

# MATTHEW YANKOWITZ

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## EDUCATION

Aug 2011 – Dec 2015      **University of Arizona**, Tucson, AZ  
Ph.D. in Physics  
*Thesis advisor:* Brian LeRoy

Sep 2007 – Jun 2011      **Stanford University**, Palo Alto, CA  
B.S. in Physics

## EMPLOYMENT

Sep 2019 - Present      **University of Washington**, Seattle, WA  
Assistant Professor, *Department of Physics*  
Assistant Professor, *Department of Materials Science and Engineering*  
WRF Innovation Assistant Professor in Clean Energy

Jan 2016 – Aug 2019      **Columbia University**, New York, NY  
Postdoctoral Research Scientist, *Department of Physics*  
*Advisor:* Cory Dean

Jun 2011 – Jan 2016      **University of Arizona**, Tucson, AZ  
Graduate Research Associate, *Department of Physics*  
*Advisor:* Brian LeRoy

## AWARDS AND HONORS

2022      IUPAP Early Career Scientist Prize in Low Temperature Physics  
2021      National Science Foundation, CAREER Award  
2021      Lee Osheroff Richardson Science Prize, Oxford Instruments  
2020      Army Research Office, Young Investigator Award  
2019      Blavatnik Regional Award for Young Scientists – *Finalist* (NYAS)  
2013 & 2015      College of Science Galileo Circle Scholar (University of Arizona)  
2014      TRIF Imaging Fellowship (University of Arizona)  
2013      Outstanding Graduate Student Colloquium Presentation (University of Arizona)

## PUBLICATIONS

### *Preprints*

1. C.-C. Tseng, T. Song, Q. Jiang, Z. Lin, C. Wang, J. Suh, T. Taniguchi, K. Watanabe, M. A. McGuire, D. Xiao, J.-H. Chu, D. H. Cobden, X. Xu, and **M. Yankowitz**, “Gate-tunable proximity effects in graphene on layered magnetic insulators,” arXiv:2206.06949 (*in press at Nano Letters*) (2022)
2. M. He, J. Cai, Y.-H. Zhang, Y. Liu, Y. Li, T. Taniguchi, K. Watanabe, D. H. Cobden, **M. Yankowitz**, and X. Xu, “Chirality-dependent topological states in twisted double bilayer graphene,” arXiv:2109.08255 (2021)

3. J. Mutch, X. Ma, C. Wang, P. Malinowski, J. Ayres-Sims, Q. Jiang, Z. Liu, D. Xiao, **M. Yankowitz**, and J.-H. Chu, “Abrupt switching of the anomalous Hall effect by field-rotation in nonmagnetic ZrTe<sub>5</sub>,” arXiv:2101.02681 (2021)

