

Jianpeng Liu's Curriculum Vitae

CONTACT

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EDUCATION

- Ph.D. in physics, Rutgers University, New Brunswick, NJ, USA (2010-2015)
Thesis: Topological materials: phase transitions and magnetoelectric coupling
Advisor: Prof. David Vanderbilt, member of National Academy of Sciences
- B.S. major in physics, Nankai University, Tianjin, China (2006-2010)

EMPLOYMENT

- September 2011 – May 2014, Teaching Assistant (general physics), Rutgers University
- June 2014 – August 2015, Research Assistant, Rutgers University
- September 2015 - March 2018, Postdoctoral Scholar in Prof. Leon Balents' group at Kavli Institute for Theoretical Physics, University of California Santa Barbara
- May 2018 – May 2020, Research Assistant Professor at Hong Kong University of Science and Technology in Prof. Xi Dai's group
- May 2020 – now, tenure-track Assistant Professor, Principal Investigator, ShanghaiTech University

RESEARCH EXPERIENCE AND INTERESTS

Condensed matter theory, first principles calculations and modelling of quantum materials, including:

- Moire 2D materials and van der Waals heterostructure systems
- Topological materials and topological phases of matter
- Strongly correlated systems
- Magnetism, magnetoelectric effects
- Nonlinear optical properties of quantum materials, periodically driven quantum materials.

ACADEMIC ACHIEVEMENTS AND SERVICES

- In total **42** academic papers published/accepted on SCI journals including **Nature (1), Science (1), Nat. Rev. Phys. (1), Phys. Rev. Lett. (10), Phys. Rev. X (3), Nat. Commun. (5), Nano Letters (1), Advanced Materials (1), npj Comput. Mater. (2), Phys. Rev. B (14)** etc., with more than **1600 citations** and an **h-index 20** (from google scholar). **5** papers are selected as **ESI highly cited papers**.
- Invited talks at CPS Fall meeting, KPS Spring meeting, Annual Conference of the Physical Society of Hong Kong, International Conference on Frontiers Materials, ICAM-China spring meeting, Conference of Condensed Matter Physics etc. Invited seminar, colloquium, or tutorial talks at UCSD, OSU, HKU, IOP CAS, CSRC, Fudan University, Nanjing University etc.
- Serve as frequent reviewers of academic journals including Nature, Phys. Rev. Lett., Phys. Rev. X, Nat. Commun., npj Quant. Mater., npj Comput. Mater., Phys. Rev. B etc.

GRANTS AWARDED

- National Natural Science Foundation of China, Grant No. 12174257, 2022.1-2025.12
- National Key R&D program of China, Grant No. 2020YFA0309601, 2020-2025

SELECTED PUBLICATIONS (*corresponding author, #co-first author)

[see <https://spst.shanghaitech.edu.cn/2020/0512/c2349a51938/page.htm> for a full publication list]

AS AN INDEPENDENT PI:

