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Liang Wu

Affiliation

Department of Physics & Astronomy
University of Pennsylvania

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Employment

Assistant Professor Department of Physics & Astronomy July 2018 - Present
University of Pennsylvania, Philadelphia, PA, USA
(Two semester parental leave in Fall 2018 and Fall 2020)

Postdoctoral Fellow Department of Physics 2016 - 2018
University of California, Berkeley, CA, USA
Materials Science Division, Lawrence Berkeley National Lab
Advisor: Joseph W. Orenstein

Graduate Research Assistant Department of Physics & Astronomy 2011 - 2015
The Johns Hopkins University, Baltimore, MD, USA
Thesis Advisor: N. Peter Armitage

Education

Ph.D. Physics December 2015
The Johns Hopkins University, Baltimore, MD, USA

B.Sc. Physics May 2010
Nanjing University, Nanjing, Jiangsu, China
Graduate with Highest Honor (GPA: 1/80 in condensed matter physics. Required course works completed within 3 years.)

Honors & Awards

- **Outstanding Young Researcher Award (Macronix Prize)**, International Organization of Chinese Physicists and Astronomers (OCPA) 2020
(*One physicist of Chinese ethnicity working in the US or Europe per year.*)
- **William L. McMillan Award for outstanding contributions in condensed matter physics**, University of Illinois 2019
(*The most prestigious award for condensed matter physicists within 5 years of completing a PhD.*)
- **Young Investigator Program (YIP) Award**, Army Research Office 2019
- **30 Under 30 in Science**, Forbes Magazine 2018
- **Michelson Postdoctoral Prize Lectureship**, Case Western Reserve University 2017
- **Richard L. Greene Dissertation Award in Experimental Condensed Matter Physics or Materials Physics**, American Physical Society 2017
(Two awardees per year globally)
- **National Scholarship**, Nanjing University 2008

Publications

Manuscripts under review.

37. Y. Zhang, Y. Gao, X. Gao, S. Lei, Z. Ni, J. Oh, J. Huang, J. Denlinger, M. Hashimoto, D. Lu, S. Gorovikov, R. J. Birgeneau, **Liang Wu**, K-T Law, E. Morosan, M, Yi *Kramers Nodal Lines and Weyl Fermions in SmAlSi*

Submitted

36. M. Liu, X. Han, S.H. Nah, Y. Wang, **Liang Wu** and S. Yang *Switching chirality in arrays of shape-reconfigurable spindle-shaped microparticles*

Submitted

35. J. Steinsberg, X. Han, S. Lee, J. Paglione, E. Takeuchi, C.L. Kane and **Liang Wu*** *Observation of the superconducting proximity effect from surface states in SmB₆/YB₆ thin film heterostructures via terahertz spectroscopy.*

arXiv:2112.10907; under review by PRL

34. Y. Xu, Z. Ni, Y. Liu, B. Ortiz, S. Wilson, B. Yan, L. Balents, and **Liang Wu*** *Universal three-state nematicity and magneto-optical Kerr effect in the charge density waves in AV₃Sb₅ (A=Cs, Rb, K)*

arXiv:2204.10116; under review in Nature Physics (2022)

Peer-reviewed Journals

33. X. Han, M. Salehi, S. Oh and **Liang Wu*** *A new type of cyclotron resonance from charge-impurity scattering in the bulk-insulating Bi₂Se₃ thin films*

Journal of Physics D: Applied Physics **55**, 364004 (2022). *Invited article for the Special Issue on Topological Materials.*

32. X. Han, A. Markou, J. Stensberg, Y. Sun, C. Felser and **Liang Wu*** *Giant room-temperature anomalous terahertz Faraday rotation in the magnetic Weyl semimetal Co₂MnGa.*

Phys. Rev. B **105**, 174406 (2022)

31. Z. Ni, N. Huang, A. Haglund, D. Mandrus, and **Liang Wu*** *Observation of giant surface second harmonic generation coupled to nematic orders in the van der Waals antiferromagnet FePS₃.*

Nano Letters **22** (8), 3283-3288 (2022)

