



Hongyun Zhang (张红云)

Beijing Tsinghua Institute for Frontier Interdisciplinary Innovation

Department of Physics, Tsinghua University

Tsinghua/Tohoku-AIMR Joint Research Center Scientist, WPI-AIMR

Email: zhanghy.2015@tsinghua.org.cn

RESEARCH EXPERIENCE:

Mar, 2025 – Now

Beijing Tsinghua Institute for Frontier Interdisciplinary Innovation, Assistant researcher

Department of Physics, Tsinghua University

Oct, 2023 – Now

Tsinghua/Tohoku-AIMR Joint Research Center Scientist
Advanced Institute for Materials Research, Tohoku University
With **Prof. Takafumi Sato**

Dec, 2021 – Feb, 2025

Shuimu Fellow, Tsinghua University
With **Prof. Wenhui Duan & Prof. Shuyun Zhou**

EDUCATION:

August, 2015 – Dec, 2021

Ph.D. in Physics, Tsinghua University

Thesis: Many-body Interactions and Ultrafast Electronic Dynamics in Two Dimensional Materials and Heterostructures

Thesis advisor: **Prof. Shuyun Zhou**

August, 2011 – July, 2015

B.S. Applied Physics, Tianjin University

PUBLICATION:

40 publications, with total citations > 2600 (Google Scholar)

First-author[†]/corresponding author^{*} papers:

1. **Hongyun Zhang[†]**, Jinxi Lu[†], Size Wu[†], Yijie Wang[†], Kai Liu, Fei Wang, Wanying Chen, Lingzhi Wen, Jinling Zhou, Kenji Watanabe, Takashi Taniguchi, Jose Avila, Pavel Dudin, Matthew D. Watson, Takafumi Sato, Pu Yu, Wenhui Duan, Zhida Song^{*}, Guorui Chen^{*},

Shuyun Zhou*. “Field-induced asymmetric band flattening and ideal quantum geometry in rhombohedral graphene”, *arXiv:2605.05199*