1. Shihao Zhang, Xin Lu, **Jianpeng Liu***, *Correlated insulators, density wave states, and their nonlinear optical responses in magic-angle twisted bilayer graphene*, **Phys. Rev. Lett.**, **128**, 247402 (2022)
2. Shihao Zhang, Xi Dai, and **Jianpeng Liu***, *Spin polarized nematic order, quantum valley Hall states, and field tunable topological transitions in the correlated states of moire graphene systems*, **Phys. Rev. Lett.** **128**, 026403 (2022)
3. Xiaoqian Liu, Ran Peng, Zhaoru Sun*, and **Jianpeng Liu***, *Moire phonons in magic-angle twisted bilayer graphene*, arXiv:2112.13240, accepted by **Nano Letters**
4. Ran Peng, **Jianpeng Liu***, *Topological piezoelectric response in moire graphene systems*, **Phys. Rev. Research** **4**, L032006 (2022)
5. Chao-Kai Li, Xu-Ping Yao, **Jianpeng Liu**, Gang Chen*, *Fractionalization on the surface: is type-II terminated 1T TaS₂ surface an anomalously realized spin liquid?* **Phys. Rev. Lett.**, **129**, 017202 (2022)
6. Bo Xie, Ran Peng, Shihao Zhang, **Jianpeng Liu***, *Alternating twisted multilayer graphene: generic partition rules, double flat bands, and orbital magnetoelectric effect*, **npj Computational Materials** **8**, 110 (2022)
7. Qiao Li, Bin Cheng*, Moyu Chen, Bo Xie, Yongqin Xie, Pengfei Wang, Fanqiang Chen, Zenglin Liu, Kenji Watanabe, Takashi Taniguchi, Shi-Jun Liang, Da Wang, Chenjie Wang, Qiang-Hua Wang, **Jianpeng Liu**, Feng Miao*, *Tunable quantum criticalities in an isospin extended Hubbard model simulator*, **Nature** (2022). <https://doi.org/10.1038/s41586-022-05106-0>
8. Le Liu, Shihao Zhang, Yanbang Chu, Cheng Shen, Yuan Huang, Yalong Yuan, Jinpeng Tian, Jian Tang, Yiru Ji, Rong Yang, Kenji Watanabe, Takashi Taniguchi, Dongxia Shi, **Jianpeng Liu**, Wei Yang*, Guangyu Zhang*, *Isospin competitions and valley polarized insulators in twisted double bilayer graphene*, **Nat. Commun.**, **13**, 3292 (2022)
9. Yiwei Li[#], Shihao Zhang[#], Fanqiang Chen, Liyang Wei, Zonglin Zhang, Hanbo Xiao, Han Gao, Moyu Chen, Shijun Liang, Ding Pei, Lixuan Xu, Kenji Watanabe, Takashi Taniguchi, Lexian Yang, Feng Miao, **Jianpeng Liu***, Bin Cheng*, Meixiao Wang*, Yulin Chen*, Zhongkai Liu*, *Observation of Coexisting Dirac Bands and Moiré Flat Bands in Magic-Angle Twisted Trilayer Graphene*, arXiv:2209.02199, accepted by **Adv. Mater.**

10. Ding Pei, Binbin Wang, Zishu Zhou, Zhihai He, Liheng An, Shanmei He, Cheng Chen, Yiwei Li, Liyang Wei, Aiji Liang, Jose Avila, Pavel Dudin, Viktor Kandyba, Alessio Giampietri, Mattia Cattelan, Alexei Barinov, Zhongkai Liu, **Jianpeng Liu**, Hongming Weng, Ning Wang*, Jiamin Xue*, and Yulin Chen*, *Observation of Γ -valley moire bands and emergent hexagonal lattice in twisted transition metal dichalcogenides*, **Phys. Rev. X**, **12**, 021065 (2022)

11. **Jianpeng Liu*** and Xi Dai*, *Orbital magnetic states in moire graphene systems*, **Nature Reviews Physics** **3**, 367–382 (2021).

12. Shuchun Huan[#], Shihao Zhang[#], Zhicheng Jiang[#], Hao Su, Hongyuan Wang, Xin Zhang, Yichen Yang, Zhengtai Liu, Xia Wang, Na Yu, Zhiqiang Zou, Dawei Shen*, **Jianpeng Liu***, Yanfeng Guo*, *Multiple magnetic topological phases in bulk van der Waals crystal $MnSb_4Te_7$* , **Phys. Rev. Lett.** **126**, 246601 (2021), Editor's suggestion

13. Mingqiang Gu, Jiayu Li, Hongyi Sun, Yufei Zhao, Chang Liu, **Jianpeng Liu***, Haizhou Lu, Qihang Liu*, *Spectral signatures of surface anomalous Hall effect in magnetic axion insulators*, **Nat. Commun.** **12**, 3524 (2021)

