Daniel Rhodes

University of Wisconsin - Madison
Department of Materials Science and Engineering
1509 University Ave., Madison, WI 53706
Email: darhodes@wisc.edu

Professional Experience

Assistant Professor of Materials Science and Engineering

Jan 2020 - Present
University of Wisconsin - Madison

Exploring correlated behavior in novel materials and their 2D analogs. Focus is placed on achieving ultra-clean 2-D systems through careful construction of van der Waals heterostructures by tuning the bulk crystal synthesis and optimizing device fabrication steps. This allows us to develop an understanding over the underlying disorder and study its effects on strongly correlated systems in 2D. Behaviors we investigate include superconductivity, quantum spin hall insulators, the quantum anomalous hall effect and other correlated states.

Postdoctoral Researcher

Sep 2016 - Dec 2019
Columbia University
Advisers: James Hone and Cory Dean

Designed and optimized new methods of crystal growth for transition metal dichalcogenides (TMDs), measured and analyzed magnetotransport of quantum phenomena in atomically thin semiconducting TMDs, and investigated of superconductivity in an anisotropic air-sensitive monolayer TMD. Trained undergraduate and graduate students on these topics.

Education

Ph.D., Physics, Florida State University Adviser: Luis Balicas	2016
M.Sc., Physics, Florida State University	2013
B.Sc., Physics and Applied Mathematics, Clemson University	2010

Teaching

Assistant Professor Courses — Jan 2020 - Present
University of Wisconsin - Madison, MS&E Department
MSE 333: Microprocessing of Materials - Spring 2020-2024
MSE 362: Materials Laboratory III - Fall 2021, 2022
MSE 550: Materials Fundamentals - Fall 2023

Graduate Teaching Assistant — Aug 2011 - May 2012
Florida State University, Physics Department
AST1002L: Astronomy Lab - Fall 2011, Spring 2012

Academic Outreach

- (2023) UW-Madison Engineering EXPO Presenter
- (2023) Engineering Tomorrow's Careers Camp Panelist
- (2023) UW-Madison Quanatum Materials Seminar Organizer
- (2022) Wisconsin Science Festival Presenter
- (2022) UW-Madison Precollege Enrichment Opportunity Program for Learning Excellence Presenter
- (2022) WiscProf: Future Faculty in Engineering Workshop Panel Participant
- (2021) UW-Madison MS&E Alumni Engagement and Panels Organizer
- (2016-2019) Columbia University Materials Research and Science Engineering Center (MRSEC) REU Program Mentor

Honors & Awards

National Science Foundation Career Award	Jan 2024
Grainger Institute for Engineering Assistant Professor	Jul 2021 - Jul 2024
Madison Teaching and Learning Excellence Fellow	Aug 2020 - April 2021
MRSEC Postdoctoral Fellow - Columbia University	Aug 2016 - Dec 2019

External Funding

1. NSF Career Award (2024-2029)
2. Department of Energy BES - Experimental Condensed Matter Physics Program (2023-2026)
3. NSF - UW-Madison MRSEC (2023-2029)
4. NSF - UW-Madison MRSEC Superseed (2022-2023)

Invited Talks

1. "Beyond Hexagonal 2D Materials: Monolayer 1T′-TMDs," Workshop on Innovative Nanoscale Devices and Systems (Dec 2023)
2. "Beyond Hexagonal 2D Materials: Monolayer 1T′-TMDs," Materials Research Society Fall Meeting (Nov 2023)
3. "Superconductivity and Ferroelectricity Few-Layer Td-$MoTe_2$," American Physical Society March Meeting (Mar 2023)
4. "Disorder and defects in van der Waals heterostructures," Workshop on Future Directions in Nanomaterial Synthesis: from Rational Design to Data-Driven Manufacturing, Mechanical Science and Engineering Department at the University of Illinois Urbana-Champaign (Jan 2021)

Publications

2 Sciences, 6 Natures, 13 Nature sister journals

1. L. Wang, L. Wei, Z.L. Gu, A. Fischer, Y. He, Q. Xu, A. Ghiotto, C. Weber, K. Watanabe, T. Taniguchi, M. Claassen, A. Rubio, A. Millis, A. Pasupathy, L. Xian, D. Rhodes, D. Kennes, and J.X. Li, *Mapping the Mottness under Magnetic Field*, Research Square Preprint 3385782 (2023)

2. A.Y. Joe, K. Pistunova, K. Kaasbjerg, K. Wang, B. Kim, D.A. Rhodes, T. Taniguchi, K. Watanabe, J. Hone, T. Low, L.A. Jauregui, and P. Kim, *Transport Study of Charge Carrier Scattering in Monolayer* WSe_2, arXiv:2310.04624 (2023)

3. X. Cong, P.A. Mohammadi, M. Zheng, K. Watanabe, T. Taniguchi, D. Rhodes, and X.X. Zhang, *Interplay of valley polarized dark trion and dark exciton-polaron in monolayer* WSe_2, Nature Communications 14, 5657 (2023)

