TEACHING EXPERIENCE</b>	<b>Teaching Assistant</b> <ul style="list-style-type: none"><li>6.867 Machine Learning (MIT), Head Teaching Assistant Oversee every aspect of the course, including homework, exams, projects, recitations, office hours, etc.</li><li>8.08 Statistical Physics II (MIT), Recitation and Grading Rating: 6.3/7</li><li>8.231 Physics of Solids I (MIT), Recitation, Problem Set Design, and Grading Rating: 6.5/7</li></ul>	Fall 2019 Spring 2019 Fall 2017
<b>SERVICE</b>	<b>Undergraduate Research Opportunities Program (UROP) Student Supervised</b> <ul style="list-style-type: none"><li>Hikari Iwasaki (MIT). Currently in Stanford Math Graduate Program.</li><li>Henry Shackleton (MIT). Currently in Harvard Physics Graduate Program.</li></ul> <b>Journal Referee</b> <i>Science Advances, Physical Review Letters, Physical Review Research, Physical Review B, Journal of Statistical Mechanics, Crystal Growth &amp; Design, and Frontiers of Physics.</i>	Summer 2018 – Fall 2018 Summer 2017 – Spring 2018
<b>PUBLICATIONS</b>	<ol style="list-style-type: none"><li>[1] <a href="#">H. Shen</a>, P. Zhang, Y-Z. You, and H. Zhai “Information Scrambling in Quantum Neural Networks,” <i>Physical Review Letters</i>, 124, 200504 (2020).</li><li>[2] <a href="#">H. Shen</a>, “Mutual Information Scaling and Expressive Power of Sequence Models,” arXiv: 1905.04271.</li><li>[3] <a href="#">H. Shen</a><sup>†</sup>, J. Liu, K. Chang, L. Fu, “In-Plane Ferroelectric Tunnel Junction,” <i>Physical Review Applied</i>, 11, 024048 (2019).</li><li>[4] Q. Ma, S. Xu, <a href="#">H. Shen</a><sup>*</sup>, et al., “Observation of the nonlinear Hall effect under time-reversal-symmetric conditions” <i>Nature</i>, 565, 337–342 (2019).</li><li>[5] N. Sun, J. Yi, P. Zhang, <a href="#">H. Shen</a>, and H. Zhai, “Deep learning topological invariants of band insulators,” <i>Physical Review B</i>, 98, 085402 (2018).</li><li>[6] Y. Wu, P. Zhang, <a href="#">H. Shen</a>, and H. Zhai, “Visualizing a neural network that develops quantum perturbation theory,” <i>Physical Review A</i>, 98, 010701(R) (2018).</li><li>[7] <a href="#">H. Shen</a> and L. Fu, “Quantum Oscillation from In-Gap States and a Non-Hermitian Landau Level Problem,” <i>Physical Review Letters</i>, 121, 026403 (2018).</li><li>[8] <a href="#">H. Shen</a><sup>†</sup>, J. Liu, and L. Fu, “Self-learning Monte Carlo with deep neural networks,” <i>Physical Review B</i>, 97, 205140 (2018).</li><li>[9] S. Xu, Q. Ma, <a href="#">H. Shen</a>, et al., “Electrically switchable Berry curvature dipole in the monolayer topological insulator WTe<sub>2</sub>,” <i>Nature Physics</i>, 14, 900 (2018).</li><li>[10] <a href="#">H. Shen</a>, B. Zhen, and L. Fu, “Topological Band Theory for Non-Hermitian Hamiltonians,” <i>Physical Review Letters</i>, 120, 146402 (2018).</li><li>[11] P. Zhang, <a href="#">H. Shen</a><sup>†</sup>, and H. Zhai, “Machine Learning Topological Invariants with Neural Networks,” <i>Physical Review Letters</i>, 120, 066401 (2018).</li><li>[12] Y. Nagai, <a href="#">H. Shen</a>, Y. Qi, J. Liu, and L. Fu, “Self-Learning Monte Carlo Method: Continuous-Time Algorithm,” <i>Physical Review B</i>, 96, 161102(R) (2017).</li></ol>	

- [13] Z. Yan, R. Bi, H. Shen, L. Lu, S. Zhang, and Z. Wang, “Nodal-link semimetals,” *Physical Review B*, 96, 041103(R) (2017).
- [14] J. Liu, H. Shen<sup>\*</sup>, Y. Qi, Z. Meng, and L. Fu, “Self-learning Monte Carlo method and cumulative update in fermion systems,” *Physical Review B*, 95, 241104(R) (2017).
- [15] R. Fan, P. Zhang, H. Shen, and H. Zhai, “Out-of-time-order correlation for many-body localization,” *Science Bulletin*, 62, 707 (2017).
- [16] H. Shen, P. Zhang, R. Fan, and H. Zhai, “Out-of-time-order correlation at a quantum phase transition,” *Physical Review B*, 96, 054503 (2017).
- [17] W. Zheng, H. Shen, Z. Wang, and H. Zhai, “Magnetic-order-driven topological transition in the Haldane-Hubbard model,” *Physical Review B*, 91, 161107(R) (2015).
- [18] H. Shen, and W. Zheng, “Landau damping in a mixture of Bose and Fermi superfluids,” *Physical Review A*, 92, 33620 (2015).

† Corresponding author; \* Joint first author.

1583 Citations (by 09/25/2020 from Google Scholar).

**INVITED TALKS AT  
INTERNATIONAL  
CONFERENCES**

- APS March Meeting, 03/06/2019, Boston, USA. “Quantum Oscillation from In-gap States in Kondo Insulators”.
- 1st International Conference on “Machine Learning and Physics” at Institute for Advanced Study, Tsinghua University, 07/06/2018, Beijing, China. “Boosting Quantum Monte Carlo Simulations with Machine Learning”.
- International Workshop “New Paradigms in Quantum Matter” at Institute of Physics, Chinese Academy of Sciences, 06/29/2018, Beijing, China. “Non-Hermitian Band Theory with Applications in Correlated Electron Systems”.
- Workshop “Machine Learning and Many-Body Physics” at Kavli Institute for Theoretical Science, 07/07/2017, Beijing, China. “Recent Developments of Self-Learning Monte Carlo Method: From Continuous-time Algorithm to Neural Networks”.
- Workshop “Quantum Gas 2016: Non-equilibrium Dynamics” at Institute for Advanced Study, Tsinghua University, 08/23/2016, Beijing, China. “Out-of-time-order Correlation in Quantum Phase Transition and Many-body Localization”.
- Workshop “An Entangled Trio: Gravity, Information and Condensed Matter” at Institute for Advanced Study, Tsinghua University, 08/11/2016, Beijing, China. “Out-of-time-order Correlation in Quantum Phase Transition and Many-body Localization”.

**INVITED  
SEMINARS**

- Northeastern University, 11/13/2019, Boston, USA. “Boosting Quantum Monte Carlo Simulations with Machine Learning”.
- Perimeter Institute for Theoretical Physics, 02/03/2020, Waterloo, Canada. “Aspect of Information in Classical and Quantum Neural Networks”.

**OTHER  
EXPERIENCE**

- Quantitative Research Intern, Citadel Jun 2020 – Aug 2020