30. H. Zhang, Z. Ni, C. Stevens, A. Bai, J. Lynch, F. Peiris, J. Hendrickson, **Liang Wu***, and D. Jariwala *Cavity-Enhanced Linear Dichroism in a van der Waals Antiferromagnet*

Nat. Photonics **16**, 311–317 (2022)

29. Z. Ni, H. Zhang, D. Hopper, A. Haglund, D. Jariwala, L. Bassett, D. Mandrus, E.J. Mele, C.L. Kane, and **Liang Wu*** *Direct imaging of antiferromagnetic domains and anomalous layer-dependent mirror symmetry breaking in atomically thin MnPS₃.*

Phys. Rev. Lett. **127**, 187201 (2021)

28. Z. Ni, A. Haglund, H. Wang, B. Xu, C. Bernhard, X. Qian, D. Mandrus, E.J. Mele, C.L. Kane and **Liang Wu*** *Imaging the Néel vector switching in the monolayer antiferromagnet MnPSe₃ with strain-controlled Ising order.*

Nature Nanotechnology **16**, 782–787 (2021)

27. Z. Ni, K. Wang, Y. Zhang, O. P. Ocena, X. Han, B. Xu, K. Manna, J. Paglione, C. Felser, A. G. Grushin, F. de Juan, E. J. Mele and **Liang Wu*** *Giant topological longitudinal circular photo-galvanic effect in the chiral multifold semimetal CoSi.*

Nature Communications, **12**, 154 (2021) *Editor's highlight*

26. Z. Ni, B. Xu, M. Sánchez-Martínez, Y. Zhang, K. Manna, C. Felser, F. de Juan, A. G. Grushin and **Liang Wu*** *Linear and nonlinear optical responses in the chiral multifold semimetal RhSi.*

npj Quantum Materials **5**, 96 (2020)

25. B. Xu, Z. Fang, M. Sánchez-Martínez, J. Vendobos, Z. Ni, K. Manna, K. Wang, J. Paglione, C. Felser, E. J. Mele, A. G. Grushin, A. M. Rappe and **Liang Wu*** *Optical signatures of multifold fermions in the chiral topological semimetal CoSi.*

Proceedings of the National Academy of Sciences **117**, 27104-27110 (2020)

24. D. Khadka, T. R. Thapaliya, S. H. Parra, X.Y. Han, J.J. Wen, J.D. Zang, J. M. Kikkawa, **Liang Wu**, S. X. Huang. *Kondo physics in antiferromagnetic Weyl semimetal $Mn_{3+x}Sn_{1-x}$ films* *Science Advances*, **6**, eabc1977 (2020)

23. Y. Jiang, M. M. Asmar, X. Y. Han, M. Ozerov, D. Smirnov, M. Salehi, S. Oh, Z. Jiang, W.-K. Tse, and **Liang Wu***. *Electron-Hole Asymmetry of Surface States in Topological Insulator Sb_2Te_3 Thin Films Revealed by Magneto-Infrared Spectroscopy.*

Nano Letters **20**, 4588 (2020)

22. **Liang Wu***, A. Farid, N. J. Laurita, T. Mueller and N. P. Armitage. *A compact broadband terahertz range quarter-wave plate*

J Infrared Milli Terahz Waves **41**, 642 (2020)

21. N. P. Armitage and **Liang Wu**

On the matter of topological insulators as magnetoelectrics

SciPost Physics **6**, 046 (2019)

20. **Liang Wu***, A. Little, E. Aldape, D. Rees, P. Kelley, A. Banerjee, D. Mandrus, S. Nagler, E. Altman, J. Orenstein *Field evolution of magnons in α - $RuCl_3$ by high-resolution polarized terahertz spectroscopy*

Phys. Rev. B **98**, 094425 (2018) *Editor's suggestion*

19. S. Patankar, **Liang Wu**, B. Lu, M. Rai, J. D. Tran, T. Morimoto, D. Parker, A. Grushin, N.L. Nair, J. G. Analytis, J. E. Moore, J. Orenstein, D. H. Torchinsky *Resonance-enhanced optical nonlinearity in the Weyl semimetal TaAs*

Phys. Rev. B **98**, 165113 (2018)

