Yahui Zhang

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Education and Employments

2022.1-present Assistant Professor, **Johns Hopkins University**

2019.9-2021.12 Postdoc scholar, **Harvard University**

Advisors: Ashvin Vishwanath and Subir Sachdev

2014.8-2019.8 Ph.D., Physics, **Massachusetts Institute of Technology**

Advisor: Senthil Todadri

2009.9-2014.6 B.Sc., Physics, **Peking University**

Honors and Awards

2023 NSF Early Career Award

Invited Presentations

- A variational wavefunction of Mott insulator and pseudogap metal using ancilla qubits
  Ohio State University, Columbus,OH, USA, 2023
- Variational wavefunction for the pseudogap metal in hole doped cuprate
  Invited speaker at March meeting, Chicago, 2022
- Fractional Fermi Liquid from doping spin-triplet doublons and possible realization in Nickelate
  KITP program: Correlated Systems with Multicomponent Local Hilbert Spaces, online, 2020
- Fractional Fermi Liquid from doping spin-triplet doublons and possible realization in Nickelate
  Harvard-MIT condensed matter seminar, online, 2020
- Electrical detection of spin liquids in double moiré layers
  KITP conference: Unconventional Magnetism and Novel Probes in Heterostructures, online, 2020
- A new way of destroying a Fermi surface
  Ultra Quantum Matter Simons Collaboration, online, 2020
- A new theory for pseudogap metal in hole doped cuprates
  Quantum matter and quantum field theory seminar, Harvard CMSA, MA, 2020
- Quantum Hall spin liquids and possible realization in moiré materials
  Condensed Matter Seminar, Harvard, MA, 2020
- Bridging Hubbard model physics and quantum Hall physics in ABC trilayer graphene/h-BN moire superlattice
  Condensed Matter Seminar, Yale, New Haven, 2018

- Bridging Hubbard model physics and quantum Hall physics in ABC trilayer graphene/h-BN moire superlattice

  Condensed Matter Seminar, Perimeter Institute, Waterloo, Canada, 2018

Selected Publications

[1] XY.Song, A.Vishwanath and **YH.Zhang**$^{+}$, *Doping the chiral spin liquid--topological superconductor or chiral metal*? arXiv:2011.10044

[2] **YH.Zhang*** and Z.Zhu, *Fractional Fermi liquid in a generalized t−J model.* arXiv:2008.11204

[3] **YH.Zhang*** and S.Sachdev, *Deconfined criticality and ghost Fermi surfaces at the onset of antiferromagnetism in a metal.* Phys. Rev. B 102, 155124 (2020).

[4] **YH.Zhang*** and A.Vishwanath, *Electrical detection of spin liquids in double moir\'e layers.* arXiv:2005.12925.

[5] **YH.Zhang*** and S.Sachdev, *From the pseudogap metal to the Fermi liquid using ancilla qubits*. Physical Review Research 2 (2), 023172 (2020), Editor's suggestion.

[6] C Repellin, Z Dong, **YH Zhang**, T Senthil, *Ferromagnetism in narrow bands of moiré superlattices.* Physical Review Letters 124 (18), 187601(2020).

[7] **YH.Zhang*** and A.Vishwanath, *Type-II t-J model in superconducting nickelate* $Nd_xSr_{1-x}NiO_2$. Physical Review Research 2 (2), 023112 (2020).

[8] **YH.Zhang*** and T. Senthil, *Quantum Hall spin liquids and their possible realization in moir\'e systems*. Phys. Rev. B 102, 115127 (2020).

[9] **YH Zhang***, D Mao, Y Cao, P Jarillo-Herrero, T Senthil, *Nearly flat Chern bands in moiré superlattices*. Physical Review B 99 (7), 075127(2019), Editor's suggestion.

Publications List

[1] Minhao He, **Ya-Hui Zhang**, Yuhao Li, Zaiyao Fei, Kenji Watanabe, Takashi Taniguchi, Xiaodong Xu, Matthew Yankowitz, *Competing correlated states and abundant orbital magnetism in twisted monolayer-bilayer graphene* arXiv:2101.04063

[2] XY.Song, A.Vishwanath and **YH.Zhang**$^{+}$, *Doping the chiral spin liquid--topological superconductor or chiral metal*? arXiv:2011.10044

[3] Saien Xie, Brendan D Faeth, Yanhao Tang, Lizhong Li, Christopher T Parzyck, Debanjan Chowdhury, **Ya-Hui Zhang**, Christopher Jozwiak, Aaron Bostwick, Eli Rotenberg, Jie Shan, Kin Fai Mak, Kyle M Shen, *Direct observation of distinct minibands in moir\'e superlattices.* arXiv:2010.07806

