Stanford

Ben Feldman

Associate Professor of Physics

Curriculum Vitae available Online

CONTACT INFORMATION

- **Administrative Contact**

  Nhung Lai

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Bio

ACADEMIC APPOINTMENTS

- Associate Professor, Physics

HONORS AND AWARDS

- NSF CAREER Award, National Science Foundation (2023-2028)
- Dicke Postdoctoral Fellow, Princeton University (Dept. of Physics) (2013-2016)
- Kavli Frontiers of Science Fellow, US National Academy of Sciences, Kavli Foundation (2018)
- Terman Faculty Fellow, Stanford University (H&S) (2018-2020)
- Sloan Research Fellow, Alfred P. Sloan Foundation (2019-2021)

PROFESSIONAL EDUCATION

- M.S., Haverford College , Physics (2007)
- Ph.D., Harvard University , Physics (2013)

LINKS

- Feldman Lab: https://sites.stanford.edu/feldman

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

How do material properties change as a result of interactions among electrons, and what is the nature of the new phases that result? What novel physical phenomena and functionality (e.g., symmetry breaking or topological excitations) can be realized by combining materials and device elements to produce emergent behavior? How can we leverage nontraditional measurement techniques to gain new insight into quantum materials? These are some of the overarching questions we seek to address in our research.

We are interested in a variety of quantum systems, especially those composed of two-dimensional flakes and heterostructures. This class of materials has been shown to exhibit an incredible variability in their properties, with the further benefit that they are highly tunable through gating and applied fields.

Teaching

COURSES

2025-26

- Quantum Mechanics II: PHYSICS 131 (Aut)
- Thermodynamics, Kinetic Theory, and Statistical Mechanics II: PHYSICS 171 (Spr)

2024-25

- Condensed Matter Seminar: APPPHYS 470 (Aut, Win, Spr)

2023-24

- Thermodynamics, Kinetic Theory, and Statistical Mechanics I: PHYSICS 170 (Win)
- Thermodynamics, Kinetic Theory, and Statistical Mechanics II: PHYSICS 171 (Spr)

2022-23

- Thermodynamics, Kinetic Theory, and Statistical Mechanics I: PHYSICS 170 (Aut)
- Thermodynamics, Kinetic Theory, and Statistical Mechanics II: PHYSICS 171 (Win)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Kevin Crust, Chaitrali Duse, Lerato Takana, Steven Tran, Xin Wei

Postdoctoral Faculty Sponsor

Yuwen Hu

Doctoral Dissertation Advisor (AC)

Hephzibah Akinleye, Jinwoo Kim, Yifan Li, Megan Loh

Doctoral Dissertation Co-Advisor (AC)

Alana Gudinas

Publications

PUBLICATIONS

- **Kondo with a topological twist Moire materials** *NATURE PHYSICS*
  Feldman, B. E.
  2026
- **Imaging supermoiré relaxation in helical trilayer graphene.** *Nature materials*
  Hoke, J. C., Li, Y., Hu, Y., May-Mann, J., Watanabe, K., Taniguchi, T., Devakul, T., Feldman, B. E.
  2026
- **Magnetic Hofstadter cascade in a twisted semiconductor homobilayer** *NATURE PHYSICS*
  Foutty, B. A., Reddy, A. P., Kometter, C. R., Watanabe, K., Taniguchi, T., Devakul, T., Feldman, B. E.
  2025
- **Local microwave sensing of excitons and their electrical environment.** *Nature communications*

Ji, Z., Barber, M. E., Zhu, Z., Kometter, C. R., Yu, J., Watanabe, K., Taniguchi, T., Liu, M., Devereaux, T. P., Feldman, B. E., Shen, Z.
2025; 16 (1): 9236