18. E. Thewalt, I. M. Hayes, J. P. Hinton, A. Little, S. Patankar, **Liang Wu**, T. Helm, C. Stan, N. Tamura, J. G. Analytis, and J. Orenstein

Imaging anomalous nematic order and strain in optimally doped $BaFe_2(As,P)_2$

Phys. Rev. Lett. **121**, 027001 (2018)

17. R.H. Ireland[†], **Liang Wu**[†], M. Salehi, N. Koirala, H.E. Katz, S. Oh and N. P. Armitage. *Nonvolatile Solid-State Charged-Polymer Gating of Topological Insulators into the Topological Insulating Regime*

Phys. Rev. Applied **9**, 044003 (2018)

16. T. Higo, H. Man, D. B. Gopman, **Liang Wu**, Y. P. Kabanov, O. M. J. van't Erve, D. Rees, Y. F. Li, S. Patankar, M. Ikhlas, C. L. Chien, R. D. Shull, J. Orenstein, and S. Nakatsuji. *Large magneto-optical Kerr effect and imaging of magnetic octupole domains in an antiferromagnetic metal.*

Nature Photonics **12**, 73-78 (2018)

15. A. Little[†], **Liang Wu**^{†,*}, P. Kelley, A. Banerjee, S. Patankar, D. Rees, C. A. Bridges, J. Q. Yan, D. Mandrus, S. Nagler and J. Orenstein. *Antiferromagnetic resonance and terahertz continuum in α - $RuCl_3$.*

Phys. Rev. Lett. **119**, 227201 (2017)

14. **Liang Wu***, S. Patankar, T. Morimoto, N. L. Nair, E. Thewalt, A. Little, J. Analytis, J. E. Moore and J. W. Orenstein*. *Giant anisotropic nonlinear optical response in transition metal mononictide Weyl semimetals.*

Nature Physics **13**, 350-355 (2017)

Highlighted in *Department of Energy, Office of Science, Basic Energy Sciences*

13. Liang Wu*, M. Salehi, N. Koirala, J. Moon, S. Oh and N. P. Armitage*. *Quantized Faraday and Kerr rotation and axion electrodynamics of a 3D topological insulator*. *Science* **354**, 1124-1127 (2016)

Highlighted in *Journal Club for Condensed Matter Physics* April 2016

Summary by the editor, “*Shining light on a peculiar coupling*”, *Science*, **354**, 1114 (2016)

Tweeted by Frank Wilczek

Discussed in Frank Wilczek’s colloquium “*Augmenting Reality: Axions, Anyons, and Entangled Histories*” (Available on YouTube)

12. B. Cheng, Liang Wu, S. K. Kushwaha, R. J. Cava, and N. P. Armitage *Measurement of the topological surface state optical conductance in bulk-insulating Sn-doped $Bi_{1.1}Sb_{0.9}Te_2S$ single crystals*

Phys. Rev. B. **94**, 201117(R) (2016)

11. M. Brahlek, N. Koirala, M. Salehi, Liang Wu, H. D. Lee, C. Xu, M. G. Han, Y. M. Zhu, J. Moon, S. J. Rhee, T. Gustafsson, N. P. Armitage, and S. Oh. *Disorder-driven topological phase transition in Bi_2Se_3 thin films*.

Phys. Rev. B. **94**, 165104 (2016)

10. A. Akrap, M. Hakl, S. Tchoumakov, I. Crassee, J. Kuba, M. O. Goerbig, C. C. Homes, O. Caha, J. Novak, F. Tepe, Liang Wu, N. P. Armitage, E. Arushanov, Q. D. Gibson, R. J. Cava, D. van der Marel, C. Faugeras, G. Martinez, M. Potemski, and M. Orlita. *Magneto-optical signature of massless Kane electrons in Cd_3As_2* .

Phys. Rev. Lett. **117**, 136401 (2016) *Editor’s suggestion*

Highlighted by the editor of *Nature Physics*, *Nature Physics* **12**, 992 (2016)

9. Liang Wu[†], R. H. Ireland[†], M. Salehi, B. Cheng, N. Koirala, S. Oh, H. E. Katz, and N. P. Armitage. *Tuning and Stabilizing Topological Insulator Bi_2Se_3 in the Intrinsic Regime by Charge Extraction with Organic Overlayers*.

