

Wencan Jin

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Auburn University
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Education

Columbia University, New York, NY Aug. 2011 – Jan. 2017
Degree: Ph.D. in Applied Physics
Thesis: Electronic Structure and Surface Physics of Two-dimensional Material MoS_2
Supervisor: Richard M. Osgood, Jr.

Renmin University of China, Beijing, China Sept. 2007 – Jun. 2011
Degree: B.S. in Physics
Supervisor: Shancai Wang

Employment

Auburn University, Auburn, AL Aug. 2019 – present
Assistant Professor in Department of Physics

University of Michigan, Ann Arbor, MI Feb. 2017 – Jul. 2019
Postdoctoral Researcher in Department of Physics
Supervisor: Prof. Liuyan Zhao

Research Interests (Group website)

- **Research topic:** Discovering and understanding novel phases of matter emerging from the interplay between lattice, charge, orbital, and spin degrees of freedom in the low-dimensional quantum materials
- **Material system:** van der Waals materials, multiferroics, molecular beam epitaxy grown oxide thin films
- **Experimental technique:** Lab-based optical spectroscopy (Second harmonic generation, pump-probe spectroscopy, Raman) and synchrotron-based photoemission spectroscopy (ARPES, PEEM, XAS)

Research Experience

Brookhaven National Laboratory, Upton, NY Mar. 2012 – present
User in Center for Functional Nanomaterials
User in National Synchrotron Light Source II
Collaborator: Dr. Jerzey Sadowski

Columbia University, New York, NY Aug. 2011 – Jan. 2017
Graduate Research Assistant
Supervisor: Prof. Richard M. Osgood, Jr.

Institute of Physics, Chinese Academy of Sciences, Beijing, China Jul. 2010 – Jun. 2011
Undergraduate Research Assistant
Supervisor: Prof. Hong Ding

Research Grants

- *Probing novel phases of matter in van der Waals magnet $\text{Fe}_{5-x}\text{GeTe}_2$* , National Science Foundation (NSF), Electronic and Photonic Materials (EPM), DMR # 2129879, 08/15/2021–07/31/2024, **PI: Wencan Jin**, Co-PI: Peng Li, \$523,200

Publications (Google Scholar)

* denotes equal contribution.

† denotes corresponding author.

Manuscripts under review

30. Probing 2D magnetism with ferromagnetic resonance
L. Alahmed, C. Tang, M. Mahdi, Y. Xiong, J. Inman, T. H. Kim, W. Jin[†], W. Zhang, and P. Li
Journal of Alloys and Compounds (under review)

