

CURRICULUM VITAE

Personal Information

Last Name: Xiao (肖)

First Name: Cong (聰)

Assistant Professor,
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Education

- | | |
|---------------------|--|
| Sep, 2011-Jul, 2016 | Institute of Theoretical Physics, School of Physics, Peking University <ul style="list-style-type: none">• Degree: PhD• Advisor: Prof. Dingping Li and Prof. Zhongshui Ma• Research Focus: Theoretical Condensed Matter Physics |
| Sep, 2007-Jul, 2011 | Department of Physics, Beijing Normal University, <ul style="list-style-type: none">• Degree: Bachelor of Science• Major: Physics |

Professional Experiences and Activities

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|------------------------|---|
| Aug, 2023 – Present | IAPME, The University of Macau, <ul style="list-style-type: none">• Assistant Professor• Research Focus: Condensed Matter Physics |
| Jan, 2022 – July, 2023 | Department of Physics, The University of Hong Kong, <ul style="list-style-type: none">• Research Assistant Professor, Supervisor: Prof. Wang Yao• Research Focus: Condensed Matter Physics |
| Jul, 2021 – Dec, 2021 | Department of Physics, The University of Hong Kong, <ul style="list-style-type: none">• Senior Research Assistant, Supervisor: Prof. Wang Yao• Research Focus: Condensed Matter Physics |

Sep, 2016 - Jan, 2021

**Department of Physics, The University of Texas at Austin,
Austin, Texas, the United States**

- **Post-doctoral researcher**, Supervisor: **Prof. Qian Niu**
- Research Focus: Theoretical Condensed Matter Physics

Research Experience and Interests

- Berry phase and quantum geometric effects in condensed matter physics
- Nonlinear Hall transport, Nonreciprocal transport
- Nonlinear spintronics: Nonlinear spin-orbit torque, Nonlinear spin Hall effect
- Quantum layertronics
- Layered antiferromagnetic spintronics
- Magnetoelectric transport effects
- Orbitronics
- Chiral electronics
- Anomalous Hall and anomalous Nernst effects, Thermal Hall effect, Spin Hall effect, and Spin-orbit torque
- Quantum geometric responses in superconductors
- Van der Waals materials, topological materials

Reviewer Experience

- Physical Review Letters
2020(2), 2021(5), 2022(4), 2023(2)
- Physical Review B
2019(3), 2020(5), 2021(3), 2022(5), 2023(2)
- Physical Review Material
2019(1)
- Nature Electronics
2023(2)
- Science Advance
2023(1)
- National Science Review
2023(1)
- Nano Letters
2023(1)
- Communications Physics
2021(1), 2022(1)

Teaching Experience

- Teacher, Faculty of Science and Technology, The University of Macau
08/2023 – present, Undergraduate Course: Advanced Mathematics I

- Teacher, Department of Physics, The University of Hong Kong
01/2022 – 05/2022, Undergraduate Course: Advanced Quantum Mechanics
01/2023 – 05/2023, Undergraduate Course: Advanced Quantum Mechanics
- Teaching Assistant, School of Physics, Peking University
09/2012 – 01/2013, Graduate Course: Quantum Statistical Physics
02/2014 – 06/2014, Undergraduate Course: Thermal Physics
09/2014 – 01/2015, Undergraduate Course: Methods of Mathematical Physics

Honors & Prizes

1. President Scholarship, Peking University, Sep. 2015
2. Chen Huxiong First Scholarship, Peking University, Oct. 2015
3. President Scholarship, Peking University, Sep. 2014
4. President Scholarship, Peking University, Sep. 2013
5. May Fourth Scholarship, Peking University, Nov. 2012
6. President Scholarship, Peking University, Sep. 2012
7. President Scholarship, Peking University, Sep. 2011
8. First Academic Scholarship, Beijing Normal University, Nov. 2010
9. First prize of Mathematical Modeling Contest of Beijing Normal University, May. 2010
10. Third Academic Scholarship, Beijing Normal University, Nov. 2009
11. First Academic Scholarship, Beijing Normal University, Nov. 2008