#### *Refereed Journal Articles*

1. C.-C. Tseng, X. Ma, Z. Liu, T. Taniguchi, K. Watanabe, J.-H. Chu, and **M. Yankowitz**, “Anomalous Hall effect at half filling in twisted bilayer graphene,” *Nature Physics* **18**, 1038-1042 (2022)
2. J. Finney, A. L. Sharpe, E. J. Fox, C. L. Hsueh, D. E. Parker, **M. Yankowitz**, S. Chen, K. Watanabe, T. Taniguchi, C. R. Dean, A. Vishwanath, M. Kastner, and D. Goldhaber-Gordon, “Unusual magnetotransport in twisted bilayer graphene,” *PNAS* **119**, e2118482119 (2022)
3. Y. Li, X. Wang, D. Tang, X. Wang, K. Watanabe, T. Taniguchi, D. R. Gamelin, D. H. Cobden, **M. Yankowitz**, X. Xu, and J. Li, “Unraveling strain gradient induced electromechanical coupling in twisted double bilayer graphene moiré superlattices,” *Advanced Materials* **33**, 2105879 (2021)
4. M. He, Y. Zhang, Y. Li, Z. Fei, K. Watanabe, T. Taniguchi, X. Xu, and **M. Yankowitz**, “Competing correlated states and abundant orbital magnetism in twisted monolayer-bilayer graphene,” *Nature Communications* **12**, 4724 (2021)
5. S. Chen, M. He, Y. Zhang, V. Hsieh, Z. Fei, K. Watanabe, T. Taniguchi, D. H. Cobden, X. Xu, C. R. Dean, and **M. Yankowitz**, “Electrically tunable correlated and topological states in twisted monolayer-bilayer graphene,” *Nature Physics* **17**, 374-380 (2021)
6. M. He, Y. Li, J. Cai, Y. Liu, K. Watanabe, T. Taniguchi, X. Xu, and **M. Yankowitz**, “Symmetry breaking in twisted double bilayer graphene,” *Nature Physics* **17**, 26-30 (2021)
7. J. A. Kephart, C. G. Romero, C.-C. Tseng, K. J. Anderton, **M. Yankowitz**, W. Kaminsky, and A. Velian, “Hierarchical nanosheets built from superatomic clusters: properties, exfoliation and single-crystal-to-single-crystal intercalation,” *Chemical Science* **11**, 10744-10751 (2020)
8. T. Song\*, Z. Fei\*, **M. Yankowitz**, Z. Lin, Q. Jiang, K. Hwangbo, Q. Zhang, B. Sun, T. Taniguchi, K. Watanabe, M. A. McGuire, D. Graf, T. Cao, J.-H. Chu, D. H. Cobden, C. R. Dean, D. Xiao, and X. Xu, “Switching 2D magnetic states via pressure tuning of layer stacking,” *Nature Materials* **18**, 1298-1302 (2019) (\* equal contribution)
9. N. Finney\*, **M. Yankowitz**\*, L. Muraleetharan, K. Watanabe, T. Taniguchi, C. R. Dean, and J. Hone, “Tunable crystal symmetry in graphene–boron nitride heterostructures with coexisting moiré superlattices,” *Nature Nanotechnology* **14**, 1029-1034 (2019) (\* equal contribution)
10. H. Polshyn\*, **M. Yankowitz**\*, S. Chen, Y. Zhang, K. Watanabe, T. Taniguchi, D. Graf, C. R. Dean, and A. F. Young, “Large linear-in-temperature resistivity in twisted bilayer graphene” *Nature Physics* **15**, 1011-1016 (2019) (\* equal contribution)
11. A. Kerelsky, L. McGilly, D. M. Kennes, L. Xian, **M. Yankowitz**, S. Chen, K. Watanabe, T. Taniguchi, J. Hone, C. R. Dean, A. Rubio, A. N. Pasupathy, “Maximized electron interactions at the magic angle in twisted bilayer graphene,” *Nature* **572**, 95–100 (2019)
12. **M. Yankowitz**\*, S. Chen\*, H. Polshyn\*, Y. Zhang, K. Watanabe, T. Taniguchi, D. Graf, A. F. Young, and C. R. Dean, “Tuning superconductivity in twisted bilayer graphene,” *Science* **363**, 1059-1064 (2019) (\* equal contribution)
13. **M. Yankowitz**, J. Jung, E. Laksono, N. Leconte, B. L. Chattari, K. Watanabe, T. Taniguchi, S. Adam, D. Graf, and C. R. Dean, “Dynamic band-structure tuning of graphene moiré superlattices with pressure,” *Nature* **557**, 404-408 (2018)