4. S. Liu, Y. Liu, L.N. Holtzman, B. Li, M. Holbrook, J. Pack, T. Taniguchi, K. Watanabe, C.R. Dean, A.N. Pasupathy, K. Barmak, D.A. Rhodes, and J. Hone, *Two-step flux synthesis of ultrapure transition metal dichalcogenides*, ACS Nano 17, 16587 (2023)

5. E.M. Shih, Q. Shi, D. Rhodes, B. Kim, K. Watanabe, T. Taniguchi, K. Yang, J. Hone, and C.R. Dean, *Spin-selective magneto-conductivity in* WSe_2, arXiv:2307.00446 (2023)

6. E.S. Yanev, T.P. Darlington, S.A. Ladyzhets, S. Liu, D.A. Rhodes, K. Hall, A. Sinha, N.J. Borys, J.C. Hone and P.J. Schuck, *Programmable Nanowrinkle-Induced Room-Temperature Exciton Localization in Monolayer* WSe_2, arXiv:2305.15506 (2023)

7. E. Morissette, J.X. Lin, D. Sun, L. Zhang, S. Liu, D. Rhodes, K. Watanabe, T. Taniguchi, J. Hone, J. Pollanen, M.S. Scheurer, M. Lilly, A. Mounce, and J. Li, *Dirac revivals drive a resonance response in twisted bilayer graphene*, Nature Physics 19, 1156 (2023)

8. A. Jindal, A. Saha, Z. Li, T. Taniguchi, K. Watanabe, J.C. Hone, T. Birol, R.M. Fernandes, C.R. Dean, A.N. Pasupathy, and D.A. Rhodes *Coupled ferroelectricity and superconductivity in bilayer* T_d-$MoTe_2$, Nature 613, 48 (2023)

9. J.X. Lin, P. Siriviboon, H.D. Scammell, S. Liu, D. Rhodes, K. Watanabe, T. Taniguchi, J. Hone, M.S. Scheurer, and J. Li, *Zero-field superconducting diode effect in small-twist-angle trilayer graphene*, Nature Physics, 18, 1221 (2022)

10. E. Morissette, J.X. Lin, D. Sun, L. Zhang, S. Liu, D. Rhodes, K. Watanabe, T. Taniguchi, J. Hone, J. Pollanen, M.S. Scheurer, M. Lilly, A. Mounce, and J. Li, *Electron spin resonance and collective excitations in magic-angle twisted bilayer graphene*, arXiv:2206.08354 (2022)

11. Q. Shi, E.M. Shih, D. Rhodes, B. Kim, K. Barmak, K. Watanabe, T. Taniguchi, Z. Papić, D.A. Abanin, J. Hone and C.R. Dean, *Bilayer* WSe_2 *as a natural platform for interlayer exciton condensates in the strong coupling limit*, Nature Nanotechnology 17, 577 (2023)

12. D. Shen, H.B. Yang, C. Spudat, T. Patel, S. Zhong, F. Chen, J. Yan, X. Luo, M. Cheng, G. Sciaini, Y. Sun, D.A. Rhodes, T. Timusk, Y.N. Zhou, N.Y. Kim, and A.W. Tsen, *High-Performance Mid-IR to Deep-UV van der Waals Photodetectors Capable of Local Spectroscopy at Room Temperature*, Nano Letters 22, 3425 (2022)

13. C. Tan, D.Y.H. Ho, L. Wanag, J. Li, I. Yudhistira, D.A. Rhodes, T. Taniguchi, K. Watanabe, K. Shepard, P.L. McEuen, C.R. Dean, S. Adam, and J. Hone, *Dissipation-enabled hydrodynamic conductivity in a tunable bandgap semiconductor*, Science Advances 8, eabi8481 (2022)

14. J.X. Lin, Y.H. Zhang, E. Morissette, S. Liu, D. Rhodes, K. Watanabe, T. Taniguchi, J. hone, and J. Li, *Spin-orbit-driven ferromagnetism at half moiré filling in magic-angle twisted bilayer graphene*, Science, eabh2889 (2022)

15. P. Siriviboon, J.X. Lin, H.D. Scammell, S. Liu, D. Rhodes, K. Watanabe, T. Taniguchi, J. Hone, M.S. Scheurer, and J. Li, *A new flavor of correlation and superconductivity in small twist-angle trilayer graphene*, arXiv:2112.07127 (2022)

16. B. Kim, Y. Luo, D. Rhodes, Y. Bai, J. Wang, S. Liu, A. Jordan, B. Huang, Z. Li, T. Taniguchi, K. Watanabe, J. Owen, S. Strauf, K. Barmak, X.Y. Zhu, J. Hone, *Free Trions with Near-Unity Quantum Yield in Monolayer* $MoSe_2$, ACS Nano 16, 140 (2021)

17. G.C. Resende, G.A.S. Riberio, O.J. Silveira, J.S. Lemos, D. Rhodes, L. Balicas, M. Terrones, M. S.C. Mazzoni, C. Fantini, B.R. Carvalho, M.A. Pimenta, *Effects of dimensionality and excitation energy on the Raman tensors of triclinic* $ReSe_2$, Journal of Raman Spectroscopy 52, 2068 (2021)