Representative Recent Publications

1. **Cong Xiao***, Weikang Wu, Hui Wang, Yue-Xin Huang, Xiaolong Feng, Huiying Liu*, Guang-Yu Guo*, Qian Niu, Shengyuan A Yang, “*Time-Reversal-Even Nonlinear Current Induced Spin Polarization*”, [Phys. Rev. Lett. 130, 166302 \(2023\)](#).
2. Dawei Zhai, Cong Chen, **Cong Xiao***, and Wang Yao*, “*Layer-Contrasted Hall Effect in Twisted Bilayers with Time Reversal Symmetry*”, [Nat. Commun. 14, 1961 \(2023\)](#).
3. Yue-Xin Huang, Xiaolong Feng, Hui Wang, **Cong Xiao***, and Shengyuan A. Yang, “*Intrinsic Nonlinear Planar Hall Effect*”, [Phys. Rev. Lett. 130, 126303 \(2023\)](#).
4. **Cong Xiao**, Huiying Liu*, Weikang Wu*, Hui Wang, Qian Niu, and Shengyuan A. Yang, “*Intrinsic Nonlinear Electric Spin Generation in Centrosymmetric Magnets*”, [Phys. Rev. Lett. 129, 086602 \(2022\)](#).
5. Huiying Liu, Jianzhou Zhao*, Yue-Xin Huang, Weikang Wu, Xian-Lei Sheng, **Cong Xiao***, and Shengyuan A. Yang, “*Intrinsic Second-Order Anomalous Hall Effect and Its Application in Compensated Antiferromagnets*”, [Phys. Rev. Lett. 127, 277202 \(2021\)](#).
6. Zhi Wang, Liang Dong, **Cong Xiao***, and Qian Niu, “*Berry curvature effects on quasiparticle dynamics in superconductors*”, [Phys. Rev. Lett. 126, 187001 \(2021\)](#).
7. **Cong Xiao**, Z. Z. Du, and Qian Niu, “*Theory of nonlinear Hall effects: Modified semiclassics from quantum kinetics*”, [Phys. Rev. B 100, 165422 \(2019\)](#).

Main Publications (first author and corresponding author)

- 30 main publications, including 6 Physical Review Letters, 1 Nature Communications, 1 Physical Review B Letter, 5 Physical Review B Rapid Communications, and 11 Physical Review B Regular Articles.
8. **Cong Xiao**, Weikang Wu, Hui Wang, Yue-Xin Huang, Xiaolong Feng, Huiying Liu, Guang-Yu Guo, Qian Niu, Shengyuan A Yang, “*Time-Reversal-Even Nonlinear Current Induced Spin Polarization*”, [Phys. Rev. Lett. 130, 166302 \(2023\)](#).
 9. Dawei Zhai, Cong Chen, **Cong Xiao (corresponding author)**, and Wang Yao, “*Layer-Contrasted Hall Effect in Twisted Bilayers with Time Reversal Symmetry*”, [Nat. Commun. 14, 1961 \(2023\)](#).
 10. Cong Chen, Dawei Zhai, **Cong Xiao (corresponding author)**, and Wang Yao, “*Crossed Nonlinear Dynamical Hall Effect in Twisted Bilayers*”, [arXiv: 2303.09973](#).
 11. Yue-Xin Huang, Xiaolong Feng, Hui Wang, **Cong Xiao (corresponding author)**, and Shengyuan A. Yang, “*Intrinsic Nonlinear Planar Hall Effect*”, [Phys. Rev. Lett. 130, 126303 \(2023\)](#).
 12. Hui Wang, Yue-Xin Huang, Huiying Liu, Xiaolong Feng, Jiaojiao Zhu, Weikang Wu, **Cong Xiao (corresponding author)**, Shengyuan A Yang, “*Theory of Intrinsic In-Plane Hall Effect*”, [arXiv: 2211.05978](#)
 13. **Cong Xiao**, Huiying Liu, Weikang Wu, Hui Wang, Qian Niu, and Shengyuan A. Yang, “*Intrinsic Nonlinear Electric Spin Generation in Centrosymmetric Magnets*”, [Phys. Rev. Lett. 129, 086602 \(2022\)](#).
 14. Huiying Liu, Jianzhou Zhao, Yue-Xin Huang, Weikang Wu, Xian-Lei Sheng, **Cong Xiao (corresponding author)**, and Shengyuan A. Yang, “*Intrinsic Second-Order Anomalous Hall Effect and Its Application in Compensated Antiferromagnets*”, [Phys. Rev. Lett. 127, 277202 \(2021\)](#).
 15. **Cong Xiao** and Qian Niu, “*Conserved current of nonconserved quantities*”, [Phys. Rev. B 104, L241411 \(2021\)](#).
 16. **Cong Xiao**, Bangguo Xiong, and Qian Niu, “*Electric driving of magnetization dynamics in a hybrid insulator*”, [Phys. Rev. B 104, 064433 \(2021\)](#).
 17. Zhi Wang, Liang Dong, **Cong Xiao (corresponding author)**, and Qian Niu, “*Berry curvature effects on quasiparticle dynamics in superconductors*”, [Phys. Rev. Lett. 126, 187001 \(2021\)](#).
 18. **Cong Xiao**, Yafei Ren, and Bangguo Xiong, “*Adiabatically induced orbital magnetization*”, [Phys. Rev. B 103, 115432 \(2021\)](#).
 19. **Cong Xiao**, Huiying Liu, Jianzhou Zhao, Shengyuan A. Yang, and Qian Niu, “*Thermoelectric generation of orbital magnetization in metals*”, [Phys. Rev. B 103, 045401 \(2021\)](#).
 20. **Cong Xiao** and Qian Niu, “*Unified bulk semiclassical theory for intrinsic thermal transport and magnetization currents*”, [Phys. Rev. B 101, 235430 \(2020\)](#).
 21. **Cong Xiao**, Hua Chen, Yang Gao, Di Xiao, Allan H. MacDonald, and Qian Niu, “*Linear magnetoresistance induced by intra-scattering semiclassics of Bloch electrons*”, [Phys. Rev. B 101, 201410\(R\) \(2020\)](#).

