Stanford



Trithep Devakul

Assistant Professor of Physics

CONTACT INFORMATION

- **Administrative Contact**

  Denise Jones

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Bio

BIO

I specialize in theoretical condensed matter physics. My research focuses on emergent quantum phases of matter, particularly those arising from the interplay of topology with electronic interactions and correlations in two-dimensional materials.

ACADEMIC APPOINTMENTS

- Assistant Professor, Physics

HONORS AND AWARDS

- Air Force Young Investigator Program Award, U.S. Air Force Office of Scientific Research (2025)
- Sloan Research Fellowship, Alfred P. Sloan Foundation (2025)

PROFESSIONAL EDUCATION

- Postdoc, Massachusetts Institute of Technology (2023)
- PhD, Princeton University , Physics (2021)
- BSc, Northeastern University , Physics (2015)

LINKS

- Google Scholar: http://scholar.google.com/citations?user=XPXVLeUAAAAJ&hl=en&oi=ao

Teaching

COURSES

2026-27

- Graduate Quantum Mechanics I: PHYSICS 230 (Win)
- Partial Differential Equations of Mathematical Physics: PHYSICS 111 (Aut)

2025-26

- Graduate Quantum Mechanics I: PHYSICS 230 (Win)
- Partial Differential Equations of Mathematical Physics: PHYSICS 111 (Aut)

2024-25

- Graduate Quantum Mechanics I: PHYSICS 230 (Win)
- Partial Differential Equations of Mathematical Physics: PHYSICS 111 (Aut)

2023-24

- Partial Differential Equations of Mathematical Physics: PHYSICS 111 (Aut)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Yifan Li

Postdoctoral Faculty Sponsor

Junkai Dong, Yugo Onishi

Doctoral Dissertation Advisor (AC)

V. Nathan Josephs, Tixuan Tan, Nicole Ticea, Andreas Tsantilas, Seongyeon Youn

Doctoral Dissertation Co-Advisor (AC)

Charles Yang

Doctoral Dissertation Reader (NonAC)

Kangning Yang

Doctoral (Program)

Charles Yang

Publications

PUBLICATIONS

- **Theory of half-integer fractional quantum spin Hall edges** *PHYSICAL REVIEW B*
  May-Mann, J., Stern, A., Devakul, T.
  2025; 111 (20)
- **Topological bands and correlated states in helical trilayer graphene** *NATURE PHYSICS*
  Xia, L., de la Barrera, S. C., Uri, A., Sharpe, A., Kwan, Y. H., Zhu, Z., Watanabe, K., Taniguchi, T., Goldhaber-Gordon, D., Fu, L., Devakul, T., Jarillo-Herrero, P.
  2025
- **Spin transport of a doped Mott insulator in moiré heterostructures.** *Nature communications*
  Regan, E. C., Lu, Z., Wang, D., Zhang, Y., Devakul, T., Nie, J. H., Zhang, Z., Zhao, W., Watanabe, K., Taniguchi, T., Tongay, S., Zettl, A., Fu, et al
  2024; 15 (1): 10252
- **Designing Topology and Fractionalization in Narrow Gap Semiconductor Films via Electrostatic Engineering.** *Physical review letters*
  Tan, T., Reddy, A. P., Fu, L., Devakul, T.
  2024; 133 (20): 206601
- **Parent Berry Curvature and the Ideal Anomalous Hall Crystal** *PHYSICAL REVIEW X*
  Tan, T., Devakul, T.
  2024; 14 (4)
- **Multi-moiré trilayer graphene: Lattice relaxation, electronic structure, and magic angles** *PHYSICAL REVIEW B*
  Yang, C., May-Mann, J., Zhu, Z., Devakul, T.
  2024; 110 (11)

- **Stability of quasiperiodic superconductors** *PHYSICAL REVIEW B*
  Ticea, N. S., May-Mann, J., Xiao, J., Berg, E., Devakul, T.
  2024; 110 (6)
- **Wigner molecular crystals from multielectron moiré artificial atoms.** *Science (New York, N.Y.)*
  Li, H., Xiang, Z., Reddy, A. P., Devakul, T., Sailus, R., Banerjee, R., Taniguchi, T., Watanabe, K., Tongay, S., Zettl, A., Fu, L., Crommie, M. F., Wang, et al
  2024; 385 (6704): 86-91
- **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
- **Strong-coupling topological states and phase transitions in helical trilayer graphene** *PHYSICAL REVIEW B*
  Kwan, Y. H., Ledwith, P. J., Lo, C., Devakul, T.
  2024; 109 (12)
- **Artificial Atoms, Wigner Molecules, and an Emergent Kagome Lattice in Semiconductor Moiré Superlattices.** *Physical review letters*
  Reddy, A. P., Devakul, T., Fu, L.
  2023; 131 (24): 246501
- **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-+
- **Magic-angle helical trilayer graphene.** *Science advances*
  Devakul, T., Ledwith, P. J., Xia, L. Q., Uri, A., de la Barrera, S. C., Jarillo-Herrero, P., Fu, L.
  2023; 9 (36): eadi6063
- **Superconductivity and strong interactions in a tunable moiré quasicrystal.** *Nature*
  Uri, A., de la Barrera, S. C., Randeria, M. T., Rodan-Legrain, D., Devakul, T., Crowley, P. J., Paul, N., Watanabe, K., Taniguchi, T., Lifshitz, R., Fu, L., Ashoori, R. C., Jarillo-Herrero, et al
  2023; 620 (7975): 762-767
- **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
- **Moiré Landau Fans and Magic Zeros.** *Physical review letters*
  Paul, N., Crowley, P. J., Devakul, T., Fu, L.
  2022; 129 (11): 116804
- **Anomaly inflow for subsystem symmetries** *PHYSICAL REVIEW B*
  Burnell, F. J., Devakul, T., Gorantla, P., Lam, H., Shao, S.
  2022; 106 (8)
- **Quantum Anomalous Hall Effect from Inverted Charge Transfer Gap** *PHYSICAL REVIEW X*
  Devakul, T., Fu, L.
  2022; 12 (2)
- **One-dimensional Luttinger liquids in a two-dimensional moire lattice** *NATURE*
  Wang, P., Yu, G., Kwan, Y. H., Jia, Y., Lei, S., Klemenz, S., Cevallos, F., Singha, R., Devakul, T., Watanabe, K., Taniguchi, T., Sondhi, S. L., Cava, et al
  2022; 605 (7908): 57-+
- **Quantum anomalous Hall effect from intertwined moiré bands.** *Nature*
  Li, T., Jiang, S., Shen, B., Zhang, Y., Li, L., Tao, Z., Devakul, T., Watanabe, K., Taniguchi, T., Fu, L., Shan, J., Mak, K. F.
  2021; 600 (7890): 641-646
- **Magic in twisted transition metal dichalcogenide bilayers** *NATURE COMMUNICATIONS*