18. L. Yuan, J. Jeong, K.W.C. Kwock, E.S. Yanev, M. Grandel, D. Rhodes, T.S. Luk, P.J. Schuck, D. Yarotski, J. Hone, I. Brener, R.P. Prasankumar, *Manipulation of Exciton Dynamics in Single-Layer* WSe_2 *Using a Toroidal Dielectric Metasurface*, Nano Letters 21, 9930 (2021)

19. Y. Dai, Q. Zheng, M.E. Ziffer, D. Rhodes, J. Hone, J. Zhao, X.Y. Zhu, *Ultrafast Ferroelectric Ordering on the Surface of a topological Semimetal* $MoTe_2$, Nano Letters 21, 9903 (2021)

20. M.S. Choi, A. Nipane, B.S.Y. Kim, M.E. Ziffer, I. Datta, A. Borah, Y. Jung, B. Kim, D. Rhodes, A. Jindal, Z.A. Lamport, M. Lee, A. Zangiabadi, M.N. Nair, T. Taniguchi, K. Watanabe, I. Kymissis, A.N. Pasupathy, M. Lipson, X.Y. Zhu, W.J. Yoo, J. Hone, and J.T. Teherani, *High carrier mobility in graphene doped using a monolayer of tungsten oxyselenide*, Nature Electronics, 4, 731 (2021)

21. M. Song, H. Kang, D. Rhodes, B. Kim, J. Hone, S. Ryu, *Optically facet-resolved reaction anisotropy in two-dimensional transition metla dichalcogenides*, 2D Materials, 8, 035045 (2021)

22. J. Gu, V. Walther, L. Waldecker, D. Rhodes, A. Raja, J. Hone, T. F. Heinz, S. Kena-Cohen, T. Pohl, and V. M. Menon, *Enhanced nonlinear interaction of polaritons via excitonic Rydberg states in monolayer* WSe_2, Nature Communications 12, 1 (2021)

23. A. Ghiotto, E.M. Shih, G.S.S.G. Pereira, D. Rhodes, B. Kim, J. Zang, A.J. Millis, K. Watanabe, T. Taniguchi, J. Hone, L. Wang, C.R. Dean, A.N. Pasupathy, *Quantum Criticality in Twisted Transition Metal Dichalcogenides*, Nature 597, 345 (2021)

24. H. Xie, S. Jiang, D. Rhodes, J. Hone, J. Shan, K.F. Mak, *Tunable Exciton-Optomechanical Coupling in Suspended Monolayer* $MoSe_2$, Nano Letters 21, 2538 (2021)

25. J. Wang, Q. Shi, E.M. Shih, L. Zhou, W. Wu, Y. Bai, D. Rhodes, K. Barmak, J. Hone, C.R. Dean, and X.Y. Zhu, *Diffusivity Reveals Three Distinct Phases of Interlayer Excitons in* $MoSe_2/WSe_2$ *Heterobilayers*, Physical Review Letters 126, 106804 (2021)

26. G.X. Ni, A.S. McLeod, Z. Sun, J.R. Matson, C.F.B. Lo, D. Rhodes, F.L. Ruta, S.L. Moore, R.A. Vitalone, R. Cusco, L. Artús, L. Xiong, C.R. Dean, J. Hone, A.J. Millis, M.M. Fogler, J.H. Edgar, J.D. Caldwell, and D.N. Basov, *Long-Lived Phonon Polaritons in Hyperbolic Materials*, Nano Letters 21, 5767 (2021)

27. D. Rhodes, A. Jindal, N.F.Q. Yuan, Y. Jung, A. Antony, H. Wang, B. Kim, Y.C. Chiu, T. Taniguchi, K. Watanabe, K. Barmak, L. Balicas, C.R. Dean, X.F. Qian, L. Fu, A.N. Pasupathy, J. Hone, *Enhanced Superconductivity in Monolayer* T_d-$MoTe_2$, Nano Letters 21, 2505 (2021)

28. P. Rivera, M. He, B. Kim, S. Liu, C. Rubio-Verdú, H. Moon, L. Mennel, D. Rhodes, H. Yu, T. Taniguchi, K. Watanabe, J. Yan, D.G. Mandrus, H. Dery, A.N. Pasupathy, D. Englund, J. Hone, W. Yao, X. Xu, *Intrinsic donor-bound excitons in ultraclean monolayer semiconductors*, Nature Communications 12, 1 (2021)

29. A.J. Sternbach, S.H. Chae, S. Latini, A.A. Rikhter, Y. Shao, B. Li, D. Rhodes, B. Kim, P.J. Schuck, X. Xu, X.Y. Zhu, R.D. Averitt, J. Hone, M.M. Fogler, A. Rubio, D.N. Basov, *Programmable hyperbolic polaritons in van der Waals semiconductors*, Science 371, 617 (2021)

30. D. Halbertal, N.R. Finney, S.S. Sunku, A. Kerelsky, C. Rubio-Verdu, S. Shabani, L. Xian, S. Carr, S. Chen, C. Zhang, L. Wang, D. Gonzalez-Acevedo, A.S. McLeod, D. Rhodes, K. Watanabe, T. Taniguchi, E. Kaxiras, C.R. Dean, J. Hone, A.N. Pasupathy, D.M. Kennes, A. Rubio, and D.N. Basov, *Moiré metrology of energy landscapes in van der Waals heterostructures*, Nature Communications 12, 1 (2021)