Appl. Phys. Lett. **108**, 221603 (2016)

8. Bing Cheng, Liang Wu, N. J. Laurita, H. Singh, P. Raychaudhuri and N. P. Armitage. *Anomalous gap edge dissipation in disordered superconductors on the brink of localization*.

Phys. Rev. B. **93**, 180511(R) (2016)

7. N. Koirala, M. Brahlek, M. Salehi, Liang Wu, J. Dai, J. Waugh, T. Nummy, M. G. Han, Y. Zhu, D. Dasseu, W. D. Wu, N. P. Armitage and S. Oh *Record high mobility topological insulator thin films and dissipation-less quantum Hall effect via temporal interface engineering*.

Nano Letters **15**, 8245-8249 (2015).

Highlighted in *Best Research of 2015 at the National MagLab*

6. Liang Wu*, W. K. Tse, M. Brahlek, C. M. Morris, R. Valdés Aguilar, N. Koirala, S. Oh and N. P. Armitage*. *High-resolution Faraday rotation and electron-phonon coupling in surface states of the bulk-insulating topological insulator $Cu_{0.02}Bi_2Se_3$* .

Phys. Rev. Lett. **115**, 217602 (2015)

5. M. Salehi, M. Brahlek, N. Koirala, J. Moon, Liang Wu, N. P. Armitage and S. Oh. *Stability of low-carrier-density topological-insulator Bi_2Se_3 thin films and effect of capping layers*.

APL Material **3**, 091101 (2015). *Invited article*

4. Liang Wu, M. Brahlek, R. Valdés Aguilar, A. V. Stier, C. M. Morris, Y. Lubashevsky, L. S. Bilbro, N. Bansal, S. Oh, N. P. Armitage. *A sudden collapse in transport lifetime through the topological phase transition in $(Bi_{1-x}In_x)_2Se_3$* .

Nature Physics **9**, 410-414 (2013).

3. R. Valdés Aguilar, Liang Wu, A. V. Stier, L. S. Bilbro, N. Bansal, S. Oh, N. P. Armitage. *Aging and reduced bulk conductance in thin films of the topological insulator Bi_2Se_3* .

J. Appl. Phys. **113**, 153702 (2013).

2. J. R. Neilson, A. Llobet, A. V. Stier, **Liang Wu**, J. J. Wen, J. Tao, Y. M. Zhu, Z. B. Tesanovic, N. P. Armitage, T. M. McQueen. *Mixed-Valence-Driven Heavy-Fermion Behavior and Superconductivity in KNi_2Se_2* .

Phys. Rev. B. **86**, 054512 (2012). *Editor's suggestion*

1. R. Valdés Aguilar, A. V. Stier, W. Liu, L. S. Bilbro, D. K. George, N. Bansal, **Liang Wu**, J. Cerne, A. G. Markelz, S. Oh, N. P. Armitage. *Terahertz Response and Colossal Kerr Rotation from the Surface States of the Topological Insulator Bi_2Se_3*

Phys. Rev. Lett. **108**, 087403 (2012). *Editor's suggestion*

Highlighted in *Department of Energy, Office of Science, Basic Energy Sciences*

† denotes equal contribution. * denotes corresponding author.

Invited Talks

99 total invited talks since 2013. (66 invited talks since 2018.)

International Conferences

37. MRS Spring Meeting, USA

TBD 2023

36. KITP program on “A Quantum Universe in a Crystal: Symmetry and Topology across the Correlation Spectrum”

TBD 2023

35. Workshop on Neutrons and Complementary Techniques for Quantum Materials, USA

TBD 2022

34. Keynote speaker, GEMCPS2022, Italy

Imaging Domain switching and Revealing Emergent Orders in 2D Antiferromagnets 2022

33. Keynote speaker, CondMat-2022, Spain

Imaging Domain switching and Revealing Emergent Orders in 2D Antiferromagnets 2022