2. Wanying Chen[†], **Hongyun Zhang^{†*}**, Jinxi Lu[†], Yu Gu[†], Qiyun Xu[†], Fei Wang, Xuanxi Cai, Jiansong Li, Jiayong Xiao, Rui Chen, Kenji Watanabe, Takashi Taniguchi, Jose Avila, Pavel Dudin, Matthew D. Watson, Pu Yu, Shengwei Jiang, Wenhui Duan, Tingxin Li*, Chong Wang* and Shuyun Zhou*. “Moiré-modulated Γ valley in twisted bilayer and twisted double-bilayer MoTe₂”, *arXiv:2512.16431*
3. **Hongyun Zhang*** and Shuyun Zhou*, “Heavy and light electrons coexist in twisted graphene”, *Nature* 653, 31 (2026). **News & views.**
4. **Hongyun Zhang[†]**, Jinxi Lu[†], Kai Liu[†], Yijie Wang[†], Fei Wang, Size Wu, Wanying Chen, Xuanxi Cai, Kenji Watanabe, Takashi Taniguchi, Jose Avila, Pavel Dudin, Matthew D. Watson, Alex Louat, Takafumi Sato, Pu Yu, Wenhui Duan, Zhida Song*, Guorui Chen* and Shuyun Zhou*. “Moiré enhanced flat band in rhombohedral graphene”, *Nat. Mater.* 25, 566 (2026)
5. **Hongyun Zhang[†]**, Qian Li[†], Michael G. Scheer, Renqi Wang, Chuyi Tuo, Nianlong Zou, Wanying Chen, Jiaheng Li, Xuanxi Cai, Changhua Bao, Ming-Rui Li, Ke Deng, Kenji Watanabe, Takashi Taniguchi, Mao Ye, Peizhe Tang, Yong Xu, Pu Yu, Jose Avila, Pavel Dudin, Jonathan D. Denlinger, Hong Yao, Biao Lian, Wenhui Duan & Shuyun Zhou*. “Correlated topological flat bands in rhombohedral graphite”, *PNAS* 121, e2410714121 (2024).
6. Qian Li[†], **Hongyun Zhang[†]** (contribute equally), Yijie Wang, Wanying Chen, Changhua Bao, Qinxin Liu, Tianyun Lin, Shuai Zhang, Haoxiong Zhang, Kenji Watanabe, Takashi Taniguchi, Jose Avila, Pavel Dudin, Qunyang Li, Pu Yu, Wenhui Duan, Zhida Song and Shuyun Zhou*. “Evolution of flat band and role of lattice relaxations in twisted bilayer graphene”. *Nat. Mater.* 23, 1070-1076 (2024).
7. **Hongyun Zhang[†]**, Qian Li[†], Youngju Park, Yujin Jia, Wanying Chen, Jiaheng Li, Qinxin Liu, Changhua Bao, Nicolas Leconte, Shaohua Zhou, Yuan Wang, Kenji Watanabe, Takashi Taniguchi, Jose Avila, Pavel Dudin, Pu Yu, Hongming Weng, Wenhui Duan, Quansheng Wu, Jeil Jung & Shuyun Zhou*. “Observation of dichotomic field-tunable electronic structure in twisted monolayer-bilayer graphene”. *Nat. Commun.* 15, 3737 (2024).
8. **Hongyun Zhang**, Tommaso Pincelli, Chris Jozwiak, Takeshi Kondo, Ralph Ernstorfer, Takafumi Sato and Shuyun Zhou. “Angle-resolved photoemission spectroscopy”. *Nat. Rev. Methods Primers* 2, 54 (2022).
9. Changhua Bao[†], **Hongyun Zhang[†]** (contribute equally), Teng Zhang, Xi Wu, Laipeng Luo, Shaohua Zhou, Qian Li, Yanhui Hou, Wei Yao, Liwei Liu, Pu Yu, Jia Li, Wenhui Duan, Hong Yao, Yeliang Wang, and Shuyun Zhou. “Experimental evidence of chiral symmetry breaking in a Kekulé-ordered graphene”. *Phys. Rev. Lett.* 126, 206804 (2021). **(Editor’s suggestion & featured in physics).**

10. **Hongyun Zhang**[†], Changhua Bao[†], Michael Schüler, Shaohua Zhou, Qian Li, Laipeng Luo, Wei Yao, Zhong Wang, Thomas P. Devereaux and Shuyun Zhou. “Self-energy dynamics and mode specific phonon threshold effect in a Kekulé-ordered graphene”. *Natl. Sci. Rev.* 9, nwab175 (2022).
11. **Hongyun Zhang**, Shuopei Wang, Eryin Wang, Xiaobo Lu, Qian Li, Changhua Bao, Ke Deng, Haoxiong Zhang, Wei Yao, Guorui Chen, Alexei V. Fedorov, Jonathan D. Denlinger, Kenji Watanabe, Takashi Taniguchi, Guangyu Zhang, and Shuyun Zhou. “Experimental evidence of plasmarons and effective fine structure constant in electron-doped graphene/hBN heterostructure”. *npj Quantum Mater.* 6, 83 (2021).
12. Changhua Bao[†], **Hongyun Zhang**[†] (contribute equally), Xi Wu, Shaohua Zhou, Qian Li, Pu Yu, Jia Li, Wenhui Duan, Shuyun Zhou. “Coexistence of extended flat band and Kekulé order in Li-intercalated graphene”. *Phys. Rev. B.* 105, L161106 (2022). (Editor’s suggestion).
13. **Hongyun Zhang**, Changhua Bao, Zeyu Jiang, Kenan Zhang, Hao Li, Chaoyu Chen, Jose Avila, Maria C. Asensio, Wenhui Duan, Yang Wu and Shuyun Zhou. “Resolving deep quantum well states in atomically thin 2H-MoTe₂ flakes by Nanospot Angle-resolved photoemission spectroscopy”, *Nano Lett.* 18 (8), 4664 (2018).
14. Haoyuan Zhong[†], **Hongyun Zhang**[†] (contribute equally), Haoxiong Zhang[†], Ting Bao, Kenan Zhang, Shengnan Xu, Laipeng Luo, Awabaikeli Rousuli, Wei Yao, Jonathan D. Denlinger, Yaobo Huang, Yang Wu, Yong Xu, Wenhui Duan and Shuyun Zhou. “Revealing the two-dimensional electronic structure and anisotropic superconductivity in a natural van der Waals superlattice (PbSe)_{1.14}NbSe₂”, *Phys. Rev. Mater.* 7, L041801 (2023).
15. **Hongyun Zhang**[†], Yulu Qin[†], Tianshuang Sheng, Haoyuan Zhong, Xuanxi Cai, Tianyun Lin, Changhua Bao, Rui Wang, Guowei Lu, Qihuang Gong, Wenhui Duan, Yunquan Liu*, Shuyun Zhou. “Spatial-temporal imaging electronic dynamics in few-layer graphene”, *2D Materials* 12, 011002 (2025).