31. P.D. Patil, M. Wasala, R. Alkhaldi, L. Weber, K.K. Kovi, B. Chakrabarti, J.A. Nash, D. Rhodes, D. Rosenmann, R. Divan, A.V. Sumant, L. Balicas, N.R. Pradhan, S. Talapatra, *Photogating-driven enhanced responsivity in a few-layered $ReSe_2$ phototransistor*, Journal Of Materials Chemistry C 9, 12168 (2021)

32. G.C. Resende, G.A.S. Ribeiro, O.J. Silveira, J.S. Lemos, J.C. Brant, D. Rhodes, L. Balicas, M. Terrones, M.S.C. Mazzoni, C. Fantini, B.R. Carvalho, M.A. Pimenta, *Origin of the complex Raman tensor elements in single-layer triclinic $ReSe_2$*, 2D Materials 8, 025002 (2020)

33. Y. Xu, S. Liu, D. Rhodes, K. Watanabe, T. Taniguchi, J. Hone, V. Elser, K.F. Mak, J. Shan, *Correlated insulating states at fractional fillings of moiré superlattices*, Nature 587, 214 (2020)

34. M. Schneider, S. Esdaille, D. Rhodes, K. Barmak, J. Hone, and A. Rahimi-Iman, *Optical dispersion of valley-hybridised coherent excitons with momentum-dependent valley polarisation in monolayer semiconductor*, 2D Materials 8, 015009 (2020)

35. I. Epstein, A.J. Chaves, D. Rhodes, B. Frank, K. Watanabe, T. Taniguchi, H. Giessen, J. Hone, N.M.R. Peres, F.H.L. Koppens, *Highly confined in-plane propagating exciton-polaritons on monolayer semiconductors*, 2D Materials 7, 035031 (2020)

36. T.P. Darlington, C. Carmesin, M. Florian, E.S. Yanev, O. Ajayi, J. Ardelean, D. Rhodes, A. Ghiotto, A. Krayev, K. Watanabe, T. Taniguchi, J.W. Kysar, A.N. Pasupathy, J. Hone, F. Jahnke, N.J. Borys, P.J. Schuck, *Imaging strain-localized excitons in nanoscale bubbles of monolayer WSe2 at room temperature*, Nature Nanotechnology 15, 854 (2020)

37. Z. Guguchia, A.M. dos Santos, F.O. von Rohr, J.J. Molaison, S. Banerjee, D. Rhodes, J. Yin, R. Khasanov, J. Hone, Y.J. Uemura, M.Z. Hasan, H. Luetkens, E.S. Bozin, and A. Amato, *Pressure Induced Topological Quantum Phase Transitions in Weyl Semimetal T_d-$MoTe_2$*, Journal of the Physical Society of Japan 89, 094707 (2020)

38. C. Nyby, A. Sood, P. Zalden, A. J. Gabourie, P. Muscher, D. Rhodes, E. Mannebach, J. Corbett, A. Mehta, E. Pop, T. F. Heinz, A. M. Lindenberg, *Visualizing Energy Transfer at Buried Interfaces in Layered Materials Using Picosecond X-Rays*, Advanced Functional Mateirals 30, 2002282 (2020)

39. L. Wang, E.-M. Shih, A. Ghiotto, L. Xian, D. Rhodes, C. Tan, M. Claasen, D. M. Kennes, Y. Bai, B. Kim, K. Watanabe, T. Taniguchi, X.-Y. Zhu, J. Hone, A. Rubio, A. Pasupathy, and C. R. Dean, *Correlated electronic phases in twisted bilayer transition metal dichalcogenides*, Nature Materials 19, 861 (2020)

40. A. Sternbach, S. Latini, S. Chae, H. Hübener, U.D. Giovannini, Y. Shao, L. Xiong, Z. Sun, N. Shi, P. Kissin, G.-X. Ni, D. Rhodes, B. Kim, N. Yu, A. Millis, M.M. Fogler, P.J. Schuck, M. Lipson, X.-Y. Zhu, J. Hone, R.D. Averitt, A. Rubio, D.N. Basov, *Femtosecond exciton dynamics in WSe2 optical waveguides*, Nature Communications 11, 1-6 (2020)

41. T.P. Darlington, C. Carmesin, M. Florian, E. Yanev, O. Ajayi, J. Ardelean, D. Rhodes, A. Ghiotto, A. Krayev, K. Watanabe, T. Taniguchi, J.W. Kysar, A.N. Pasupathy, J. Hone, F. Jahnke, N.J. Borys, P.J. Schuck, *Imaging strain-localized excitons in nanoscale bubbles of monolayer WSe2 at room temperature*, Nature Nanotechnology 15, 854 (2020)

42. E.Y. Ma, L. Waldecker, D. Rhodes, J. Hone, K. Watanabe, T. Taniguchi, T.F. Heinz, *High-resolution optical micro-spectroscopy extending from the near-infrared to the vacuum-ultraviolet*, Review of Scientific Instruments 91, 073107 (2020)