14. Soohyun Cho[#], Haiyang Ma[#], Wei Xia[#], Yichen Yang, Zhengtai Liu, Zhe Huang, Zhicheng Jiang, Xianglu Lu, Jishan Liu, Zhonghao Liu, Jinfeng Jia, Yanfeng Guo*, **Jianpeng Liu***, Dawei Shen*, *Emergence of new van Hove singularities in the charge density wave state of a topological kagome metal RbV_3Sb_5* , **Phys. Rev. Lett.** **127**, 236401 (2021)

15. Xingdan Sun[#], Shihao Zhang[#], Zhiyong Liu[#], Honglei Zhu, Jinqiang Huang, Kai Yuan, Zhenhua Wang*, Kenji Watanabe, Takashi Taniguchi, Mengjian Zhu, Jinhai Mao, Teng Yang, Jun Kang*, **Jianpeng Liu***, Yu Ye*, Zheng Vito Han*, Zhidong Zhang, *Correlated states in single layer graphene in a dual moire super potential*, **Nat. Commun.** **12**, 7196 (2021)

16. QuanSheng Wu*, **Jianpeng Liu***, Yifei Guan, Oleg V. Yazyev*, *Landau levels as probe for band topology in graphene moire superlattices*, **Phys. Rev. Lett.** **126**, 056401 (2021)

AS A POSTDOC OR STUDENT:

17. **Jianpeng Liu**, and Xi Dai, *Theories for the correlated insulating states and the quantum anomalous Hall phenomena in twisted bilayer graphene*. **Phys. Rev. B** **103**, 035427 (2021), Editors' suggestion. (ESI highly cited paper)

18. **Jianpeng Liu*** and Xi Dai, *Anomalous Hall effect, magneto-optical properties, and nonlinear optical properties of twisted graphene systems*. **npj Computational Materials**, **6**, 57 (2020)

19. **Jianpeng Liu**, Zhen Ma, Jinhua Gao, and Xi Dai, *Quantum valley Hall effect, orbital magnetism, and anomalous Hall effect in twisted graphene multilayers*. **Phys. Rev. X** **9**, 031021 (2019) (ESI highly cited paper)

20. **Jianpeng Liu**, Junwei Liu, and Xi Dai, *Pseudo-Landau-level representation of twsited bilayer graphene: band topology and implications on the correlated insulating phases*. **Phys. Rev. B** **99**, 155415 (2019) (ESI highly cited paper)

21. T. Suzuki, L. Savary, **J. Liu**, J. W. Lynn, L. Balents, and J. G. Checkelsky, *Singular angular magnetoresistance and spontaneous symmetry breaking in a magnetic nodal semimetal*. **Science**, **365**, 377-381 (2019)
22. **Jianpeng Liu**, Kasma Hejazi, and Leon Balents, *Floquet engineering of multi-orbital Mott insulators: applications to orthorhombic titanates*. **Phys. Rev. Lett.** **121**, 107201 (2018)
23. **Jianpeng Liu** and Leon Balents, *Anomalous Hall effect and topological defects in antiferromagnetic Weyl semimetals: Mn_3Sn/Ge* . **Phys. Rev. Lett.** **119**, 087202 (2017)
24. **Jianpeng Liu** and Leon Balents, *Correlation effects and quantum oscillations in topological nodal-loop semimetals*. **Phys. Rev. B** **95**, 075426 (2017)
25. **Jianpeng Liu**, Se Young Park, Kevin F. Garrity and David Vanderbilt, *Flux states and topological phases from spontaneous time-reversal symmetry breaking in $CrSi(Ge)Te_3$ -based systems*. **Phys. Rev. Lett.** **117**, 257201 (2016)
26. Huaqing Huang, **Jianpeng Liu**, David Vanderbilt and Wenhui Duan, *Topological nodal-line semimetals in alkaline-earth stannides, germanides and silicides*. **Phys. Rev. B** **93**, 201114 (2016) (**ESI highly cited paper**)
27. **Jianpeng Liu** and David Vanderbilt, *Gauge-discontinuity contributions to Chern-Simons orbital magnetoelectric coupling*. **Phys. Rev. B** **92**, 245138 (2015)
28. **Jianpeng Liu** and David Vanderbilt, *Weyl semimetals from noncentrosymmetric topological insulators*. **Phys. Rev. B** **90**, 155316 (2014). Editors' suggestion in PRB. (**ESI highly cited paper**)
29. **Jianpeng Liu** and David Vanderbilt, *Spin-orbit spillage as a measure of band inversion in insulators*. **Phys. Rev. B** **90**, 125133 (2014)
30. **Jianpeng Liu** and David Vanderbilt, *Topological phase transitions in $(Bi_{1-x}In_x)_2Se_3$ and $(Bi_{1-x}Sbx)_2Se_3$* . **Phys. Rev. B** **88**, 224202 (2013)

