

TONGTONG LIU

Department of Physics, Massachusetts Institute of Technology

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EDUCATION

Ph.D. candidate in Physics

2017 to present

Massachusetts Institute of Technology

GPA:4.6/5.0

B.S. in Physics, Peking University

2013-2017

GPA: 3.8/4.0

RESEARCH EXPERIENCE

Research Assistant

Prof. Mingda Li, MIT, 2021-present

- Investigate novel scattering techniques to probe entanglement in quantum materials
- Use machine learning to extract Hamiltonian information from diffusing scattering

Research Assistant

Prof. Liang Fu, MIT, 2017-2020

- Predicted and demonstrated the spatial profile of the valley exciton in quantum Hall ferroelectric and nematic states, which can be locally probed via scanning tunneling microscopy (STM).
- Studied an exotic ferromagnetic transition in 1D chiral metal, proposed a possible realization of 1D supermetal in the cold atom system.
- Studied the charge order in TMD (transition metal dichalcogenides) moire lattice and the nematic states at finite temperature, via large-size cluster Monte Carlo calculation. The maximally-localized wannier function was obtained for various TMD materials to get accurate screening interaction parameter.

Undergraduate Research Assistant

Prof. Cheng Chin, The University of Chicago, 2016 summer

- Calculated the wave functions of domain walls in Bose-Einstein Condensates with Double-Well Dispersion using imaginary time evolution method, an exotic soliton solution is analytically derived.
- Built a high-frequency signal source for transporting cold atoms with moving lattice modulated by acousto-optic modulator.

Undergraduate Research Assistant

Prof. Biao Wu & Prof. Xuzong Chen, Peking University, 2015-2017

- Studied dynamics of novel solitons in Bose-Einstein Condensates
- Simulated evaporative cooling of cold atom via Monte Carlo method to look for ultrafast cooling path in microgravity condition

PUBLICATIONS

Tongtong Liu, Logan W. Clark, Cheng Chin, “Exotic domain walls in Bose-Einstein condensates with double-well dispersion”, Phys. Rev. A 94, 063646

Pok Man Tam, **Tongtong Liu**, Inti Sodemann, and Liang Fu, “Local probes for quantum Hall ferroelectrics and nematics”, Phys. Rev. B 101, 241103(R)

Yang Zhang, **Tongtong Liu**, Liang Fu, “Electrically tunable charge transfer and charge orders in twisted transition metal dichalcogenide bilayers”, arXiv:2009.14224

TEACHING

Fall 2018 Teaching Assistance, 8.01 Physics I

Fall 2019 Teaching Assistance, 8.321 Quantum Theory I

Spring 2021 Teaching Assistance, 8.02 Physics II