

Curriculum Vitae: Wei Ruan

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Education

- Ph. D. in Physics, Tsinghua University, 08/2010 - 07/2017
Thesis: "Scanning tunneling microscopy study on doped Mott insulators and Kondo insulators"
Advisor: Prof. Yayu Wang
- B. S. in Physics, Tsinghua University, 08/2006 - 07/2010

Working experience

- Associate professor, Physics department, Fudan University, 5/2021 - now
- Postdoc, Materials Sciences Division, Lawrence Berkeley National Laboratory, 10/2018 - 12/2020
- Postdoc, Department of Physics, University of California, Berkeley, 08/2017 - 12/2020
- Graduate research assistant, Department of Physics, Tsinghua University, 08/2010 - 07/2017
- Visiting research scholar, Department of Physics, University of California, Berkeley, 11/2013 - 11/2014
- Teaching assistant, Department of Physics, Tsinghua University, 02/2011 - 06/2011

Honors and awards

- The Yu-Hsun WOO Nominee Prize (for excellence in graduate study of physics), Department of Physics and Hung Yin Hua Guan Foundation, Tsinghua, 07/03/2016
- Young scientist participant in the 65th Lindau Nobel Laureate Meeting, Council for the Lindau Nobel Laureate Meetings, Lindau, 06/28/2015 - 07/03/2015
- The Chih-Kung Jen Prize (for excellence in experimental research of physics), Chih-Kung Jen Foundation, Tsinghua, 07/2015
- National scholarship for graduate students, 10/2014
- The Chi-Sun YEH Prize (for excellence in undergraduate study of physics), Department of Physics and Chi-Sun YEH Foundation, Tsinghua, 05/2010
- Outstanding graduate, and Outstanding Thesis Award, Tsinghua University, 2010

Invited presentations

- 17th China low-temperature physics conference, Jinhua, 06/05/2021
Imaging quantum spin liquid behavior in single-layer 1T-TaSe₂
- Online seminar, Berkeley, 05/03/2021
Imaging quantum spin liquid behavior in single-layer 1T-TaSe₂

- A3 Foresight Program, The 7th International Workshop on 2D Materials (online), 2/2021
Imaging quantum spin liquid behavior in single-layer 1T-TaSe₂
- Online seminar, Columbia, 10/14/2020
Imaging spinon density modulations in a 2D quantum spin liquid
- Seminar, Kavli Institute for Theoretical Sciences, University of Chinese Academy of Sciences, 11/18/2019
Evidence for a quantum spin liquid in single-layer 1T-TaSe₂
- Seminar, Fudan University, 10/31/2019
Evidence for a quantum spin liquid in single-layer 1T-TaSe₂
- APS March meeting, Boston, 03/2019
Evidence for a quantum spin liquid in single-layer 1T-TaSe₂