43. Q. Shi, E.-M. Shih, M. V. Gustafsson, D. Rhodes, B. Kim, K. Watanabe, T. Taniguchi, Z. Papic, J. Hone, and C. R. Dean, *Odd- and even-denominator fractional quantum Hall states in monolayer* WSe_2, Nature Nanotechnology 15, 569 (2020)

44. I. Epstein, B. Terres, A. J. Chaves, V.-V. Pusapati, D. Rhodes, B. Frank, V. Zimmermann, Y. Qin, K. Watanabe, T. Taniguchi, H. Giessen, S. Tongayu, J. Hone, N. MR Peres, and F. Koppens, *Near-unity Light Absorption in a Monolayer* WS_2 *Van der Waals Heterostructure Cavity*, Nano Letters 20, 3545 (2020)

45. L. M. Schneider, S. Esdaille, D. Rhodes, K. Barmak, J. Hone, and A. Rahimi-Iman, *Shedding light on exciton's nature in monolayer quantum material by optical dispersion measurments*, Optics Express 27, 37131(2019)

46. Z. Lu, D. Rhodes, Z. Li, D. V. Tuan, Y. Jiang, J. Ludwig, Z. Jiang, Z. Lian, S.-F. Shi, J. Hone, H. Dery, and D. Smirnov, *Magnetic field mixing and splitting of bright and dark excitons in monolayer* $MoSe_2$, 2D Materials 7, 015017 (2019)

47. Z. Wang, D. Rhodes, K. Watanabe, T. Taniguchi, J. Hone, J. Shan, and K. F. Mak, *Evidence of high-temperature exciton condensation in two-dimensional atomic double layers*, Nature 574, 76 (2019)

48. Q. R. Zhang, B. Zeng, Y. C. Chiu, R. Schönemann, S. Memaran, W. Zheng, D. Rhodes, K.-W. Chen, T. Besara, R. Sankar, F. Chou, G. T. McCandless, J. Y. Chan, N. Alidoust, S.-Y. Xu, I. Belopolski, M. Z. Hasan, F. F. Balakirev, and L. Balicas, *Possible manifestation of the chiral anomaly and evidence for a magnetic field induced toplogical phase transition in the type-I Weyl semimetal TaAs*, Physical Review B 100, 115138 (2019)

49. J. O. Island, X. Cui, C. Lewandowski, J. Y. Khoo, E. M. Spanton, D. Rhodes, J. Hone, T. Taniguchi, K. Watanabe, L. S. Levitov, M. P. Zaletel, and A. F. Young, *Spin-orbit driven band inversion in bilayer graphene by the van der Waals proximity effect*, Nature 571, 85-89 (2019)

50. Y. Shimura, Q. Zhang, B. Zeng, D. Rhodes, R. Schönemann, M. Tsujimoto, Y. Matsumoto, A. Sakai, T. Sakakibara, K. Araki, W. Zheng, Q. Zhou, L. Balicas, and S. Nakatsuji, *Giant Anisotropic Magnetoresistance due to Purely Orbital Rearrangement in the Quadrupolar Heavy Fermion Superconductor* PrV_2Al_{20}, Physical Review Letters 122, 256601 (2019)

51. D. Edelberg, D. Rhodes (co-first), B. Kim, J. Wang, A. Zangiabad, C. Kim, A. Antony, I. Zhang, R. Zu, E.J.G. Santos, L. Balicas, C. Marianetti, K. Barmak, X.-Y. Zhu, J. Hone, and A.N. Pasupathy, *Approaching the Intrinsic Limit in Transition Metal Diselenides via Point Defect Control*, Nano Letters 19, 4371-4379 (2019)

52. D. Rhodes, S. Chae, R. Ribeiro-Palau, and J. Hone, *Disorder in van der Waals heterostructures of 2D materials*, Nature Materials 18, 541 (2019)

53. E.J. Sie, C. M. Nyby, C. D. Pemmaraju, S. J. Park, X. Shen, J. Yang, M. C. Hoffmann, BK Ofori-Okai, R. Li, A. H. Reid, S. Weathersby, E. Mannebach, N. Finney, D. Rhodes, D. Chenet, A. Antony, L. Balicas, J. Hone, T. P. Devereaux, T. F. Heinz, X. Wang, and A. M. Lindenberg, *An ultrafast symmetry switch in a Weyl semimetal*, Nature 565, 61 (2019)

54. Y. Shimura, Q.R. Zhang, B. Zheng, D. Rhodes, R.U. Schönemann, M. Tsujimoto, Y. Matsumoto, A. Sakai, T. Sakakibara, K. Araki, W. Zheng, Q. Zhou, L. Balicas, and S. Nakatsuji, *giant Anisotropic Magnetoresistance due to Purely Orbital Reaarangement in the Quadrupolar Heavy Fermion Superconductor* PrV_2Al_20, Physical Review Letters 122, 256601 (2019)

55. Q. R. Zhang, B. Zeng, Y.C. Chiu, R. Schoenemann, S. Memaran, W. Zheng, D. Rhodes, K.W. Chen, T. Besara, R. Sankar, F. Chou, G.T. McCandless, J.Y. Chan, N. Alidoust, S.Y. Xu, I. Belopolski, M.Z. Hasan, F.F. Balakirev, L. Balicas, *Planar Hall-effect, Anomalous planar Hall-effect, and Magnetic Field-Induced Phase Transitions in TaAs*, Physical Review B 100, 115138 (2019)