32. RIKEN Center for Emergent Matter Science Topical Meeting, Japan

Nonlinear optical responses in topological semimetals, Japan 2022

31. 2022 APS March Meeting, USA

Linear and nonlinear optical responses of multifold fermions 2022

30. LEES 2021—International conference on Low Energy Electrodynamics in Solids, USA

Imaging the Néel vector switching in the monolayer antiferromagnet $MnPSe_3$ with strain-controlled Ising order. 2021

29. 2DMAT2021*, France

Direct imaging of Néel vector switching in the monolayer antiferromagnet with strain-controlled Ising order 2021

28. Workshop on nonlinear electromagnetic dynamics of topological semimetals, USA

Nonlinear terahertz emission spectroscopy of topological chiral multifold semimetals 2021

27. 2020 APS MAS Meeting, USA

Nonlinear terahertz emission spectroscopy of topological chiral multifold semimetals 2020

26. KITP program on “Correlated Systems with Multicomponent Local Hilbert Spaces”

- High-field excitations in the Kitaev magnet α - RuCl_3* 2020
25. **Telluride science workshop “Enhanced functionalities in 4- and 5d-containing materials from large spin-orbit coupling”, USA***
- High-field excitations in the Kitaev magnet α - RuCl_3* 2020
24. **XXIX: International Materials Research Congress, organized by SMM & MRS, Mexico***
- Large topological circular photogalvanic effect in the chiral multi-fold fermions.* 2020
23. **Excitronics and Polaritronics International Conference (EPIC 2020), Singapore***
- Large topological circularly photogalvanic effect in the chiral multi-fold fermions.* 2020
22. **2020 APS March Meeting***
- Linear and nonlinear optical responses in chiral topological semimetals.* 2020
21. **PCTS workshop on The Future of Topological Materials, Princeton University, USA**
- Linear and nonlinear optical responses in chiral topological semimetals.* 2019
20. **2018 APS MAS meeting**
- Giant anisotropic nonlinear optical responses in Weyl semimetals.* 2018
19. **2018 CINT (Center for Integrated Nanotechnologies) user meeting, USA**
- Giant anisotropic nonlinear optical responses in Weyl semimetals.* 2018
18. **HFM 2018—International conference on Highly Frustrated Magnetism, USA**
- Antiferromagnetic resonance and terahertz continuum in α - RuCl_3 .* 2018
17. **LEES 2018—International conference on Low Energy Electrodynamics in Solids, Italy**
- Band geometry and nonlinear optical studies on polar Weyl semimetals.* 2018
16. **30th Workshop on Recent Developments in Electronic Structure (ES18), USA**
- Band geometry and nonlinear optical studies on polar Weyl semimetals.* 2018
15. **Gordon Berry Moore Foundation 2nd EPiQS Postdoctoral Symposium, USA**
- Resonance-enhanced optical nonlinearity in the Weyl semimetal TaAs.* 2018
14. **Young Research Leaders Workshop on Topological Matter, Israel**
- Resonance-enhanced optical nonlinearity in the Weyl semimetal TaAs.* 2018
13. **International conference on Frontier on Electronic Science and Technology, China**
- Resonance-enhanced optical nonlinearity in the Weyl semimetal TaAs.* 2018
12. **Oxford Symposium on Dynamics and Topology in Quantum Materials, United Kingdom**
- Resonance-enhanced optical nonlinearity in the Weyl semimetal TaAs.* 2018
11. **2018 APS March Meeting, USA**
- The quantized magnetoelectric effect in topological insulators* 2018
10. **SPIE Photonics West, USA**
- Giant anisotropic nonlinear optical response in Weyl semimetals.* 2018
9. **The 3rd Conference on Condensed Matter Physics (CCMP 2017), China**
- Antiferromagnetic resonance and terahertz continuum in α - RuCl_3 .* 2017
8. **2017 APS March Meeting Invited Talk for the Richard L. Greene Award**
- Quantized Faraday and Kerr rotation and axion electrodynamics of a 3D topological insulator.* 2017
7. **Gordon Berry Moore Foundation 1st EPiQS Postdoctoral Symposium, USA**
- Giant anisotropic nonlinear optical response in transition metal mononictide Weyl semimetals.* 2017
6. **Energy Materials & Nanotechnology (EMN) Qingdao Meeting, China**
- Low energy electrodynamics of topological insulator thin films.* 2015
5. **Optical Terahertz Science & Technology Conference, USA**