22. Liang Dong, **Cong Xiao (corresponding author)**, Bangguo Xiong and Qian Niu, “Berry-phase effects in dipole density and Mott relation”, [Phys. Rev. Lett. 124](#), 066601 (2020).
23. Weiwei Chen, **Cong Xiao (corresponding author)**, Qinwei Shi and Qunxiang Li, “Spin-orbit related power-law dependence of the diffusive conductivity on the carrier density in disordered Rashba two-dimensional electron systems”, [Phys. Rev. B 101](#), 020203(R) (2020).
24. **Cong Xiao**, Z. Z. Du, and Qian Niu, “Theory of nonlinear Hall effects: Modified semiclassics from quantum kinetics”, [Phys. Rev. B 100](#), 165422 (2019).
25. **Cong Xiao**, Hailong Zhou, and Qian Niu, “Scaling parameters in anomalous and nonlinear Hall effects depend on temperature”, [Phys. Rev. B 100](#), 161403(R) (2019).
26. **Cong Xiao**, Yi Liu, Zhe Yuan, Shengyuan A. Yang, and Qian Niu, “Temperature dependence of side-jump spin Hall conductivity”, [Phys. Rev. B 100](#), 085425 (2019).
27. Hailong Zhou, **Cong Xiao (corresponding author)**, and Qian Niu, “Valley-contrasting orbital magnetic moment induced negative magnetoresistance”, [Phys. Rev. B 100](#), 041406(R) (2019).
28. **Cong Xiao**, Ying Liu, Ming Xie, Shengyuan A. Yang, and Qian Niu, “Theory of the phonon side-jump contribution in anomalous Hall effect”, [Phys. Rev. B 99](#), 245418 (2019).
29. **Cong Xiao**, Jihang Zhu, Bangguo Xiong, and Qian Niu, “Conserved spin current for the Mott relation”, [Phys. Rev. B 98](#), 081401(R) (2018).
30. **Cong Xiao**, Bangguo Xiong, and Fei Xue, “Boltzmann approach to spin-orbit-induced transport in effective quantum theories”, [J. Phys: Condens. Matter](#), **30**, 415002 (2018).
31. **Cong Xiao**, “Semiclassical Boltzmann theory of spin Hall effects in giant Rashba systems”, [Front. Phys.](#) **13**, 137202 (2018).
32. **Cong Xiao** and Qian Niu, “Semiclassical theory of spin-orbit torques in disordered multiband electron systems”, [Phys. Rev. B 96](#), 045428 (2017).
33. **Cong Xiao** and Qian Niu, “Rashba torque beyond the Boltzmann regime”, [Phys. Rev. B 96](#), 035423 (2017).
34. **Cong Xiao**, Dingping Li, and Zhongshui Ma, “The role of band-index-dependent transport relaxation times in anomalous Hall effect”, [Phys. Rev. B 95](#), 035426 (2017).
35. **Cong Xiao**, Dingping Li, and Zhongshui Ma, “Unconventional thermoelectric behaviors and enhancement of figure of merit in Rashba spintronic systems” [Phys. Rev. B 93](#), 075150 (2016).
36. **Cong Xiao** and Dingping Li, “Semiclassical magnetotransport in strongly spin-orbit coupled Rashba two-dimensional electron systems”, [J. Phys: Condens. Matter](#), **23**, 235801 (2016).
37. **Cong Xiao**, Dingping Li, and Zhongshui Ma, “Thermoelectric response of spin polarization in Rashba spintronic systems”, [Front. Phys.](#) **11**, 117201 (2016).