56. Y. Luo, G. D. Shepard, J. V. Ardelean, D. Rhodes, B. Kim, K. Barmak, J. Hone, and S. Strauf, *Deterministic coupling of site-controlled quantum emitters in monolayer* WSe_2 *to plasmonic nanocavities*, Nature Nanotechnology 13, 1137 (2018)

57. Z. Guguchia, A. Kerelsky, D. Edelberg, S. Banerjee, F. von Rohr, D. Scullion, M. Augustin, M. Scully, D.A. Rhodes, Z. Shermadini, H. Luetkens, A. Shengelaya, C. Baines, E. Morenzoni, A. Amato, J.C. Hone, R. Khasanov, S.J.L. Billinge, E. Santos, A.N. Pasupathy, and Y.J. Uemura, *Magnetism in Semiconducting Molybdenum Dichalcogenides*, Science Advances 4, eeat3672 (2018)

58. C. Garcia, N. R. Pradhan, D. Rhodes, L. Balicas, and S. A. McGill, *Photogating and high gain in* ReS_2 *field-effect transistors*, Journal of Applied Physics 124, 204306 (2018)

59. B.K. Rai, S. Chikara, X.X. Ding, I.W.H. Oswald, R. Shönemann, V. Loganathan, A.M. Hallas, H.B. Cao, M. Stavinoha, H. Man, S. Carr, J. Singleton, V. Zapf, K. Benavides, J.Y. Chan, Q.R. Zhang, D. Rhodes, Y.C. Chiu, L. Balicas, A.A. Aczel, Q. Huang, J.W. Lynn, J. Gaudet, D.A. Sokolov, P.C. Dai, A.H. Nevidomskyy, C.-L. Huang, and E. Morosan, *Anomalous metamagnetism in the low carrier denisty Kondo Lattice YbRh3Si7*, Physical Review X 8, 041047 (2018)

60. 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., *Phase transition and electronic structure evolution of* $MoTe_2$ *induced by W substitution*, Physical Review B 98, 144114 (2018)

61. Z. Ye, L. Waldecker, E.Y. Ma, D. Rhodes, A. Antony, B. Kim, X.X. Zhang, M. Deng, Y. Jiang, Z. Lu, D. Smirnov, K. Watanabe, T. Taniguchi, J. Hone and T.F. Heinz, *Efficient generation of neutral and charged biexcitons in encapsulated* WSe_2 *monolayers* Nature Communications 9, 3718 (2018)

62. S. Ghosh, M. Wasala, N.R. Pradhan, D. Rhodes, P.D. Patil, M. Fralaide, Y. Xin, S.A. McGill, L. Balicas, and S. Talapatra, *Low temperature photoconductivity of few layer p-type tungsten diselenide* (WSe_2) *field-effect transistors (FETs)*, Nanotechnology 29, 484002 (2018)

63. N.R. Pradhan, C. Garcias, B. Isenberg, D. Rhodes, S. Feng, S. Memaran, Y. Xin, A. McCreary, A.R. Hight Walker, A. Raeliarijaona, H. Terrones, M. Terrones, S. McGill, and L. Balicas, *Phase Modulators Based on High Mobility Ambipolar* $ReSe_2$ *Field-Effect Transistors*, Scientific Reports 8, 12745 (2018)

64. S. Najmaei, M.R. Neupane, B.M. Nichols, R.A. Burke, A.L. Mazzoni, M.L. Chin, D. Rhodes, L. Balicas, A.D. Franklin, and M. Dubey, *Cross-Plane Carrier Transport in van der Waals Layered Materials*, Small 20, 1703808 (2018)

65. M.V. Gustafsson, M. Yankowitz, C. Forsythe, D. Rhodes, K. Watanabe, T. Taniguchi, J. Hone, X.Y. Zhu, and C.R. Dean, *Ambipolar Landau levels and strong band-selective carrier interactions in monolayer* WSe_2 Nature Materials 17, 411-415 (2018)

66. W. Zheng, R. Shönemann, N. Aryal, Q. Zhou, D. Rhodes, Y.-C. Chiu, K.-W. Chen, E. Kampert, T. Förster, T.J. Martin, G.T. McCandless, J.Y. Chan, E. Manousakis, and L. Balicas, *Detailed study on the Fermi surfaces of the type-II Dirac semimetallic candidates* $\boldsymbol{XTe_2}$ *(X = Pd, Pt)*, Physical Review B 97, 235154 (2018)

67. E.J. Telford, A. Benyamini, D. Rhodes, D. Wang, Y. Jung, A. Zangiabadi, K. Watanabe, T. Taniguchi, S. Jia, K. Barmak, A.N. Pasupathy, C.R. Dean, and J.C. Hone, *Via Method for Lithography Free Contact and Preservation of 2D Materials*, Nano Letters 18, 1416 (2018)