Co-authored papers:

16. Fei Wang[†], Xuanxi Cai[†], Xiao Tang, Jinxi Lu, Wanying Chen, Tianshuang Sheng, Runfa Feng, Haoyuan Zhong, **Hongyun Zhang**, Pu Yu and Shuyun Zhou*. “Observation of Floquet-induced gap in graphene”, *Nat. Mater.* (2026) [See related news & views in Nat. Mater.](#)
17. Fei Wang[†], Xuanxi Cai[†], Wanying Chen[†], Jinxi Lu, Tianshuang Sheng, Xiao Tang, Jiansong Li, **Hongyun Zhang**, Shuyun Zhou*. “Robust Floquet-induced gap in irradiated graphite”, *Chin. Phys. Lett.* 43, 050705 (2026).
18. Fei Wang⁺, Xuanxi Cai⁺, Teng Xiao⁺, Changhua Bao, Haoyuan Zhong, Wanying Chen, Tianyun Lin, Tianshuang Sheng, Xiao Tang, **Hongyun Zhang**, Pu Yu, Zhiyuan Sun* and Shuyun Zhou*. “Floquet engineering enabled by charge density wave transition”, *arXiv:2510.18323*.
19. Wanying Chen⁺, Yiwen Yin⁺, Fei Wang, **Hongyun Zhang**, Yixuan Ma, Kejie Bao, Haoyuan Zhong, Qian Li, Tianyun Lin, Changhua Bao, Hugen Yan, Junyi Zhu*, and Shuyun Zhou*.

