

XUE-YANG SONG

songxy@ust.hk **Citizenship:** Chinese **Date of Birth:** Jul 18,1994

Education: 09/2013-07/2017 BS physics, Peking University, Beijing

09/2017-09/2021 Ph.D physics, Harvard University

Advisor: Prof. Ashvin Vishwanath

Work experience: 09/2021-03/2024 Moore Postdoctoral Fellow at MIT

03/2024- Assistant professor, Hong Kong Univ. of Science and Technology

Research Area: Theoretical condensed matter (quantum spin liquids and magnetism; high-temperature superconductivity; non-Fermi liquids; topological order; quantum hall systems)

Publications:

1. “*Moore-Read state in Half-filled Moiré Chern band from three-body Pseudo-potential*” by L Zhang and X-Y Song (arxiv: 2403.11478)
2. “*Intertwined fractional quantum anomalous Hall states and charge density waves*” by X-Y Song, C-M Jian, L Fu and C. Xu (Phys. Rev. B 109, 115116(2024))
3. “*Density wave halo around anyons in fractional quantum anomalous hall states*” by X-Y Song, and T Senthil (arxiv: 2311.16216)
4. “*Phase transitions out of quantum Hall states in moiré TMD bilayers*” by X-Y Song, Y-H Zhang and T Senthil (Phys. Rev. B 109, 085143 (2024))
5. “*Translation-enriched Z₂ spin liquids and topological vison bands: possible application to alpha-RuCl₃*” by Xue-Yang Song and T Senthil (arXiv:2206.14197)
6. “*Deconfined criticalities and dualities between chiral spin liquid, topological superconductor and charge density wave Chern insulator*” by Xue-Yang Song and Ya-Hui Zhang (SciPost Phys. 15, 215 (2023))
7. “*Doping a moiré Mott Insulator: A t-J model study of twisted cuprates*” by Xue-Yang Song, Ya-Hui Zhang and Ashvin Vishwanath (Phys. Rev. B **105**, L201102(2022), Featured in condensed matter journal club by Leonid Glazman DOI: 10.36471/JCCM_July_2022_02)

8. “*Electric polarization as a nonquantized topological response and boundary Luttinger theorem*” by Xue-Yang Song, Yin-Chen He, Ashvin Vishwanath and Chong Wang (*PHYSICAL REVIEW RESEARCH* 3, 023011 (2021))
9. “*Doping the chiral spin liquid - topological superconductor or chiral metal?*” by Xue-Yang Song, Ashvin Vishwanath and Ya-Hui Zhang (*Phys. Rev. B* 103, 165138(2021))
10. “*Unifying Description of Competing Orders in Two Dimensional Quantum Magnets*”, by Xue-Yang Song, Yin-Chen He, Ashvin Vishwanath and Chong Wang (*Nat Commun* 10, 4254 (2019), featured in “*Quantum electrodynamics in a piece of rock*”. *Nat Rev Phys* 1, 583–584 (2019), by McGreevy, J.)
11. “*From spinon band topology to the symmetry quantum numbers of monopoles in Dirac spin liquids*”, by Xue-Yang Song, Chong Wang, Ashvin Vishwanath and Yin-Chen He, (*Physical Review X* 10, 011033 (2020))
12. “*Strongly Correlated Metal built from Sachdev-Ye-Kitaev model*”, by Xue-Yang Song, Chao-Ming Jian and Leon Balents (*Phys. Rev. Lett.* 119, 216601 (2017))
13. “*Interaction effects on the classification of crystalline topological insulators and superconductors*”, by Xue-Yang Song and Andreas P. Schnyder (*Phys. Rev. B* 95, 195108 (2017))
14. “*Low-energy spin dynamics of the honeycomb spin liquid beyond the Kitaev limit*”, by Xue-Yang Song, Yi-Zhuang You, and Leon Balents (*Phys. Rev. Lett.* 117.037209(2016))
15. “*Quantum Oscillations in narrow-gap topological insulators*”, by Long Zhang, Xue-Yang Song, and Fa Wang (*Phys. Rev. Lett.* 116, 046404 (2016))
16. “*Magnetoinfrared Spectroscopy of Landau Levels and Zeeman Splitting of Three-Dimensional Massless Dirac Fermions in ZrTe5*”, by R. Y. Chen, Z. G. Chen, X.-Y. Song, J. A. Schneeloch, G. D. Gu, F. Wang, and N. L. Wang (*Phys. Rev. Lett.* 115, 176404 (2015), *Editors’ Suggestions*)

Awards:

Award for Outstanding self-financed Chinese Students studying abroad, Chinese ministry of Education, 08/2022

Rising Stars in Quantum physics, Univ. Chicago, 09/2021
Peirce Fellowship, Harvard University, Cambridge, MA, 09/2017
Purcell Fellowship, Harvard University, Cambridge, MA, 09/2017
Valedictorian of Class '17, Peking University, Beijing, China, 07/2017
Excellent Graduate, Peking University, Beijing, China, 07/2017
Gold medalist Asian Physics Olympiad, Bogor, Indonesia, 05/2013

Research activities:

Invited talk “Monopoles in Dirac spin liquids” at APS March meeting, 03/2021
Talk “Polarization by instantons and boundary Luttinger theorem” at Ultra quantum Matter meeting, Harvard, 09/2019; Perimeter Institute, Waterloo, ON, Canada, 08/2019
Talk “Monopoles in Dirac spin liquids” at EPiQS Moore Foundation postdoctoral symposium, Beverly, MA, 06/2019; String Luncheon Seminar, Harvard, Cambridge, MA, 04/2019
Talk “Monopoles in Dirac spin liquids” at kick-off workshop on Topological aspects in Condensed matter, CMSA, Cambridge, MA, 08/2018

Services:

Referee for *Physical Review X*, *Physical Review Letters*, *Physical Review B*, *Physical Review D*
Teaching Fellow for graduate course Advanced Quantum Mechanics II, Harvard, 2019 Spring
Organizer of Kids’ Seminar series at Physics Department, Harvard, 2019-2020