Peer-reviewed journals

29. Magnetism and spin dynamics in room-temperature van der Waals magnet Fe_5GeTe_2
L. Alahmed, B. Nepal, J. Macy, K. Wei, W. Zheng, A. Sapkota, A. R. Mazza, M. Brahlek, W. Jin[†], C. Mewes, L. Balicas, T. Mewes, and P. Li
2D Materials 8, 045030 (2021)
28. Correlating surface stoichiometry and termination in SrTiO_3 films grown by hybrid molecular beam epitaxy
S. Thapa, S. Provence, J. Sadowski, J. Lapano, M. Brahlek, W. Jin, and R. Comes
Journal of Vacuum Science & Technology A 39, 053203 (2021)
27. Structural monoclinicity and its coupling to layered magnetism in few-layer CrI_3
K. Guo, W. Jin^{*}, Z. Ye, G. Ye, H. Xie, B. Yang, H. H. Kim, S. Yan, Y. Fu, S. Tian, H. Lei, A. W. Tsen, K. Sun, J. Yan, R. He and L. Zhao
ACS Nano 15, 10444-10450 (2021)
26. Second-order nonlinear optical and linear UV-VIS absorption properties of type-II multiferroic candidates $\text{RbFe}(\text{AO}_4)_2$ ($A = \text{Mo}, \text{Se}, \text{S}$)
R. Owen, E. Drueke, C. Alburnio, A. Kaczmarek, W. Jin, D. Obeysekera, S. -W. Cheong, J. J. Yang, S. Cundiff, and L. Zhao
Physical Review B 103, 054104 (2021)
25. Observation of the polaronic character of excitons in a two-dimensional semiconducting magnet CrI_3
W. Jin, H. H. Kim, Z. Ye, G. Ye, L. Rojas, X. Luo, B. Yang, F. Yin, J. Horng, S. Tian, Y. Fu, H. Deng, H. Lei, A. W. Tsen, K. Sun, R. He, and L. Zhao
Nature Communications 11, 4780 (2020)
24. Tunable layered-magnetism-assisted magneto-Raman effect in a two-dimensional magnet CrI_3
W. Jin, Z. Ye, X. Luo, B. Yang, G. Ye, F. Yin, H. H. Kim, L. Rojas, S. Tian, Y. Fu, S. Yan, H. Lei, K. Sun, A. W. Tsen, R. He, and L. Zhao
Proceedings of the National Academy of Sciences 117, 24664-24669 (2020)
23. Bulk-like dielectric and magnetic properties of sub 100 nm thick single crystal Cr_2O_3 films on an epitaxial oxide electrode
N. M. Vu, X. Luo, S. Novakov, W. Jin, J. Nordlander, P. B. Meisenheimer, M. Trassin, L. Zhao, and J. T. Heron
Scientific Reports 10, 14721 (2020)
22. Symmetry-resolved two-magnon excitations in a strong spin-orbit-coupled bilayer antiferromagnet
S. Li, E. Drueke, Z. Porter, W. Jin, Z. Lu, D. Smirnov, R. Merlin, S. D. Wilson, K. Sun, and L. Zhao
Physical Review Letters 125, 087202 (2020)
21. Observation of a ferro-rotational order coupled with second-order nonlinear optical fields
W. Jin, E. Drueke, S. Li, A. Admasu, R. Owen, M. Day, K. Sun, S.-W. Cheong, and L. Zhao
Nature Physics 16, 42-46 (2020).
"News & Views" at **Nature Physics** ("Order! Order!!") and **News at Umich** ([Link](#))