[4] A Alexandradinata, NP Armitage, Andrey Baydin, Wenli Bi, Yue Cao, Hitesh J Changlani, Eli Chertkov, Eduardo H Neto, Luca Delacretaz, Ismail El Baggari, GM Ferguson, William J Gannon, Sayed Ali Akbar Ghorashi, Berit H Goodge, Olga Goulko, G Grissonnanche, Alannah Hallas, Ian M Hayes, Yu He, Edwin W Huang, Anshul Kogar, Divine Kumah, Jong Yeon Lee, A Legros, Fahad Mahmood, Yulia Maximenko, Nick

Pellatz, Hryhoriy Polshyn, Tarapada Sarkar, Allen Scheie, Kyle L Seyler, Zhenzhong Shi, Brian Skinner, Lucia Steinke, K Thirunavukkuarasu, Thaís Victa Trevisan, Michael Vogl, Pavel A Volkov, Yao Wang, Yishu Wang, Di Wei, Kaya Wei, Shuolong Yang, Xian Zhang, **Ya-Hui Zhang**, Liuyan Zhao, Alfred Zong, *The Future of the Correlated Electron Problem.* arXiv:2010.00584

[5] **YH.Zhang*** and Z.Zhu, *Fractional Fermi liquid in a generalized t−J model.* arXiv:2008.11204

[6] **YH.Zhang*** and S.Sachdev, *Deconfined criticality and ghost Fermi surfaces at the onset of antiferromagnetism in a metal.* Phys. Rev. B 102, 155124 (2020).

[7] **YH.Zhang*** and A.Vishwanath, *Electrical detection of spin liquids in double moir\'e layers.* arXiv:2005.12925.

[8] **YH.Zhang*** and S.Sachdev, *From the pseudogap metal to the Fermi liquid using ancilla qubits*. Physical Review Research 2 (2), 023172 (2020), Editor's suggestion.

[9] C Repellin, Z Dong, **YH Zhang**, T Senthil, *Ferromagnetism in narrow bands of moiré superlattices.* Physical Review Letters 124 (18), 187601(2020).

[10] **YH.Zhang*** and A.Vishwanath, *Type-II t-J model in superconducting nickelate* $Nd_xSr_{1-x}NiO_2$. Physical Review Research 2 (2), 023112 (2020).

[11] S.Chen, M.He, **YH.Zhan**g, Valerie Hsieh, Zaiyao Fei, K Watanabe, T Taniguchi, David H Cobden, Xiaodong Xu, Cory R Dean, Matthew Yankowitz*, Electrically tunable correlated and topological states in twisted monolayer-bilayer graphene.* Nature Physics, 10.1038(2020)

[12] **YH.Zhang*** and T. Senthil, *Quantum Hall spin liquids and their possible realization in moir\'e systems*. Phys. Rev. B 102, 115127 (2020).

[13] Guorui Chen, Aaron L Sharpe, Eli J Fox, **Ya-Hui Zhang**, Shaoxin Wang, Lili Jiang, Bosai Lyu, Hongyuan Li, Kenji Watanabe, Takashi Taniguchi, Zhiwen Shi, T Senthil, David Goldhaber-Gordon, Yuanbo Zhang, Feng Wang, *Tunable correlated chern insulator and ferromagnetism in a moiré superlattice.* Nature 579 (7797), 56-61(2020).

[14] **YH.Zhang*** and D.Mao, *Spin liquids and pseudogap metals in the SU (4) Hubbard model in a moiré superlattice.* Physical Review B 101 (3), 035122(2020).

[15] **YH.Zhang***, D.Mao and T. Senthil, *Twisted bilayer graphene aligned with hexagonal boron nitride: anomalous Hall effect and a lattice model*. Physical Review Research 1 (3), 033126 (2019).

[16] **YH.Zhang***, HC.Po and T. Senthil, *Landau level degeneracy in twisted bilayer graphene: Role of symmetry breaking*. Physical Review B 100 (12), 125104 (2019) .

[17] **YH. Zhang*** and T. Senthil, *Bridging Hubbard model physics and quantum Hall physics in trilayer moiré superlattice*. Physical Review B 99 (20), 205150 (2019) Editor's suggestion.

[18] **YH Zhang***, D Mao, Y Cao, P Jarillo-Herrero, T Senthil, *Nearly flat Chern bands in moiré superlattices*. Physical Review B 99 (7), 075127(2019), Editor's suggestion.

[19] Z Dai*, **YH Zhang***, T Senthil, PA Lee, *Pair-density waves, charge-density waves, and vortices in high-Tc cuprates.* Physical Review B 97 (17), 174511 (2018). Editor's suggestion.

[20] **YH Zhang***, *Entanglement entropy of target functions for image classification and convolutional neural network.* arXiv:1710.05520.