14. M. Gustafsson\*, **M. Yankowitz\***, C. Forsythe, D. Rhodes, K. Watanabe, T. Taniguchi, J. Hone, X. Zhu and C. R. Dean, “Ambipolar Landau levels and strong band-selective carrier interactions in monolayer WSe<sub>2</sub>,” *Nature Materials* **17**, 411-415 (2018) (\* equal contribution)
15. S. Huang, **M. Yankowitz**, K. Chattrakun, A. Sandhu, and B. J. LeRoy, “Evolution of the electronic band structure of twisted bilayer graphene upon doping,” *Scientific Reports* **7**, 7611 (2017)
16. **M. Yankowitz**, K. Watanabe, T. Taniguchi, P. San-Jose, and B. J. LeRoy, “Pressure-induced commensurate stacking of graphene on boron nitride,” *Nature Communications* **7**, 13168 (2016)
17. K. Kim, **M. Yankowitz**, B. Fallahazad, S. Kang, H. Movva, S. Huang, S. Larentis, C. Corbet, K. Watanabe, T. Taniguchi, S. Banerjee, B. J. LeRoy, and E. Tutuc, “Van der Waals heterostructures with high accuracy rotational alignment,” *Nano Letters* **16**, 1989-1995 (2016)
18. **M. Yankowitz**, D. McKenzie, and B. J. LeRoy, “Local spectroscopic characterization of spin and layer polarization in WSe<sub>2</sub>,” *Phys. Rev. Lett.* **115**, 136803 (2015) († Editors’ Suggestion)
19. **M. Yankowitz**, S. Larentis, K. Kim, J. Xue, D. McKenzie, S. Huang, M. Paggi, M. N. Ali, R. J. Cava, E. Tutuc, and B. J. LeRoy, “Intrinsic disorder in graphene on transition metal dichalcogenide heterostructures,” *Nano Letters* **15**, 1925-1929 (2015)
20. **M. Yankowitz**, J. I-J. Wang, S. Li, A. G. Birdwell, Y.-A. Chen, K. Watanabe, T. Taniguchi, S. Y. Quek, P. Jarillo-Herrero, and B. J. LeRoy, “Band structure mapping of bilayer graphene via quasiparticle scattering,” *APL Materials* **2**, 092503 (2014)
21. **M. Yankowitz**, J. I-J. Wang, A. G. Birdwell, Y.-A. Chen, K. Watanabe, T. Taniguchi, P. Jacquod, P. San-Jose, P. Jarillo-Herrero, and B. J. LeRoy, “Electric field control of soliton motion and stacking in trilayer graphene,” *Nature Materials* **13**, 786-789 (2014)
22. B. Hunt\*, J. D. Sanchez-Yamagishi\*, A. F. Young\*, **M. Yankowitz**, B. J. LeRoy, K. Watanabe, T. Taniguchi, P. Moon, M. Koshino, P. Jarillo-Herrero, and R. C. Ashoori, “Massive Dirac fermions and Hofstadter butterfly in a van der Waals heterostructure,” *Science* **340**, 6193 (2013) (\* equal contribution)
23. **M. Yankowitz**, F. Wang, C. N. Lau, and B. J. LeRoy, “Local spectroscopy of the electrically tunable band gap in trilayer graphene,” *Phys. Rev. B* **87**, 165102 (2013)
24. **M. Yankowitz**, J. Xue, D. Cormode, J. Sanchez-Yamagishi, K. Watanabe, T. Taniguchi, P. Jarillo-Herrero, P. Jacquod, and B. J. LeRoy, “Emergence of superlattice Dirac points in graphene on hexagonal boron nitride,” *Nature Physics* **8**, 382-386 (2012)
25. F. Amet, J. R. Williams, A. G. F. Garcia, **M. Yankowitz**, K. Watanabe, T. Taniguchi, and D. Goldhaber-Gordon, “Tunneling spectroscopy of graphene-boron-nitride heterostructures,” *Phys. Rev. B* **85**, 073405 (2012)

#### *Invited Review Articles*

1. L. G. Pimenta Martins, R. Comin, M. J. S. Matos, M. S. C. Mazzoni, B. R. A. Neves, and **M. Yankowitz**, “High pressure studies of atomically-thin van der Waals materials,” (*under review at Applied Physics Reviews*) (2022)
2. **M. Yankowitz**, Q. Ma, P. Jarillo-Herrero, and B. J. LeRoy, “van der Waals heterostructures combining graphene and hexagonal boron nitride,” *Nature Reviews Physics* **1**, 112-125 (2019)
3. **M. Yankowitz**, J. Xue, and B. J. LeRoy, “Graphene on hexagonal boron nitride,” *Journal of Physics: Condensed Matter* **26**, 303201 (2014)

### *Invited Commentary and Editorials*

1. **M. Yankowitz** and K. F. Mak, “Moiré coupling and other emergent phenomena in stacked van der Waals materials,” *APL Materials* **10**, 080401 (2022)
2. B. J. LeRoy and **M. Yankowitz**, “Emergent complex states in bilayer graphene,” *Science* **345**, 31-32 (2014)

### PRESENTATIONS

#### *Invited Talks at International Conferences*

1. **Moiré effects approaching and within the bulk graphitic limit**  
*2022 MRS Fall Meeting*, Boston, MA, Nov. 2022 (*upcoming*)
2. **Correlated and topological states in moiré graphene multilayers**  
*29<sup>th</sup> International Conference on Low Temperature Physics*, Sapporo, Japan – *virtual*, Aug. 2022
3. **Strong correlations and topology in moiré structures approaching the graphitic limit**  
*International Conference on Frontier Materials 2022*, Zhuhai, China – *virtual*, May 2022
4. **Controlling the symmetry-broken states in twisted graphene multilayers**  
*IOP CMD 29*, Manchester, UK – *virtual*, Oct. 2021
5. **Strong correlations and topology in graphene-based moiré quantum materials**  
*PNWAVS 2021*, Corvallis, OR – *virtual*, Sep. 2021
6. **Moiré van der Waals materials**  
*APS March Meeting*, (Lee Osheroff Richardson Prize Talk – *virtual*), Mar. 2021
7. **Tunable correlated and topological states in twisted monolayer-bilayer graphene**  
*GrapheneForUS 2021*, New York, NY – *virtual*, Feb. 2021
8. **Tuning the magic angle in twisted bilayer graphene with pressure**  
*APS March Meeting*, Boston, MA, Mar. 2019
9. **High temperature transport in twisted bilayer graphene**  
*KITP Workshop: Correlations in Moiré Flat Bands*, Santa Barbara, CA, Jan. 2019
10. **Tuning superconductivity in twisted bilayer graphene**  
*SIT 2018*, Villard de Lans, France, Oct. 2018
11. **Ambipolar Landau levels and strong band-selective carrier interactions in monolayer WSe<sub>2</sub>**  
*HMF*, Toulouse, France, July 2018
12. **Detecting novel quantum Hall states in graphene and WSe<sub>2</sub>**  
*IWEPNM*, Kirchberg in Tirol, Austria, Mar. 2017