20. Spectroscopic photoemission and low energy electron microscopy studies of surface- and electronic structure of low-dimensional materials
W. Jin and R. M. Osgood, Jr.
Advances in Physics: X 4, 1688187 (2019) (**Invited review article**)
19. Polarized Raman spectroscopy study of metallic $(\text{Sr}_{1-x}\text{La}_x)_3\text{Ir}_2\text{O}_7$: a consistent picture of disorder-interrupted unidirectional charge order
W. Jin, S. Li, J. Liu, Q. Han, Z. Porter, C. Peterson, J. Schmeh, I. Boulares, K. Sun, R. Merlin, S. D. Wilson, and L. Zhao
Physical Review B 99, 041109(R) (2019). (**Rapid Communications**)
18. Raman fingerprint of two terahertz spin wave branches in a two-dimensional honeycomb Ising ferromagnet
W. Jin, H. H. Kim, Z. Ye, S. Li, P. Rezaie, F. Diaz, S. Siddiq, E. Wauer, B. Yang, C. Li, S. Tian, K. Sun, H. Lei, A. W. Tsen, L. Zhao, and R. He
Nature Communications 9, 5122 (2018). (**Editors' Highlights**)
17. Phase transition and electronic structure evolution of MoTe_2 induced by W substitution
W. Jin, T. Schiros, Y. Lin, J. Ma, R. Lou, Z. Dai, J.-X. Yu, D. Rhodes, J. T. Sadowski, X. Tong, T. Qian, M. Hashimoto, D. Lu, J. I. Dadap, S. Wang, E. J. G. Santos, J. Zang, K. Pohl, H. Ding, J. Hone, L. Balicas, A. N. Pasupathy, and R. M. Osgood, Jr.
Physical Review B 98, 144114 (2018).
16. Excitation and characterization of image potential state electrons on quasi-free-standing graphene
Y. Lin, Y. Li, J. T. Sadowski, W. Jin, J. I. Dadap, M. S. Hybertsen, and R. M. Osgood, Jr.
Physical Review B 97, 165413 (2018).
15. Surface buckling of black phosphorus: Determination, origin, and influence on electronic structure
Z. Dai, W. Jin, J.-X. Yu, M. Grady, J. T. Sadowski, Y. D. Kim, J. Hone, J. I. Dadap, J. Zang, R. M. Osgood, Jr. and K. Pohl
Physical Review Materials 1, 074003 (2017).
14. Electronic structure of the metastable epitaxial rock-salt SnSe $\{111\}$ topological crystalline insulator
W. Jin, S. Vishwanath, J. Liu, L. Kong, R. Lou, Z. Dai, J. Sadowski, X. Liu, H.-H. Lien, A. Chaney, Y. Han, M. Cao, J. Ma, T. Qian, S. Wang, M. Dobrowolska, J. Furdyna, D. A. Muller, K. Pohl, H. Ding, J. I. Dadap, H. G. Xing, and R. M. Osgood, Jr.
Physical Review X 7, 041020 (2017).
13. Engineering the structural and electronic phases of MoTe_2 through W substitution
D. Rhodes, D. A. Chenet, B. E. Janicek, C. Nyby, Y. Lin, W. Jin, D. Edelberg, E. Mannebach, N. Finney, A. Antony, T. Schiros, T. Klarr, A. Mazzoni, M. Chin, Y.-C. Chiu, W. Zheng, Q. R. Zhang, F. Ernst, J. I. Dadap, X. Tong, J. Ma, R. Lou, S. Wang, T. Qian, H. Ding, R. M. Osgood, Jr., D. W. Paley, A. M. Lindenberg, P. Y. Huang, A. N. Pasupathy, M. Dubey, J. Hone, and L. Balicas
Nano Letters 17, 1616-1622 (2017).
12. Two-color field enhancement at an STM junction for spatiotemporally resolved photoemission
X. Meng, W. Jin, H. Yang, J. I. Dadap, R. M. Osgood, Jr., A. Dolocan, P. Sutter, and N. Camilone
Optics Letter 42, 2651-2654 (2017).
11. Surface Structure of bulk 2H-MoS_2 (0001) and exfoliated suspended monolayer MoS_2 : A selected area low energy electron diffraction study
Z. Dai, W. Jin, M. Grady, J. T. Sadowski, J. I. Dadap, R. M. Osgood, Jr. and K. Pohl
Surface Science 660, 16-21 (2017).
10. Rigorous theoretical analysis of a surface-plasmon nanolaser with monolayer MoS_2 gain medium
X. Meng, R. R. Grote, W. Jin, J. I. Dadap, N. C. Panouiu, and R. M. Osgood, Jr.
Optics Letters 41, 2636-2639 (2016).
9. Direct measurement of the tunable electronic structure of bilayer MoS_2 by interlayer twist