- Low energy electrodynamics of topological insulator thin films.* 2015
4. **Low Energy Electrodynamics in Solids conference, France**
A sudden collapse in transport lifetime through the topological phase transition in $(Bi_{1-x}In_x)_2Se_3$. 2014
 3. **Correlated Electron Systems, Gordon Research Seminar, USA**
A sudden collapse in transport lifetime through the topological phase transition in $(Bi_{1-x}In_x)_2Se_3$. 2014
 2. **Ultrafast Phenomena in Cooperative Systems, Gordon Research Seminar, USA**
A sudden collapse in transport lifetime through the topological phase transition in $(Bi_{1-x}In_x)_2Se_3$. 2014
 1. **Workshop on New Trends in Topological Insulators, Spain**
A sudden collapse in transport lifetime through the topological phase transition in $(Bi_{1-x}In_x)_2Se_3$. 2013

Seminar & Colloquium

62. **Condensed Matter Seminar, Johns Hopkins University, USA**
TBD 2023
61. **Frontier Condensed Matter Physics Seminar, Rice & Columbia University, USA**
Universal three-state nematicity and magneto-optical Kerr effect in the charge density waves in kagome superconductors 2022
60. **Condensed Matter Physics Colloquium, University of Maryland, College Park, USA**
Universal three-state nematicity and magneto-optical Kerr effect in the charge density waves in kagome superconductors 2022
59. **Condensed Matter Seminar, Penn State University, USA**
TBD 2022
58. **Condensed Matter Seminar, Institute of Physics, China**
Universal three-state nematicity and magneto-optical Kerr effect in the charge density waves in AV_3Sb_5 ($A=Cs, Rb, K$) 2022
57. **Asia Pacific Center for Theoretical Physics SEMINAR Series on Topological Matter Out of Equilibrium, Korea**
Nonlinear optical responses in topological semimetals 2022
56. **Condensed Matter Seminar, Army Research Lab, USA**
Nonlinear terahertz emission spectroscopy of topological chiral multifold semimetals 2022
55. **Physics Colloquium, Missouri S& T University, USA**
Imaging domains and discovering new orders in 2D antiferromagnets 2022
54. **Condensed Matter Seminar, Rice University, USA**
Imaging domains and discovering new orders in 2D antiferromagnets 2022
53. **Condensed Matter Seminar, Ohio State University, USA**
Imaging domains and discovering new orders in 2D antiferromagnets 2021
52. **Condensed Matter Seminar, Boston College, USA**
Imaging domains and discovering new orders in 2D antiferromagnets 2021
51. **Condensed Matter Seminar, SUNY-Stony Brook, USA**
Nonlinear terahertz emission spectroscopy of topological chiral multifold semimetals 2021
50. **Condensed Matter Seminar, Nanyang Technological University, Singapore**
Nonlinear terahertz emission spectroscopy of topological chiral multifold semimetals 2021
49. **Condensed Matter Seminar, Oak Ridge National Lab, USA***