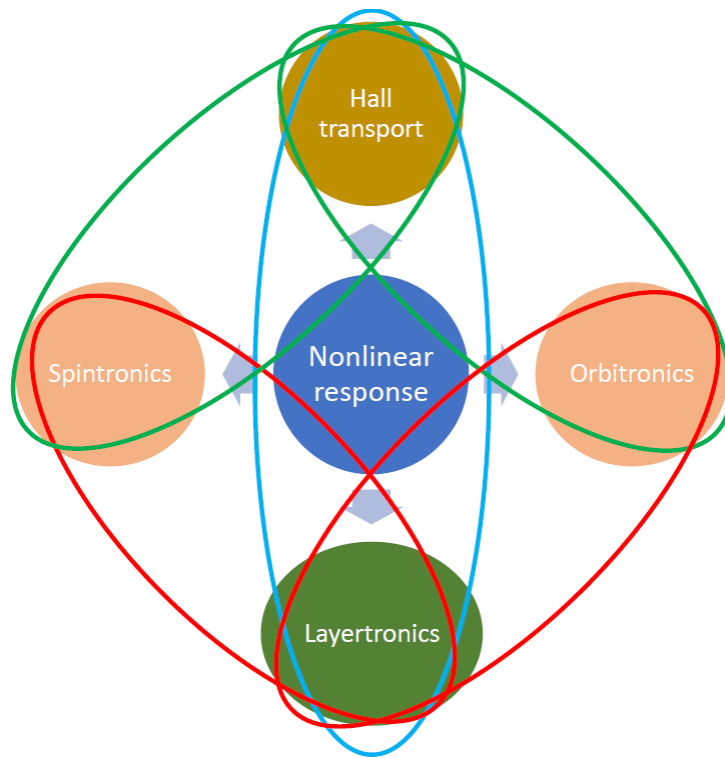
Other Publications

7 other publications, including 2 Physical Review Letters, 1 Nature Communications, and 4 Physical Review B Regular Articles.

1. Ziming Zhu, Huiying Liu, Yongheng Ge, Zeying Zhang, Weikang Wu, **Cong Xiao**, Shengyuan A. Yang, “*Third-order charge transport in a magnetic topological semimetal*”, [Phys. Rev. B 107, 205120 \(2023\)](#).
2. Yang Wang, Sivakumar V. Mambakkam, Yue-Xin Huang, Yong Wang, Yi Ji, **Cong Xiao**, Shengyuan A. Yang, Stephanie A. Law, and John Q. Xiao, “*Observation of nonlinear planar Hall effect in magnetic-insulator–topological-insulator heterostructures*”, [Phys. Rev. B 106, 155408 \(2022\)](#).
3. Huiying Liu, Jianzhou Zhao, Yue-Xin Huang, Xiaolong Feng, **Cong Xiao**, Weikang Wu, Shen Lai, Wei-bo Gao, and Shengyuan A. Yang, “*Berry connection polarizability tensor and third-order Hall effect*”, [Phys. Rev. B 105, 045118 \(2022\)](#).
4. Yafei Ren, **Cong Xiao**, Daniyar Saparov, and Qian Niu, “*Phonon Magnetic Moment from Electronic Topological Magnetization*”, [Phys. Rev. Lett. 127, 186403 \(2021\)](#).
5. Archana Tiwari, Fangchu Chen, Shazhou Zhong, Elizabeth Druke, Jahyun Koo, Austin Kaczmarek, **Cong Xiao**, Jingjing Gao, Xuan Luo, Qian Niu, Yuping Sun, Binghai Yan, Liuyan Zhao, Adam W. Tsen, “*Giant c-axis nonlinear anomalous Hall effect in Td-MoTe2 and WTe2*”, [Nat. Commun. 12, 2049 \(2021\)](#).
6. Ying Liu, Zhi-Ming Yu, **Cong Xiao**, and Shengyuan A. Yang, “*Quantized Circulation of Anomalous Shift in Interface Reflection*”, [Phys. Rev. Lett. 125, 076801 \(2020\)](#).
7. Jingjing Feng, **Cong Xiao**, Yang Gao, and Qian Niu, “*Magnetic field influenced electron-impurity scattering and magnetotransport*”, [Phys. Rev. B 100, 134202 \(2019\)](#).

Current Research Highlight

- Open up the new research field of nonlinear spintronics
- Advance the theoretical development of nonlinear Hall effect, and find new effects for nonlinear rectification
- Open up the new research field of spin-Hall-based nonlinear topological antiferromagnetic spintronics for high-density magnetic memory
- Explore the emerging research field of quantum layertronics



Make progress in each field and in the crossings of them