- “Strongly Enhanced Mass Anisotropy in Monolayer Phosphorene and Field Tunability”, *Phys. Rev. Lett.* 135, 046401 (2025). (Editor's suggestion)
20. Jiawei Yu, Guihao Jia, Qian Li, Zhen Zhan, Yuyang Wang, Kebin Xiao, Yongkang Ju, Hongyun Zhang, Zhiqiang Hu, Yunkai Guo, Biao Lian, Peizhe Tang, Pierre A Pantaleón, Shuyun Zhou, Francisco Guinea, Qi-Kun Xue*, Wei Li*. “Strain and twist angle driven electronic structure evolution in twisted bilayer graphene”, *Rep. Prog. Phys.* 89 048001 (2026).
 21. Pei Ouyang, Jiawei Yu, Qian Li, Guihao Jia, Yuyang Wang, Kebin Xiao, Hongyun Zhang, Zhiqiang Hu, Pierre A Pantaleón, Zhen Zhan*, Shuyun Zhou, Francisco Guinea, Qi-Kun Xue*, Wei Li*. “Structural and electronic signatures of strain-tunable marginally twisted bilayer graphene”, *Natl. Sci. Rev.* 13: nwaf568 (2026).
 22. Runfa Feng, Yang Zhang, Jiaheng Li, Qian Li, Changhua Bao, **Hongyun Zhang**, Wanying Chen, Xiao Tang, Ken Yaegashi, Katsuki Sugawara, Takafumi Sato, Wenhui Duan, Pu Yu* and Shuyun Zhou*. “Giant Rashba splitting in PtTe/PtTe₂ heterostructure”, *Nat. Commun.* 16, 2667 (2025).
 23. Fei Wang[†], Wanying Chen[†], Changhua Bao, Tianyun Lin, Haoyuan Zhong, **Hongyun Zhang**, and Shuyun Zhou*. “Light-Field Dressing of Transient Photoexcited States above the Fermi Energy”, *Phys. Rev. Lett.* 134, 146401 (2025).
 24. Mingzhe Yan, Huaqing Huang, Kenan Zhang, Eryin Wang, Wei Yao, Ke Deng, Guoliang Wan, **Hongyun Zhang**, Masashi Arita, Haitao Yang, Zhe Sun, Hong yao, Yang Wu, Shoushan Fan, Wenhui Duan and Shuyun Zhou. “Lorentz-violating type-II Dirac fermions in transition metal dichalcogenide PtTe₂”. *Nat. Commun.* 8, 257 (2017).
 25. Ke Deng, Guoliang Wan, Peng Deng, Kenan Zhang, Shijie Ding, Eryin Wang, Mingzhe Yan, Huaqing Huang, **Hongyun Zhang**, Zhilin Xu, Jonathan Denlinger, Alexei Fedorov, Haitao Yang, Wenhui Duan, Hong Yao, Yang Wu, Shoushan Fan, Haijun Zhang, Xi Chen, and Shuyun Zhou. “Experimental observation of topological Fermi arcs in type-II Weyl semimetal MoTe₂”. *Nat. Phys.* 12, 1105 (2016).
 26. Changhua Bao, Michael Schüler, Teng Xiao, Fei Wang, Haoyuan Zhong, Tianyun Lin, Xuanxi Cai, Tianshuang Sheng, Xiao Tang, **Hongyun Zhang**, Pu Yu, Zhiyuan Sun, Wenhui Duan & Shuyun Zhou. “Manipulating the symmetry of photon-dressed electronic states”. *Nat. Commun.* 15, 10535 (2024).
 27. Changhua Bao, Haoyuan Zhong, Benshu Fan, Xuanxi Cai, Fei Wang, Shaohua Zhou, Tianyun Lin, **Hongyun Zhang**, Pu Yu, Peizhe Tang*, Wenhui Duan and Shuyun Zhou*. “Floquet-Volkov interference in a semiconductor”, *Phys. Rev. B* 111, L081106 (2025).
 28. Changhua Bao, Fei Wang, Haoyuan Zhong, Shaohua Zhou, Tianyun Lin, **Hongyun Zhang**, Xuanxi Cai, Wenhui Duan and Shuyun Zhou. “Light-Induced Ultrafast Glide-Mirror Symmetry Breaking in Black Phosphorus”. *ACS Nano* 18, 32038 (2024).
 29. Wanying Chen, Fei Wang, Tianyun Lin, Haoyuan Zhong, Shaohua Zhou, Changhua Bao, Hongyun Zhang, and Shuyun Zhou. “Distinct light-matter coupling mechanisms in Bi₂Te₃:

Crossover from above-gap photoexcitation to light-field dressing". **Phys. Rev. B** 110 L201116 (2024).