- Imaging domains and discovering new orders in 2D antiferromagnets* 2021
48. **Physics Colloquium, Binghamton University - SUNY, USA***
Topological Nonlinear Optics. 2020
47. **Physics Colloquium, University of Pennsylvania, USA**
Topological Nonlinear Optics. 2020
46. **Condensed Matter Seminar, Rutgers, The State University of New Jersey, USA**
Linear and nonlinear optical responses in chiral topological semimetals. 2019
45. **Condensed Matter Seminar, Simon Fraser University, Canada**
Linear and nonlinear optical responses in chiral topological semimetals. 2019
44. **Condensed Matter Seminar, University of British Columbia, Canada**
Linear and nonlinear optical responses in chiral topological semimetals. 2019
43. **Physics Colloquium for the McMillan Award, University of Illinois, USA**
Terahertz studies on topological materials. 2019
42. **Condensed Matter Seminar, University of Minnesota, USA**
How many magnetic-field-induced phase transitions in α - $RuCl_3$? 2019
41. **Condensed Matter Seminar, 3M, USA**
Topological materials — shaping the future technology. 2019
40. **Condensed Matter Seminar, University of Texas, Austin, USA**
Linear and nonlinear optical responses in chiral topological semimetals. 2019
39. **Condensed Matter Seminar, Texas A&M University, USA**
Linear and nonlinear optical responses in chiral topological semimetals. 2019
38. **Condensed Matter Seminar, Rutgers, The State University of New Jersey, USA**
How many magnetic-field-induced phase transitions in α - $RuCl_3$? 2019
37. **Condensed Matter Seminar, Nanjing University, China**
Giant anisotropic nonlinear optical responses in Weyl semimetals. 2019
36. **Physics Colloquium, University of Miami, USA**
Axion electrodynamics of topological insulators 2018
35. **Physics Colloquium, University of Pennsylvania, USA**
Terahertz studies on symmetry and topology in quantum materials. 2018
34. **Material Science and Engineering Seminar, Drexel University, USA**
Giant anisotropic nonlinear optical responses in Weyl semimetals. 2018
33. **Condensed Matter Seminar, Penn State University, USA**
Giant anisotropic nonlinear optical responses in Weyl semimetals. 2018
32. **Condensed Matter Seminar, ENS-Lyon, France**
Antiferromagnetic resonance and terahertz continuum in α - $RuCl_3$. 2018
31. **Condensed Matter Seminar, Institut Neel, France**
Band geometry and nonlinear optical studies on polar Weyl semimetals. 2018
30. **Condensed Matter Seminar, Oxford University, UK**
Band geometry and nonlinear optical studies on polar Weyl semimetals. 2018
29. **Condensed Matter Seminar, Oak Ridge National Lab, USA**
Antiferromagnetic resonance and terahertz continuum in α - $RuCl_3$. 2018
28. **Condensed Matter Seminar, University of Tennessee, USA**
Band geometry and nonlinear optical studies on polar Weyl semimetals. 2018
27. **Condensed Matter Seminar, Stony Brook University, USA**
Band geometry and nonlinear optical studies on polar Weyl semimetals. 2018
26. **Condensed Matter Seminar, Rutgers, The State University of New Jersey, USA**
Band geometry and nonlinear optical studies on polar Weyl semimetals. 2018
25. **ABC...z Seminar, University of California, Santa Barbara, USA**

- Band geometry and nonlinear optical studies on polar Weyl semimetals.* 2018
24. **Center for Nanophysics and Advanced Materials Colloquium, University of Maryland, College Park, USA**
Quantized electro-dynamical response in topological materials. 2017
23. **Condensed Matter Seminar, Johns Hopkins University, USA**
Antiferromagnetic resonance and terahertz continuum in α - $RuCl_3$. 2017
22. **Physics Colloquium, Case Reserve Western University, USA**
Quantized electro-dynamical response in topological materials. 2017
21. **Michelson Lecture, Case Reserve Western University, USA**
Giant anisotropic nonlinear optical response in Weyl semimetals. 2017
20. **Michelson Lecture, Case Reserve Western University, USA**
Low energy electrodynamics of 3D topological insulator thin films. 2017
19. **Michelson Lecture, Case Reserve Western University, USA**
Antiferromagnetic resonance and terahertz continuum in α - $RuCl_3$. 2017
18. **Physics Colloquium, University of Notre Dame, USA**
Quantized electro-dynamical responses in topological materials. 2017
17. **Condensed Matter Seminar, Stanford University, USA**
Shining light on topological insulators and Weyl semimetals. 2017
16. **Condensed Matter Seminar, Boston University, USA**
Shining light on topological insulators and Weyl semimetals. 2017
15. **Condensed Matter Seminar, Michigan State University, USA**
Shining light on topological insulators and Weyl semimetals. 2017
14. **Physics Colloquium, New York University, USA**
Shining light on topological insulators and Weyl semimetals. 2017
13. **Condensed Matter Seminar, University of Pennsylvania, USA**
Shining light on topological insulators and Weyl semimetals. 2017
12. **Condensed Matter Seminar, Princeton University, USA**
Shining light on topological insulators and Weyl semimetals. 2017
11. **Physics Colloquium, Boston College, USA**
Shining light on topological insulators and Weyl semimetals. 2017
10. **Condensed Matter Seminar, Harvard University, USA**
Shining light on topological insulators and Weyl semimetals. 2016
9. **Condensed Matter Seminar, University of Notre Dame, USA**
Shining light on topological insulators and Weyl semimetals. 2016
8. **Material Science Division Forum on Topological Insulators, Lawrence Berkeley National Laboratory, USA**
Quantized Faraday and Kerr rotation and axion electrodynamics of a 3D topological insulator. 2016
7. **290K Condensed Matter Seminar, University of California, Berkeley, USA**
Low-energy electrodynamics of 3D topological insulators. 2016
6. **Condensed Matter Seminar, Perimeter Institute for Theoretical Physics, Canada**
Low energy electrodynamics of 3D topological insulator thin films. 2016
5. **Condensed Matter Seminar, Fudan University, China**
Low energy (Terahertz) electrodynamics of topological insulator thin films. 2015
4. **Quantum Materials Seminar, University of California, Berkeley, USA**
Low energy (Terahertz) electrodynamics of topological insulator thin films. 2015
3. **Special Condensed Matter Seminar, Massachusetts Institute of Technology, USA**
Low energy (Terahertz) electrodynamics of topological insulator thin films. 2015
2. **Condensed Matter Seminar, Nanjing University, China**