- P.-C. Yeh, W. Jin, N. Zaki, J. Kunstmann, D. Chenet, G. Arefe, J. T. Sadowski, J. I. Dadap, P. Sutter, J. Hone, and R. M. Osgood, Jr.
Nano Letters 16, 953-959 (2016).
8. Tuning the electronic structure of monolayer graphene/MoS₂ van der Waals heterostructure via inter-layer twist
W. Jin, P.-C. Yeh, N. Zaki, D. Chenet, G. Arefe, Y. Hao, A. Sala, T. O. Mentis, J. I. Dadap, A. Locatelli, J. Hone, and R. M. Osgood, Jr.
Physical Review B 92, 201409(R) (2015). **(Editors' Suggestion)**
 7. Sudden gap closure across the topological phase transition in Bi_{2-x}In_xSe₃
R. Lou, Z. Liu, W. Jin, H. Wang, Z. Han, K. Liu, X. Wang, T. Qian, Y. Kushnirenko, S.-W. Cheong, R. M. Osgood, Jr., H. Ding, and S. Wang
Physical Review B 92, 115150 (2015).
 6. Layer-dependent electronic structure of an atomically heavy two-dimensional dichalcogenide
P.-C. Yeh, W. Jin, N. Zaki, D. Zhang, J. T. Liou, J. T. Sadowski, A. Al-Mahboob, J. I. Dadap, I. P. Herman, P. Sutter, and R. M. Osgood, Jr.
Physical Review B 91, 041407(R) (2015). **(Editors' Suggestion)**
 5. Substrate interaction with suspended and supported monolayer MoS₂: angle-resolved photoemission spectroscopy
W. Jin, P.-C. Yeh, N. Zaki, D. Zhang, J. T. Liou, J. T. Sadowski, A. Barinov, M. Yablonskikh, J. I. Dadap, P. Sutter, I. P. Herman, and R. M. Osgood, Jr.
Physical Review B 91, 121409(R) (2015).
 4. Quasiparticle interference, quasiparticle interactions, and the origin of the charge density wave in 2H-NbSe₂
C. Arguello, E. Rosenthal, E. Andrade, W. Jin, P. Yeh, N. Zaki, S. Jia, R. Cava, R. Fernandes, A. Millis, T. Valla, R. M. Osgood, Jr., and A. N. Pasupathy
Physical Review Letters 114, 037001 (2015). **(Editors' Suggestion & On the Cover)**
 3. Probing substrate-dependent long-range surface structure of single-layer and multilayer MoS₂ by low-energy electron microscopy and microprobe diffraction
P.-C. Yeh, W. Jin, N. Zaki, D. Zhang, J. T. Sadowski, A. Al-Mahboob, A. M. van der Zande, D. A. Chenet, J. I. Dadap, I. P. Herman, P. Sutter, J. Hone, and R. M. Osgood, Jr.
Physical Review B 89, 155408 (2014).
 2. Direct measurement of the thickness-dependent electronic band structure of MoS₂ using angle-resolved photoemission spectroscopy
W. Jin, P.-C. Yeh, N. Zaki, D. Zhang, J. T. Sadowski, A. Al-Mahboob, A. M. van der Zande, D. A. Chenet, J. I. Dadap, I. P. Herman, P. Sutter, J. Hone, and R. M. Osgood, Jr.
Physical Review Letters 111, 106801 (2013). **(Highly Cited Paper - Web of Science)**
 1. Absence of a holelike Fermi surface for the iron-based K_{0.8}Fe_{1.7}Se₂ superconductor revealed by angle-resolved photoemission spectroscopy
T. Qian, X.-P. Wang, W.-C. Jin, P. Zhang, P. Richard, G. Xu, X. Dai, Z. Fang, J.-G. Guo, X.-L. Chen, and H. Ding
Physical Review Letters 106, 187001 (2011). **(Highly Cited Paper - Web of Science)**

Presentations

Invited talks

18. Probing a ferro-rotational order by optical second harmonic generation
Department of Physics, Nanjing University, Nanjing, China, Jun. 12, 2020
17. Shedding light on ferroic materials: novel phases of matter unraveled by ultrafast lasers
School of Physics, Zhengzhou University, Zhengzhou, China, Jan. 16, 2020