- **Particle-Hole Asymmetric Ferromagnetism and Spin Textures in the Triangular Hubbard-Hofstadter Model** *PHYSICAL REVIEW X*
  Ding, J. K., Yang, L., Wang, W. O., Zhu, Z., Peng, C., Mai, P., Huang, E. W., Moritz, B., Phillips, P. W., Feldman, B. E., Devereaux, T. P.
  2024; 14 (4)
- **Anomalous Landau Level Gaps Near Magnetic Transitions in Monolayer WSe2** *PHYSICAL REVIEW X*
  Foutty, B. A., Calvera, V., Han, Z., Kometter, C. R., Liu, S., Watanabe, K., Taniguchi, T., Hone, J. C., Kivelson, S. A., Feldman, B. E.
  2024; 14 (3)
- **Uncovering the spin ordering in magic-angle graphene via edge state equilibration.** *Nature communications*
  Hoke, J. C., Li, Y., May-Mann, J., Watanabe, K., Taniguchi, T., Bradlyn, B., Hughes, T. L., Feldman, B. E.
  2024; 15 (1): 4321
- **Mapping twist-tuned multiband topology in bilayer WSe2.** *Science (New York, N.Y.)*
  Foutty, B. A., Kometter, C. R., Devakul, T., Reddy, A. P., Watanabe, K., Taniguchi, T., Fu, L., Feldman, B. E.
  2024; 384 (6693): 343-347
- **Characterization of Two Fast-Turnaround Dry Dilution Refrigerators for Scanning Probe Microscopy** *JOURNAL OF LOW TEMPERATURE PHYSICS*
  Barber, M. E., Li, Y., Gibson, J., Yu, J., Jiang, Z., Hu, Y., Ji, Z., Nandi, N., Hoke, J. C., Bishop-Van Horn, L., Arias, G. R., Van Harlingen, D. J., Moler, et al
  2024
- **Competing electron solids and electron fluids in the moire atomic limit** *NATURE PHYSICS*
  Feldman, B. E., Yu, J.
  2023; 19 (12): 1769-1770
- **Hofstadter states and re-entrant charge order in a semiconductor moire lattice** *NATURE PHYSICS*
  Kometter, C. R., Yu, J., Devakul, T., Reddy, A. P., Zhang, Y., Foutty, B. A., Watanabe, K., Taniguchi, T., Fu, L., Feldman, B. E.
  2023; 19 (12): 1861-+
- **Spin skyrmion gaps as signatures of strong-coupling insulators in magic-angle twisted bilayer graphene.** *Nature communications*
  Yu, J., Foutty, B. A., Kwan, Y. H., Barber, M. E., Watanabe, K., Taniguchi, T., Shen, Z. X., Parameswaran, S. A., Feldman, B. E.
  2023; 14 (1): 6679
- **1/4 is the new 1/2 when topology is intertwined with Mottness.** *Nature communications*
  Mai, P., Zhao, J., Feldman, B. E., Phillips, P. W.
  2023; 14 (1): 5999
- **Tunable spin and valley excitations of correlated insulators in Γ-valley moiré bands.** *Nature materials*
  Foutty, B. A., Yu, J., Devakul, T., Kometter, C. R., Zhang, Y., Watanabe, K., Taniguchi, T., Fu, L., Feldman, B. E.
  2023
- **Interaction-driven spontaneous ferromagnetic insulating states with odd Chern numbers** *NPJ QUANTUM MATERIALS*
  Mai, P., Huang, E. W., Yu, J., Feldman, B. E., Phillips, P. W.
  2023; 8 (1)
- **Topological Mott insulator at quarter filling in the interacting Haldane model** *PHYSICAL REVIEW RESEARCH*
  Mai, P., Feldman, B. E., Phillips, P. W.
  2023; 5 (1)
- **Correlated Hofstadter spectrum and flavour phase diagram in magic-angle twisted bilayer graphene** *NATURE PHYSICS*
  Yu, J., Foutty, B. A., Han, Z., Barber, M. E., Schattner, Y., Watanabe, K., Taniguchi, T., Phillips, P., Shen, Z., Kivelson, S. A., Feldman, B. E.
  2022
- **The preferred direction** *NATURE PHYSICS*
  Feldman, B. E.
  2021

- **Quantum Hall valley nematics.** *Journal of physics. Condensed matter : an Institute of Physics journal*
  Parameswaran, S. A., Feldman, B.
  2019
- **Interacting multi-channel topological boundary modes in a quantum Hall valley system.** *Nature*
  Randeria, M. T., Agarwal, K., Feldman, B. E., Ding, H., Ji, H., Cava, R. J., Sondhi, S. L., Parameswaran, S. A., Yazdani, A.
  2019
- **Squeezing strong correlations from graphene.** *Science (New York, N.Y.)*
  Feldman, B. E.
  2019; 363 (6431): 1035–36
- **Ferroelectric quantum Hall phase revealed by visualizing Landau level wavefunction interference** *NATURE PHYSICS*
  Randeria, M. T., Feldman, B. E., Wu, F., Ding, H., Gyenis, A., Ji, H., Cava, R. J., MacDonald, A. H., Yazdani, A.
  2018; 14 (8): 796-+
- **Visualizing heavy fermion confinement and Pauli-limited superconductivity in layered CeCoIn5** *NATURE COMMUNICATIONS*
  Gyenis, A., Feldman, B. E., Randeria, M. T., Peterson, G. A., Bauer, E. D., Aynajian, P., Yazdani, A.
  2018; 9: 549
- **High-resolution studies of the Majorana atomic chain platform** *NATURE PHYSICS*
  Feldman, B. E., Randeria, M. T., Li, J., Jeon, S., Xie, Y., Wang, Z., Drozdov, I. K., Bernevig, B. A., Yazdani, A.
  2017; 13 (3): 286-?
- **Observation of a nematic quantum Hall liquid on the surface of bismuth** *SCIENCE*
  Feldman, B. E., Randeria, M. T., Gyenis, A., Wu, F., Ji, H., Cava, R. J., MacDonald, A. H., Yazdani, A.
  2016; 354 (6310): 316-321
- **Electron-hole asymmetric integer and fractional quantum Hall effect in bilayer graphene** *SCIENCE*
  Kou, A., Feldman, B. E., Levin, A. J., Halperin, B. I., Watanabe, K., Taniguchi, T., Yacoby, A.
  2014; 345 (6192): 55-57
- **Fractional Quantum Hall Phase Transitions and Four-Flux States in Graphene** *PHYSICAL REVIEW LETTERS*
  Feldman, B. E., Levin, A. J., Krauss, B., Abanin, D. A., Halperin, B. I., Smet, J. H., Yacoby, A.
  2013; 111 (7)
- **Unconventional Sequence of Fractional Quantum Hall States in Suspended Graphene** *SCIENCE*
  Feldman, B. E., Krauss, B., Smet, J. H., Yacoby, A.
  2012; 337 (6099): 1196-1199
- **Local Compressibility Measurements of Correlated States in Suspended Bilayer Graphene** *PHYSICAL REVIEW LETTERS*
  Martin, J., Feldman, B. E., Weitz, R. T., Allen, M. T., Yacoby, A.
  2010; 105 (25)
- **Broken-symmetry states and divergent resistance in suspended bilayer graphene** *NATURE PHYSICS*
  Feldman, B. E., Martin, J., Yacoby, A.
  2009; 5 (12): 889-893