68. G.D. Shepard, J.V. Ardelean, O.A. Ayaji, D. Rhodes, X. Zhu, J.C. Hone, and S. Strauf, *Trion-Species-Resolved Quantum Beats in* $MoSe_2$ ACS Nano 11, 11550 (2017)

69. D. Rhodes, R. Schönemann, N. Aryal, Q. Zhou, Q.R. Zhang, E. Kampert, Y.-C. Chiu, Y. Lai, Y. Shimura, G.T. McCandless, J.Y. Chang, D.W. Paley, J. Lee, A.D. Finke, J.P.C. Ruff, S. Das, E. Manousakis, and L. Balicas, *Bulk Fermi surface of the Weyl type-II semimetallic candidate* γ-$MoTe_2$ Physical Review B 96, 165134 (2017)

70. A.J. Li, X.C. Zhu, D. Rhodes, C.C. Samouce, L. Balicas, and A.F. Hebard, *van der Waals Schottky barriers as interface probes of the correlation between chemical potential shifts and charge density wave formation in* 1T-$TiSe_2$ *and* 2H-$NbSe_2$ Physical Review B 96, 125301 (2017)

71. A.D. McCreary, J.R. Simpson, Y. Wang, D. Rhodes, K. Fujisawa, L. Balicas, M. Dubey, V.H. Crespi, M. Terrones, and A.R. Hight Walker, *Intricate Resonant Raman Response in Anistropic* ReS_2, Nano Letters 17, 5897 (2017)

72. D. Wang, K. Smyser, D. Rhodes, L. Balicas, A.N. Pasupathy, and I.P. Herman, *Passivating 1T'-*$MoTe_2$ *multilayers at elevated temperatures by encapsulation*, Nanoscale, 9, 13910 (2017)

73. 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, *Engineering the Structural Electronic Phases of* $MoTe_2$ *through W Substitution*, Nano Letters 17, 1616 (2017)

74. N.R. Pradhan, C. Garcia, J. Holleman, D. Rhodes, C. Parker, S. Talapatra, M. Terrones, L. Balicas, and S.A. McGill, *Photoconductivity of few-layered* p-WSe_2 *phototransistors via multi-terminal measurements*, 2D Materials 3, 041004 (2016)

75. Q.R. Zhang, D. Rhodes, B. Zeng, M.D. Johannes, and L. Balicas, *Non-Ising-like two-dimensional sueprconductivity in a bulk single crystal*, Physical Review B 94, 094511 (2016)

76. T. Besara, D. Rhodes, K.-W. Chen, S. Das, Q.R. Zhang, J. Sun, B. Zeng, Y. Xin, L. Balicas, R.E. Baumbach, E. Manousakis, D.J. Singh, and T. Siegrist, *Coexistence of Weyl physics and planar defects in the semimetals TaP and TaAs*, Physical Review B 93, 245152 (2016)

77. Q. Zhou, D. Rhodes, Q.R. Zhang, S. Tang, R. Schönemann, and L. Balicas,*Hall effect within the colossal magnetoresistive semimetallic state of* $MoTe_2$, Physical Review B 94, 121101 (2016)

78. N. R. Pradhan, A. McCreary, D. Rhodes, Z. Lu, S. Feng, E. Manousakis, D. Smirnov, R. Namburu, M. Dubey, A.R.H. Walker, H. Terrones, M. Terrones, V. Dobrosavljevic, and L. Balicas, *Metal to Insulator Quantum-Phase Transition in Few-Layered ReS2*, ACS Nano Letters 15, 8377 (2015)

79. N. R. Pradhan, Z. Lu, D. Rhodes, D. Smirnov, E. Manousakis, and L. Balicas, *An Optoelectronic Switch Based on Intrinsic Dual Schottky Diodes in Ambipolar MoSe2 Field-Effect Transistors*, Advanced Electronic Materials 1, 1500215 (2015)

80. S. Memaran, N. R. Pradhan, Z. Lu, D. Rhodes, J. Ludwig, Q. Zhou, O. Ogunsolu, P.M. Ajayan, D. Smirnov, A. L. Fernandez-Dominguez, F.J. Garcia-Vidal, and L. Balicas, *Pronounced Photovoltaic Response from Multilayered Transition-Metal Dichalcogenides PN-Junctions*, Nano Letters 15, 7532 (2015)

81. D. Rhodes, S. Das, Q. R. Zhang, B. Zeng, N. R. Pradhan, N. Kikugawa, E. Manousakis, and L. Balicas, *Role of spin-orbit coupling and evolution of the electronic structure of* WTe_2 *under and external magnetic field*, Physical Review B 92, 125152 (2015)

82. N. R. Pradhan, J. Ludwig, Z. Lu, D. Rhodes, M.M. Bishop, K. Thirunavukkuarasu, S.A. McGill, D. Smirnov, and L. Balicas, *High Photoresponsivity and Short Photoresponse Times in Few-Layered WSe2 Transistors*, ACS Applied Materials and Interfaces 7, 12080 (2015)

83. J. Wang, D. Rhodes, S. Feng, M.A.T. Nguyen, K. Watanabe, T. Taniguchi, T.E. Mallouk, M. Terrones, L. Balicas, and J. Zhu, *Gate-modulated conductance of few-layer WSe2 field-effect transistors in the subgap regime: Schottky barrier transistors and subgap impurity states*, Applied Physics Letters 106, 152104 (2015)