#### *Invited Colloquia/Seminars*

1. **Interactions and band reconstruction in bulk moiré graphite**  
*Quantum Materials and Devices Seminar (Harvard/MIT/Howard – virtual)*, Cambridge, MA, Oct. 2022 (*upcoming*)
2. **Symmetry-broken states in twisted graphene multilayers**  
*Condensed Matter Theory Forum (University of Oxford – virtual)*, Oxford, UK, Nov. 2021
3. **Symmetry-broken states in twisted graphene multilayers**  
*Condensed Matter Seminar (Washington University in St. Louis)*, St. Louis, MO, Nov. 2021
4. **Tunable correlated and topological states in twisted graphene heterostructures**  
*Condensed Matter Seminar (UT Austin – virtual)*, Austin, TX, April 2021
5. **Tunable correlated and topological states in twisted graphene heterostructures**  
*Physics Colloquium (George Mason University – virtual)*, Fairfax, VA, Feb. 2021
6. **Tunable correlated and topological states in twisted graphene heterostructures**  
*Quantum Foundry Seminar (UC Santa Barbara – virtual)*, Santa Barbara, CA, Feb. 2021
7. **Tunable correlated and topological states in twisted graphene heterostructures**

*Condensed Matter Seminar (Case Western Reserve University – virtual)*, Cleveland, OH, Sept. 2020

8. **Tunable correlated and topological states in twisted graphene heterostructures**  
*CAMP Seminar (Penn State University – virtual)*, State College, PA, Aug. 2020
9. **Tunable correlated and topological states in twisted graphene multilayers**  
*MSE Seminar (University of Washington – virtual)*, Seattle, WA, May 2020
10. **Tunable correlated and topological states in twisted graphene multilayers**  
*Condensed Matter Seminar (Brown University – virtual)*, Providence, RI, May 2020
11. **Correlations, superconductivity, and strong electron-phonon scattering in twisted bilayer graphene**  
*Condensed Matter & Biophysics Seminar (Brown University)*, Providence, RI, April 2019
12. **Two-dimensional quantum materials with a twist**  
*MSE Special Seminar (University of Washington)*, Seattle, WA, Mar. 2019
13. **Two-dimensional quantum electronics with a twist**  
*Physics Colloquium (University of Arizona)*, Tucson, AZ, Feb. 2019
14. **Two-dimensional quantum electronics with a twist**  
*Physics Colloquium (University of Washington)*, Seattle, WA, Feb. 2019
15. **Two-dimensional quantum electronics with a twist**  
*Condensed Matter Seminar (Purdue University)*, West Lafayette, IN, Jan. 2019
16. **Tuning superconductivity in twisted bilayer graphene**  
*Frontiers of Condensed Matter Physics (Columbia University)*, New York, NY, Dec. 2018
17. **Tuning superconductivity in twisted bilayer graphene**  
*ABC Physics Seminar (University of Washington)*, Seattle, WA, Nov. 2018
18. **Tuning superconductivity in twisted bilayer graphene**  
*Condensed Matter Seminar (Washington University in St. Louis)*, St. Louis, MO, Oct. 2018
19. **Tuning superconductivity in twisted bilayer graphene**  
*Séminaire SPEC (CEA, IRAMIS)*, Paris, France, Oct. 2018
20. **Dynamic band structure tuning of 2D van der Waals heterostructures with pressure**  
*Condensed Matter Seminar (Rutgers University)*, New Brunswick, NJ, April 2018
21. **Probing fragile electronic states in two-dimensional materials**  
*Physics Colloquium (University of Arizona)*, Tucson, AZ, Jan. 2017
22. **Local probe spectroscopy of 2D van der Waals heterostructures**  
*MRSEC Seminar (Columbia University)*, New York, NY, Oct. 2015
23. **Local probe spectroscopy of 2D van der Waals heterostructures**  
*ITST Seminar (University of California, Santa Barbara)*, Santa Barbara, CA, Sept. 2015
24. **Local probe spectroscopy of 2D van der Waals heterostructures**  
*CM/AMO Seminar (University of Arizona)*, Tucson, AZ, Sept. 2015
25. **Local probe spectroscopy of 2D van der Waals heterostructures**  
*CNST Seminar (National Institute of Standards and Technology)*, Gaithersburg, MD, July 2015
26. **Local probe spectroscopy of 2D van der Waals heterostructures**  
*Condensed Matter Seminar (Harvard University)*, Cambridge, MA, June 2015
27. **Controlling the electronic properties of graphene**  
*Chemical Physics Seminar (University of Arizona)*, Tucson, AZ, Feb. 2014