16. Probing a ferro-rotational order by optical second harmonic generation
Department of Physics, Renmin University of China, Beijing, China, Jan. 8, 2020
15. Probing a ferro-rotational order by optical second harmonic generation
Institute of Physics, University of Chinese Academy of Sciences, Beijing, China, Jan. 7, 2020
14. Probing a ferro-rotational order by optical second harmonic generation
Department of Mechanical Engineering, Beijing Institute of Technology, Beijing, China, Jan. 6, 2020
13. Shedding light on ferroic materials: novel phases of matter unraveled by ultrafast lasers
School of Chemical and Material Engineering, Jiangnan University, Wuxi, China, Jan. 3, 2020
12. Probing a ferro-rotational order by optical second harmonic generation
Department of Physics, Southern University of Science and Technology, Shenzhen, China, Dec. 26, 2019
11. Shedding light on ferroic materials: novel phases of matter unraveled by ultrafast lasers
Department of Physics, Georgia Southern University, GA, Nov. 4, 2019
10. Probing a ferro-rotational order by optical second harmonic generation
Center for Functional Nanomaterials, Brookhaven National Laboratory, NY, Oct. 10, 2019
9. Probing a ferro-rotational order by optical second harmonic generation
Department of Electrical & Computer Engineering, University of Nebraska-Lincoln, NE, Feb. 25, 2019
8. Probing a ferro-rotational order by optical second harmonic generation
Department of Physics, Auburn University, AL, Feb. 7, 2019
7. Shedding Light on Quantum Materials: Spectroscopic and Symmetry Insights of Novel Phases of Matter
National High Magnetic Field Laboratory, FL, Feb. 5, 2019
6. Probing a ferro-rotational order by optical second harmonic generation
Department of Physics, Florida State University, FL, Feb. 4, 2019
5. Raman Spectroscopy Studies of Charge Order in Metallic La-doped $\text{Sr}_3\text{Ir}_2\text{O}_7$
Department of Physics, University of Michigan, MI, Oct. 31, 2017
4. Electronic Structure and Surface Physics of Two-dimensional Materials
Department of Physics, University of New Hampshire, NH, Dec. 7, 2016
3. Electronic Structure and Surface Physics of Transition Metal Dichalcogenides
Department of Physics, University of Michigan, MI, Dec. 2, 2016
2. Applications of LEEM/PEEM in Electronic Structure and Surface Physics of Atomically Thin Materials
Center for Functional Nanomaterials, Brookhaven National Laboratory, NY, Nov. 17, 2016
1. Electronic- and Surface Structure of Transition Metal Dichalcogenides and van der Waals Interfaces
Center for Nanophase Materials Sciences, Oak Ridge National Laboratory, TN, Jun. 13, 2016

Contributed talks

8. Raman spectroscopy studies of spin waves in two-dimensional CrI_3
APS March Meeting, Boston, MA; March 3-8, 2019
7. Raman Spectroscopy Study of Charge Order Excitations in Metallic $(\text{Sr}_{1-x}\text{La}_x)_3\text{Ir}_2\text{O}_7$
APS March Meeting, Los Angeles, CA; March 5-9, 2018
6. Observation of Oscillatory Relaxation in the Sn-terminated Surface of Epitaxial Rock-salt SnSe {111}
Topological Crystalline Insulator
APS March Meeting, New Orleans, LA; March 13-17, 2017
5. SPELEEM Studies on the Surface and Electronic Structure of Halide Perovskites
AVS 62nd International Symposium & Exhibition, San Jose, CA; October 18-23, 2015.

4. Direct Measurements of the Electronic Structure of Twisted Graphene/MoS₂ van der Waals Heterostructures
International Conference on Electron Spectroscopy and Structure, Stony Brook, NY; September 28 - October 2, 2015.
3. SPE-LEEM Studies on the Electronic Structure of MoS₂/Graphene Heterostructure
APS March Meeting, San Antonio, TX; March 2-6, 2015.
2. SPE-LEEM Studies on the Surface and Electronic Structure of 2D Transition Metal Dichalcogenides (Part II)
APS March Meeting, Denver, CO; March 3-7, 2014.
1. Direct Measurement of the Thickness-Dependent Electronic Band Structure of MoS₂ using Angle-Resolved Photoemission Spectroscopy
Young Researcher Symposium, Brookhaven National Laboratory, NY; November 15, 2013.

Honors & Awards

- Graduate student professional development scholarship, Columbia University 2015
- Outstanding Undergraduate Thesis, Renmin University of China 2011

Synergistic Activities

- Referee of *Physical Review X*, *Physical Review Letters*, *Physical Review B*, *Nano Letters*, *APL Materials*, and *National Science Review*
- Member of CLEO 2021 Technical Program Committee
- Reviewer of NSF CMP Nanomaterials Panel 2020
- Focus Topic Chair, American Physical Society March Meeting 2019, Electronic and Optical Properties of 2D Materials III
- Organizer of Girls Science Day at Columbia University 2016
- Organizer of OSA/SPIE Columbia student chapter Maker Faire at New York Hall of Science 2016

Teaching Experience

- PHYS 1610 - Engineering Physics II Fall 2019
- PHYS 1600 - Engineering Physics I Spring 2020
- PHYS 8930 - Directed study in advanced Physics Fall 2020
- PHYS 1600 - Engineering Physics I Fall 2021