30. Hao Qiu, Zhihao Yu, Tiange Zhao,, Hui Zeng, Guangyu Zhang, **Hongyun Zhang**, Jincheng Zhang, Kai Zhang, Tao Zhang, Xinbo Zhang, Yanfeng Zhang, Chunsong Zhao, Yuda Zhao, Ting Zheng, Peng Zhou, Shuyun Zhou, Yuxuan Zhu, Deren Yang, Yi Shi, Han Wang, Xinran Wang. "Two-dimensional materials for future information technology: status and prospects". **Sci. China Inf. Sci.** 67, 160400 (2024). Review article.
31. Tianyun Lin, Yongkang Ju, Haoyuan Zhong, Xiangyu Zeng, Xue Dong, Changhua Bao, **Hongyun Zhang**, Tian-Long Xia, Peizhe Tang and Shuyun Zhou. "Ultrafast Carrier Relaxation Dynamics in a Nodal-Line Semimetal $PtSn_4$ ". **Nano Lett.** 24, 6278 (2024).
32. Haoyuan Zhong, Xuanxi Cai, Changhua Bao, Fei Wang, Tianyun Lin, Yudong Chen, Sainan Peng, Lin Tang, Chen Gu, Zhensheng Tao, **Hongyun Zhang** and Shuyun Zhou. "HHG light source with polarization selectivity and sub-100- μm beam size for TrARPES". **Ultrafast Sci.** 0, 0063 (2024).
33. Shaohua Zhou, Changhua Bao, Benshu Fan, Fei Wang, Haoyuan Zhong, **Hongyun Zhang**, Peizhe Tang, Wenhui Duan, and Shuyun Zhou. "Floquet Engineering of Black Phosphorus upon Below-Gap Pumping". **Phys. Rev. Lett.** 131, 116401 (2023). (Editor's suggestion)
34. Runfa Feng, Wei Wang, Changhua Bao, Zichun Zhang, Fei Wang, **Hongyun Zhang**, Junjie Yao, Yong Xu, Pu Yu, Shuai-Hua Ji, Chen Si, Shuyun Zhou. "Selective Control of Phases and Electronic Structures of Monolayer $TaTe_2$ ". **Adv. Mater.** 36, 2302297 (2024).
35. Changhua Bao, **Hongyun Zhang**, Qian Li, Shaohua Zhou, Haoxiong Zhang, Ke Deng, Kenan Zhang, Laipeng Luo, Wei Yao, Chaoyu Chen, Jose Avila, Maria C. Asensio, Yang Wu and Shuyun Zhou. "Spatially-resolved electronic structure of phase-separated $IrTe_2$ through electronic structure microscopy". **Commun. Phys.** 4, 229 (2021).
36. Changhua Bao, Laipeng Luo, **Hongyun Zhang**, Shaohua Zhou, Zefeng Ren and Shuyun Zhou. "Full diagnostics and optimization of time resolution for time and angle-resolved photoemission spectroscopy". **Rev. Sci. Instrum.** 92, 033904 (2021).
37. Yiyang Wang, **Hongyun Zhang**, Xiaoqin Lu, Lin-Lin Sun, Sheng Xu, Zhong-Yi Lu, Kai Liu, Shuyun Zhou and Tian-Long Xia. "Extremely large magnetoresistance and electronic structure of $TmSb$ ". **Phys. Rev. B** 97, 085137 (2018).
38. Haoxiong Zhang, Awabakeli Rousuli, Kenan Zhang, Laipeng Luo, Chenguang Guo, Xin Cong, Zuzhang Lin, Changhua Bao, **Hongyun Zhang**, Shengnan Xu, Runfa Feng, Shengchun Shen, Kun Zhao, Wei Yao, Yang Wu, Shuaihua Ji, Xi Chen, Pingheng Tan, Qi-Kun Xue, Yong Xu, Wenhui Duan, Pu Yu, Shuyun Zhou. "Tailored Ising superconductivity in intercalated bulk $NbSe_2$ ". **Nat. Phys.** (2022).
39. Mingzhe Yan, Eryin Wang, Xue Zhou, Guangqi Zhang, **Hongyun Zhang**, Kenan Zhang, Wei Yao, Shuzhen Yang, Koji Miyamoto, Taichi Okuda, Yang Wu, Pu Yu, Wenhui Duan, and Shuyun Zhou. "High quality atomically thin $PtSe_2$ films grown by molecular beam epitaxy". **2D Mater.** 4, 045015 (2017).