#### *Contributed Talks at International Conferences*

1. **Dynamic band structure tuning of graphene moiré superlattices with pressure**  
*ICPS*, Montpellier, France, Aug. 2018
2. **Quantum Hall interferometry in graphene**  
*APS March Meeting*, Los Angeles, CA, Mar. 2018
3. **Density-dependent enhancement of spin susceptibility in monolayer WSe<sub>2</sub>**  
*EP2DS*, State College, PA, July 2017

4. **Control of interlayer separation in van der Waals heterostructures**  
*Graphene 2017*, Barcelona, Spain, Mar. 2017
5. **Tuning the Hofstadter butterfly in graphene with interlayer separation**  
*APS March Meeting*, New Orleans, LA, Mar. 2017
6. **Control of commensuration between graphene and boron nitride**  
*APS March Meeting*, Baltimore, MD, Mar. 2016
7. **Intrinsic disorder in graphene on transition metal dichalcogenide heterostructures**  
*APS March Meeting*, San Antonio, TX, Mar. 2015
8. **Electric field control of stacking-order solitons in trilayer graphene**  
*APS March Meeting*, Denver, CO, Mar. 2014
9. **Local spectroscopy of the electrically tunable band gap in trilayer graphene**  
*APS March Meeting*, Baltimore, MD, Mar. 2013
10. **Scanning tunneling spectroscopy of graphene on hexagonal boron nitride**  
*APS March Meeting*, Boston, MA, Mar. 2012
11. **Electronic edge effects in chemical vapor deposition grown graphene**  
*APS Four Corners Meeting*, Tucson, AZ, Oct. 2011

## EXTERNAL SERVICE AND MEMBERSHIP

<i>Journal reviewer:</i>	Science, Nature, Nature Physics, Nature Materials, Nature Nanotechnology, Nature Electronics, Nature Communications, Physical Review Letters, Physical Review X, Physical Review B, Nano Letters, ACS Nano, Advanced Materials, Applied Physics Letters, APL Materials, Scientific Reports, Science Bulletin
<i>Grant proposal reviewer:</i>	National Science Foundation (NSF), Department of Energy (DOE), Army Research Office (ARO)
<i>Editorial board member:</i>	Communications Physics (Oct. 2020 – Present)
<i>Guest editor:</i>	APL Materials, Special Topic on Moiré Materials (2021 – 2022)
<i>International committee member:</i>	National High Magnetic Field Laboratory <ul style="list-style-type: none"> <li>▪ DC-High B/T Users Advisory Committee (Jan. 2020 – Dec. 2022)</li> <li>▪ DC-High B/T Executive Committee (Sept. 2020 – Dec. 2022)</li> </ul>
<i>Conference organizer:</i>	<ul style="list-style-type: none"> <li>• Emerging Phenomena in Moiré Materials (<i>co-organizer</i>) (symposium at 2022 MRS Spring Meeting)</li> <li>• Abstract sorter for 2022 APS March Meeting</li> <li>• APS Conferences for Undergraduate Women in Physics (CUWiP), University of Washington 2023 (<i>co-organizer</i>)</li> </ul>
<i>Community outreach:</i>	Presenter at the University of Washington Physics Slam (2019)
<i>Professional membership:</i>	American Physical Society, Materials Research Society

## TEACHING

2022 (winter)	Physics 116: Waves, Optics, Atoms and Nuclei
2021 (autumn)	Physics 115: Heat, Fluids and Electricity and Magnetism
2021 (spring)	MSE 498D/599E: Quantum Materials
2021 (winter)	Physics 115: Heat, Fluids and Electricity and Magnetism
2020 (spring)	MSE 498G: Quantum Materials
2020 (winter)	Physics 576B: Selected Topics in Experimental Physics
2014 – 2015	LASC 397B/C: Entering Research I/II (University of Arizona)