84. N. R. Pradhan, D. Rhodes, S. Memaran, J.-M. Poumirol, D. Smirnov, S. Talapatra, S. Feng, N. Perea-Lopez, A. L. Elias, M. Terrones, P. M. Ajayan, and L. Balicas, *Hall and field-effect mobilities in few layered p-WSe2 field-effect transistors*, Scientific Reports 5, 8979 (2015)

85. B. Zeng, Q. R. Zhang, D. Rhodes, Y. Shimura, D. Watanabe, R. E. Baumbach, P. Schlottmann, T. Ebihara, and L. Balicas, *CeCuGe*$_2$*: Challenging our understanding of quantum criticality*, Phys. Rev. B 90, 155101 (2014)

86. N. R. Pradhan, D. Rhodes, Y. Xin, S. Memaran, L. Bhaskaran, M. Siddiq, S. Hill, P. M. Ajayan, and L.Balicas, *Ambipolar Molybdenum Diselenide Field-Effect Transistors: Field-Effect and Hall Mobilities*, ACS Nano 8, 7923 (2014)

87. N. R. Pradhan, D. Rhodes, S. Feng, Y. Xin, S. Memaran, B.-H. Moon, H. Terrones, M. Terrones, and L. Balicas, *Field-Effect Transistors Based on Few-Layered* α*-*$MoTe_2$, ACS Nano 8, 5911 (2014)

88. H. Terrones, E. Del Corro, S. Feng, J.M. Poumirol, D. Rhodes, D. Smirnov, N. R. Pradhan, Z. Lin, M. A. T. Nguyen, A. L. Elias, T.E. Mallouk, L. Baliacs, M. A. Pimenta, and M. Terrones, *New First Order Raman-active Modes in Few Layered Transition Metal Dichalcogenides*, Scientific Reports 4, 4215 (2014)

89. Q. R. Zhang, D. Rhodes, B. Zeng, T. Besara, T. Siegrist, M. D. Johannes, and L. Balicas, *Anomalous metallic state and anisotropic multiband superconductivity in* $Nb_3Pd_{0.7}Se_7$, Physical Review B 88, 024508 (2013)

90. G. Li, Q. R. Zhang, D. Rhodes, B. Zeng, P. Goswami, R. E. Baumbach, P. H. Tobash, F. Ronning, J. D. Thompson, E. D. Bauer, and L. Balicas, *Bulk evidence for a time-reversal symmetry broken superconducting state in* URu_2Si_2, Physical Review B 88, 134517 (2013)

91. T. Day, F. Drymiotis, T. Zhang, D. Rhodes, X. Shi, L. Chen, and G. J. Snyder, *Evaluating the potential for high thermoelectric efficiency of silver selenide*, Journal of Materials Chemistry C 1, 7568 (2013)

92. N. R. Pradhan, D. Rhodes, Q. Zhang, S. Talapatra, M. Terrones, P. M. Ajayan, and L. Balicas, *Intrinsic carrier mobility of multi-layered* MoS_2 *field-effect transistors on* SiO_2, Applied Physics Letters 102, 123105 (2013)

93. Q. Zhang, G. Li, D. Rhodes, A. Kiswandhi, T. Besara, B. Zeng, J. Sun, T. Siegrist, M. D. Johannes, and L. Balicas, *Superconductivity with extremely large upper critical fields in $Nb_2Pd_{0.81}S_5$*, Scientific Reports 3, 1446 (2013)

94. F. R. Drymiotis, S. Lindsey, J. Capps, J.C. Lashley, D. Rhodes, Q. R. Zhang, C. Nucklos, and T. B. Drye, *Excess vibrational modes and high thermoelectric performance of the quenched and slow-cooled two-phase alloy $Cu_{.2}Ag_{2.8}SbTe_2$*, Journal of Physics: Condensed Matter 23, 135305 (2011)

95. J. Capps, B. Ma, T. Drye, C. Nucklos, S. Lindsey, D. Rhodes, Q. Zhang, K. Modic, S. Cawthorne, and F. Drymiotis, *The effect of Ag concewntration on the structural, electrical and thermal transport behavior of Pb:Te:Ag:Se mixtures and improvement of thermoelectric performance via Cu doping*, Journal of Alloys and Compounds 509, 1544 (2011)

96. F. Drymiotis, T. Drye, D. Rhodes, Q. Zhang, J.C. Lashley, Y. Wang, S. Cawthorne, B. Ma, S. Lindsey, and T. Tritt, *Glassy thermal conductivity in two-phase $Cu_xAg_{3-x}SbSeTe_2$ alloy and high temperature thermoelectric behavior*, Journal of Physics: Condensed Matter 22, 035801 (2011)

97. F. R. Drymiotis, T. B. Drye, Y. Wang, J. He, D. Rhodes, K. Modic, S. Cawthorne, and Q. R. Zhang, *Structure formation and very low thermal conductivity in Pb:Te:Ag:Se mixtures*, Journal of Applied Physics 107, 033519 (2010)