40. Xue Zhou, Zeyu Jiang, Kenan Zhang, Wei Yao, Mingzhe Yan, **Hongyun Zhang**, Wenhui Duan and Shuyun Zhou. “*Electronic structure of molecular beam epitaxy grown 1T'-MoTe₂ film and strain effect*”. *Chin. Phys. B* 28, 107307 (2019).

PRESENTATIONS:

1. “*Flat band engineering in twisted/stacked graphene heterostructures*”, **Invited talk**, The 16th Asia Pacific Physics Conference (APPC16), Haikou, China, Oct 2025
2. “*Engineering topological flat bands in pentalayer rhombohedral graphene*”, **Invited talk**, Second Conference on Two-Dimensional Correlated Physics (2DCP-2025), Shanghai, China, Aug 2025
3. “*Flat band engineering in twisted graphene systems (转角石墨烯体系的平带电子结构调控)*”, **Invited talk**, 二维半导体中的量子物态前沿研讨会, Shenyang, China, Feb 2025
4. “*Engineering flat bands in twisted graphene systems*”, **Invited talk**, 15th International Conference on Atomically Controlled Surfaces, Interfaces and Nanostructures (ACSIN-15), Suzhou, China, May 2024
5. “*Engineering the electronic structure of 2D materials and heterostructures*”, **Invited talk**, WPI-AIMR workshop, Tohoku University, Nov 2023
6. “*Self-energy dynamics and mode-specific phonon threshold effect in a Kekulé-ordered graphene*”, **Young Scientist Talk**, The 9th Workshop of A3 Korea-China-Japan Foresight Program, Japan (Online conference), February 2022
7. “*Electronic structure of exfoliated 2H-MoTe₂ atomically thin flakes by using NanoARPES*”, **Young Scientist Talk**, The 2nd Workshop of A3 Korea-China-Japan Foresight Program, Nanjing, Feb 2019
8. “*Field Tunable flat band in Twisted Monolayer-Bilayer Graphene*”, **contributed talk**, American Physical Society March Meeting, Minneapolis, March 2024
9. “*Self-energy dynamics and mode-specific phonon threshold effect in a Kekulé-ordered graphene*”, **contributed talk**, American Physical Society March Meeting, Boston, March 2023
10. “*Band structure tuning of doped Graphene/hBN heterostructure*”, **contributed talk**, American Physical Society March Meeting, Boston, March 2019
11. “*Layer-Dependent Electronic structure of exfoliated 2H-MoTe₂ revealed by Nanospot Angle Resolved photoemission Spectroscopy*”, PFUNT (Joint academic seminar by five Universities: Tsinghua University, Peking University, Fudan University, Nanjing University & University of Science and Technology of China), Shanghai, December 2018
12. “*Layer-Dependent Electronic structure of exfoliated 2H-MoTe₂ revealed by Nanospot Angle Resolved photoemission Spectroscopy*”, **contributed talk**, American Physical Society March Meeting, Los Angeles, March 2018

HONORS AND AWARDS:

- **Outstanding Doctoral Graduate Students of Beijing, 2022 (北京市优秀毕业生)**

- Outstanding Doctoral Graduate Students of Tsinghua University, 2022 (清华大学优秀毕业生)
- **Excellent Ph.D. Thesis of Tsinghua University (top 10%), 2022 (清华大学优秀博士学位论文)**
- **“Shuimu Tsinghua Scholar”, 2021 & 2023 (水木学者 2021&2023)**
- **National Scholarship for Doctoral Students, China (2019)**
- **“Yu-Hsun WOO Prize” (Highest Honor for Doctoral Students), Department of Physics, Tsinghua University (2021) (清华大学物理系“吴有训”奖)**
- The First Grade Scholarship for Excellent Students, Tsinghua University (2021)
- Outstanding Presentation Prize PFUNT forum (Joint academic seminar by five Universities: Tsinghua University, Peking University, Fudan University, Nanjing University & University of Science and Technology of China), Shanghai, China (2018)