Publications

- Tiancong Zhu[#], **Wei Ruan**^{##}, Yan-Qi Wang[#], Hsin-Zon Tsai, Shuopei Wang, Canxun Zhang, Tianye Wang, Franklin Liou, Kenji Watanabe, Takashi Taniguchi, Jeffrey B. Neaton, Alex Weber-Bargioni, Alex Zettl, Ziqiang Qiu, Guangyu Zhang, Feng Wang^{*}, Joel E. Moore^{*}, and Michael F. Crommie^{*}, “Imaging gate-tunable Tomonaga-Luttinger liquids in 1H-MoSe₂ mirror twin boundaries”.
<https://arxiv.org/abs/2108.03829>
- **Wei Ruan**[#], Yi Chen[#], Shujie Tang, Jinwoong Hwang, Hsin-Zon Tsai, Ryan Lee, Meng Wu, Hyejin Ryu, Salman Kahn, Franklin Liou, Caihong Jia, Andrew Aikawa, Choongyu Hwang, Feng Wang, Yongseong Choi, Steven G. Louie, Patrick A. Lee, Zhi-Xun Shen, Sung-Kwan Mo, and Michael F. Crommie, “Evidence for quantum spin liquid behavior in single-layer 1T-TaSe₂ from scanning tunneling microscopy”, **Nature Physics** accepted. <https://doi.org/10.1038/s41567-021-01321-0>
- Yi Chen[#], **Wei Ruan**[#], Meng Wu[#], Shujie Tang[#], Hyejin Ryu, Hsin-Zon Tsai, Ryan Lee, Salman Kahn, Franklin Liou, Caihong Jia, Oliver R. Albertini, Hongyu Xiong, Tao Jia, Zhi Liu, Jonathan A. Sobota, Amy Y. Liu, Joel E. Moore, Zhi-Xun Shen, Steven G. Louie, Sung-Kwan Mo, and Michael F. Crommie, “Strong correlations and orbital texture in single-layer 1T-TaSe₂”, **Nature Physics** 16, 218-225 (2020). <https://doi.org/10.1038/s41567-019-0744-9>
- **Wei Ruan**, Xintong Li, Cheng Hu, Zhenqi Hao, Haiwei Li, Peng Cai, Xingjiang Zhou, Dung-Hai Lee and Yayu Wang, “Visualization of the periodic modulation of Cooper pairing in a cuprate superconductor”, **Nature Physics** 14, 1178-1182 (2018).
<https://doi.org/10.1038/s41567-018-0276-8>
- Xintong Li, Ying Ding, Chaocheng He, **Wei Ruan**, Peng Cai, Cun Ye, Zhenqi Hao, Lin Zhao, Xingjiang Zhou, Qianghua Wang, and Yayu Wang, “Quasiparticle interference and charge order in a heavily overdoped non-superconducting cuprate”, **New Journal of Physics** 20, 063041 (2018).
<https://doi.org/10.1088/1367-2630/aacb5e>
- Shuang Qiao[#], Xintong Li[#], Naizhou Wang, **Wei Ruan**, Cun Ye, Peng Cai, Zhenqi Hao, Hong Yao, Xianhui Chen, Jian Wu^{*}, Yayu Wang^{*}, and Zheng Liu^{*}, “Mottness Collapse in 1T-TaS_{2-x}Se_x Transition-Metal Dichalcogenide: An Interplay between Localized and Itinerant Orbitals”, **Physical Review X** 7, 041054 (2017). <https://doi.org/10.1103/PhysRevX.7.041054>
- Chang Liu[#], Yunyi Zang[#], **Wei Ruan**[#], Yan Gong, Ke He^{*}, Xucun Ma, Qi-Kun Xue, and Yayu Wang^{*}, “Dimensional Crossover-Induced Topological Hall Effect in a Magnetic Topological Insulator”, **Physical Review Letters** 119, 176809 (2017). <https://doi.org/10.1103/PhysRevLett.119.176809>