How to ‘kill’ a topological insulator (TI) and how to ‘cook’ a bulk-insulating TI? 2014

1. **Condensed Matter Seminar & ‘Physics in the Field’, the lecture series at the Pulsed Field Facility at Los Alamos National Laboratory, USA**

How to ‘kill’ a topological insulator (TI) and how to ‘cook’ a bulk-insulating TI? 2014

(*Cancelled/Postponed by the organizers due to COVID-19.)

Synergistic Activities

- Chair, Workshop on New Development on Quantum Antiferromagnetic Spintronics (supported by Penn NSF MRSEC) 2023
- Chair, Workshop on New Development on Topological and Correlated Materials (supported by Gordon Betty Moore Foundation & University Research Foundation at Penn) 2021, 2022
- Chair, Young Investigator Leader Workshop on Topological Materials (supported by Gordon Betty Moore & Simons Foundation) 2019
- Chair, Gordon Betty Moore Foundation EPiQS Postdoctoral Symposium 2021, 2022
- Grant Reviewer, *Department of Energy, Basic Energy Sciences; National Science Foundation; German Research Foundation (DFG); Army Research Office; Israel Science Foundation* 2018 - Present
- Journal Referees, *Science; Nature; Nature Nanotechnology; Nature Photonics; Nature Review Materials; Science Advances; Nature Electronics; Nature Communications; Physical Review Letters; Physical Review X; Physical Review B; etc.*

Current Group Members

Postdocs

Isaiah Gray (2022-)

Graduate Students

Zhuoliang Ni (2018-); Xingyue Han (2019-); Jonathan Steinsberg (2019-); Qinwen Deng (2021-); Qi Tian (2022-); Benjamin Mead (2022-).

Alumni

Postdocs

Yishuai Xu (now at Apple); Zhaodong Chu (now at Argonne National Lab).

Undergraduate Students

Xinping Yang (now graduate student at Yale); Stefano Roccasecca (optical engineer at AFRL, now graduate student at UCLA); Yuxuan Wang (now graduate student at Boston College); Jinsu Zhang (now graduate student at Purdue); Adithya Sriram (now graduate student at Stanford, NSF Graduate Research Fellowship); Pranav Mulgund (now at Zoom).

Teaching & Service & Outreach

Teaching

- Phys. 151. Principles of Physics II

University of Pennsylvania

2019-

Service

Graduate Committee

2019-2020

Undergraduate Committee

2022-2023

Outreach

2019 - present

My group performs physics demonstration at the Philadelphia Materials Day annually.

I regularly give talks in Summer Experimental Physics Academy at Penn for high-school students.