SELECTED TALKS & PRESENTATIONS

- 2013-2019 and 2021, contributed talks, APS March meetings
- “Theoretical studies on antiferromagnetic Weyl semimetals Mn_3Sn and $CeAlGe$ ”, invited talk, topological matter symposium, Liyang, Jiangsu, China, May 2018
- “Chern-Simon orbital magnetoelectric coupling from gauge discontinuity”, invited talk, 4th Conference on Condensed Matter Physics, Shanghai, China, June 2018
- “The Manifestation of Band Topology in Real Space Textures: Magnetic Topological Defects and Moiré Pattern”, seminar talk, The University of Hong Kong, Jan 2019
- “The Manifestation of Band Topology in Real Space Textures: Magnetic Topological Defects and Moiré Pattern”, special colloquium, The Ohio State University, Feb 2019

- “Topological aspects of twisted graphene bilayers and multilayers”, invited talk, 5th Conference on Condensed Matter Physics, Liyang, Jiangsu, China, May 2019
- “Topological aspects of twisted graphene bilayers and multilayers”, seminar talk, Kavli Institute for Theoretical Sciences, May 2019
- “Topological aspects and optical properties of twisted graphene bilayers and multilayers”, invited talk, CPS Fall Meeting, Zhengzhou, China, Sep 2019
- “Band topology, optical properties, and correlation effects in twisted graphene systems”, seminar talk, Southern University of Science and Technology, Dec 2019
- “Topological properties and spontaneous symmetry breaking in twisted graphene systems”, 23rd Annual Conference of the Physical Society of Hong Kong, July. 2020
- “Topological properties and symmetry-breaking states in twisted graphene systems”, ICAM-China 2021 Spring Symposium, April 2021, Shanghai, China
- “Topological and correlated states in twisted graphene systems”, invited seminar talk, Institute of Physics, Chinese Academy of Sciences, May 2021, Beijing China
- “Topological properties and correlated states in twisted graphene systems”, invited seminar talk, Theoretical physics seminar of Fudan University, Nov 2021, Shanghai, China
- Invited series lecture talks, CSRC Workshop on Twistronics: Experiments and Methods, Beijing Computational Science Research Center, Nov 2021, Beijing China
- “Nonlinear optical properties and piezoelectric response in twisted graphene systems”, Physical chemistry seminar talk, University of California, San Diego, April 2022
- “Piezoelectric response and nonlinear optical properties of twisted graphene systems”, invited talk, Pioneer Symposium: Moire quantum materials, in the Korean Physical Society Meeting, April 2022
- “Topological properties and correlation effects of twisted graphene systems”, invited talk, International Conference on Frontiers Materials, May 2022
- “Topological properties and correlation effects in moire graphene systems”, invited seminar talk, Southern University of Science and Technology, June 2022
- “Interacting Dirac fermions in graphene-based heterostructures”, invited seminar talk, Huazhong University of Science and Technology, July 2022
- “Interacting Dirac fermions in graphene-based heterostructures”, invited seminar talk, HKU-UCAS Joint Institute of Theoretical and Computational Physics seminar, August 2022

REFERENCES

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