- **Wei Ruan**, Cheng Hu, Jianfa Zhao, Peng Cai, Yingying Peng, Cun Ye, Runze Yu, Xintong Li, Zhenqi Hao, Changqing Jin, Xingjiang Zhou, Zheng-Yu Weng, and Yayu Wang, “Relationship between the parent charge transfer gap and maximum transition temperature in cuprates”, **Science Bulletin** 61, 1826-1832 (2016). <https://doi.org/10.1007/s11434-016-1204-x>
- Peng Cai, **Wei Ruan**, Yingying Peng, Cun Ye, Xintong Li, Zhenqi Hao, Xingjiang Zhou, Dung-Hai Lee and Yayu Wang, “Visualizing the evolution from the Mott insulator to a charge-ordered insulator in lightly doped cuprates”, **Nature Physics** 12, 1047-1051 (2016). <https://doi.org/10.1038/nphys3840>
- Miguel M. Ugeda*, Aaron J. Bradley, Yi Zhang, Seita Onishi, Yi Chen, **Wei Ruan**, Claudia Ojeda-Aristizabal, Hyejin Ryu, Mark T. Edmonds, Hsin-Zon Tsai, Alexander Riss, Sung-Kwan Mo, Dunghai Lee, Alex Zettl, Zahid Hussain, Zhi-Xun Shen, Michael F. Crommie*, “Characterization of collective ground states in single-layer NbSe₂”, **Nature Physics** 12, 92-97 (2015). <https://doi.org/10.1038/nphys3527>
- Cun Ye, **Wei Ruan**, Peng Cai, Xintong Li, Aifeng Wang, Xianhui Chen, and Yayu Wang, “Strong similarities between the local electronic structure of insulating iron pnictide and lightly doped cuprate”, **Physical Review X** 5, 021013 (2015). <https://doi.org/10.1103/PhysRevX.5.021013>
- **Wei Ruan**[#], Peizhe Tang[#], Aifang Fang, Peng Cai, Cun Ye, Xintong Li, Wenhui Duan, Nanling Wang, and Yayu Wang, “Structural phase transition and electronic structure evolution in Ir_{1-x}Pt_xTe₂ studied by scanning tunneling microscopy”, **Science Bulletin** 60, 798-805 (2015). <https://doi.org/10.1007/s11434-015-0776-1>
- Aaron J. Bradley[#], Miguel Moreno Ugeda^{#*}, Felipe H da Jornada[#], Diana Y. Qiu, **Wei Ruan**, Yi Zhang, Sebastian Wickenburg, Alexander Riss, Jiong Lu, Sung-Kwan Mo, Zahid Hussain, Zhi-Xun Shen, Steven G. Louie, and Mickael F. Crommie*, “Probing the Role of Interlayer Coupling and Coulomb Interactions on Electronic Structure in Few-Layer MoSe₂ Nanostructures”, **Nano Letters** 15, 2594-2599 (2015). <https://doi.org/10.1021/acs.nanolett.5b00160>
- Miguel M. Ugeda^{#*}, Aaron J. Bradley[#], Su-Fei Shi[#], Felipe H. da Jornada, Yi Zhang, Diana Y. Qiu, **Wei Ruan**, Sung-Kwan Mo, Zahid Hussain, Zhi-Xun Shen, Feng Wang, Steven G. Louie, and Michael F. Crommie*, “Giant bandgap renormalization and excitonic effects in a monolayer transition metal dichalcogenide semiconductor”, **Nature Materials** 13, 1091-1095 (2014). <https://doi.org/10.1038/nmat4061>
- **Wei Ruan**, Cun Ye, Minghua Guo, Fei Chen, Xianhui Chen, Guangming Zhang, and Yayu Wang, “Emergence of a Coherent In-Gap State in the SmB₆ Kondo Insulator Revealed by Scanning Tunneling Spectroscopy”, **Physical Review Letters** 112, 136401 (2014). <https://doi.org/10.1103/PhysRevLett.112.136401>
- Peng Cai, **Wei Ruan**, Xiaodong Zhou, Cun Ye, Aifeng Wang, Xianhui Chen, Dung-Hai Lee, and Yayu Wang, “Doping Dependence of the Anisotropic Quasiparticle Interference in NaFe_{1-x}Co_xAs Iron-Based Superconductors”, **Physical Review Letters** 112, 127001 (2014). <https://doi.org/10.1103/PhysRevLett.112.127001>
- P. Cai, X. Zhou, **W. Ruan**, A. Wang, X. Chen, D. H. Lee, and Y. Wang, “Visualizing the microscopic coexistence of spin density wave and superconductivity in underdoped NaFe_{1-x}Co_xAs”, **Nature communications** 4, 1596 (2013). <https://doi.org/10.1038/ncomms2592>
- C. Ye[#], P. Cai[#], R. Yu, X. Zhou, **W. Ruan**, Q. Liu, C. Jin, and Y. Wang, “Visualizing the atomic-scale electronic structure of the Ca₂CuO₂Cl₂ Mott insulator”, **Nature communications** 4, 1365 (2013). <https://doi.org/10.1038/ncomms2369>

- Xiaodong Zhou, Peng Cai, Aifeng Wang, **Wei Ruan**, Cun Ye, Xianhui Chen, Yizhuang You, Zheng-Yu Weng, and Yayu Wang, “Evolution from Unconventional Spin Density Wave to Superconductivity and a Pseudogaplike Phase in $\text{NaFe}_{1-x}\text{Co}_x\text{As}$ ”, **Physical Review Letters** 109, 037002 (2012). <https://doi.org/10.1103/PhysRevLett.109.037002>
- Peng Cai, Cun Ye, **Wei Ruan**, Xiaodong Zhou, Aifeng Wang, Meng Zhang, Xianhui Chen, and Yayu Wang, “Imaging the coexistence of a superconducting phase and a charge-density modulation in the $\text{K}_{0.73}\text{Fe}_{1.67}\text{Se}_2$ superconductor using a scanning tunneling microscope”, **Physical Review B** 85, 094512 (2012). <https://doi.org/10.1103/PhysRevB.85.094512>
- Minhao Liu, Cui-Zu Chang, Zuocheng Zhang, Yi Zhang, **Wei Ruan**, Ke He, Li-Li Wang, Xi Chen, Jin-feng Jia, Shou-Cheng Zhang, Qi-Kun Xue, Xucun Ma, and Yayu Wang, “Electron interaction-driven insulating ground state in Bi_2Se_3 topological insulators in the two-dimensional limit”, **Physical Review B** 83, 165440 (2011). <https://doi.org/10.1103/PhysRevB.83.165440>