Devakul, T., Crepel, V., Zhang, Y., Fu, L.
2021; 12 (1): 6730

- **Theory of competing excitonic orders in insulating WTe2 monolayers** *PHYSICAL REVIEW B*
  Kwan, Y. H., Devakul, T., Sondhi, S. L., Parameswaran, S. A.
  2021; 104 (12)
- **Quantum Oscillations in the Zeroth Landau Level: Serpentine Landau Fan and the Chiral Anomaly** *PHYSICAL REVIEW LETTERS*
  Devakul, T., Kwan, Y. H., Sondhi, S. L., Parameswaran, S. A.
  2021; 127 (11): 116602
- **Spin-textured Chern bands in AB-stacked transition metal dichalcogenide bilayers.** *Proceedings of the National Academy of Sciences of the United States of America*
  Zhang, Y., Devakul, T., Fu, L.
  2021; 118 (36)
- **Fractalizing quantum codes** *QUANTUM*
  Devakul, T., Williamson, D. J.
  2021; 5
- **Type-II fractons from coupled spin chains and layers** *PHYSICAL REVIEW B*
  Williamson, D. J., Devakul, T.
  2021; 103 (15)
- **Floating topological phases** *PHYSICAL REVIEW B*
  Devakul, T., Sondhi, S. L., Kivelson, S. A., Berg, E.
  2020; 102 (12)
- **Fractonic Chern-Simons and BF theories** *PHYSICAL REVIEW RESEARCH*
  You, Y., Devakul, T., Sondhi, S. L., Burnell, F. J.
  2020; 2 (2)
- **Symmetric fracton matter: Twisted and enriched** *ANNALS OF PHYSICS*
  You, Y., Devakul, T., Burnell, F. J., Sondhi, S. L.
  2020; 416
- **Strong planar subsystem symmetry-protected topological phases and their dual fracton orders** *PHYSICAL REVIEW RESEARCH*
  Devakul, T., Shirley, W., Wang, J.
  2020; 2 (1)
- **Extension of the eigenstate thermalization hypothesis to nonequilibrium steady states** *PHYSICAL REVIEW B*
  Moudgalya, S., Devakul, T., Arovas, D. P., Sondhi, S. L.
  2019; 100 (4)
- **Classifying local fractal subsystem symmetry-protected topological phases** *PHYSICAL REVIEW B*
  Devakul, T.
  2019; 99 (23)
- **Operator spreading in quantum maps** *PHYSICAL REVIEW B*
  Moudgalya, S., Devakul, T., von Keyserlingk, C. W., Sondhi, S. L.
  2019; 99 (9)
- **Fractal symmetric phases of matter** *SCIPOST PHYSICS*
  Devakul, T., You, Y., Burnell, F. J., Sondhi, S. L.
  2019; 6 (1)
- **Classification of subsystem symmetry-protected topological phases** *PHYSICAL REVIEW B*
  Devakul, T., Williamson, D. J., You, Y.
  2018; 98 (23)

- **Higher-order symmetry-protected topological states for interacting bosons and fermions** *PHYSICAL REVIEW B*
  You, Y., Devakul, T., Burnell, F. J., Neupert, T.
  2018; 98 (23)
- **Universal quantum computation using fractal symmetry-protected cluster phases** *PHYSICAL REVIEW A*
  Devakul, T., Williamson, D. J.
  2018; 98 (2)
- **Subsystem symmetry protected topological order** *PHYSICAL REVIEW B*
  You, Y., Devakul, T., Burnell, F. J., Sondhi, S. L.
  2018; 98 (3)
- **Probing the Quench Dynamics of Antiferromagnetic Correlations in a 2D Quantum Ising Spin System** *PHYSICAL REVIEW X*
  Guardado-Sanchez, E., Brown, P. T., Mitra, D., Devakul, T., Huse, D. A., Schauss, P., Bakr, W. S.
  2018; 8 (2)
- **Z(3) topological order in the face-centered-cubic quantum plaquette model** *PHYSICAL REVIEW B*
  Devakul, T.
  2018; 97 (15)
- **Quantum gas microscopy of an attractive Fermi-Hubbard system** *NATURE PHYSICS*
  Mitra, D., Brown, P. T., Guardado-Sanchez, E., Kondov, S. S., Devakul, T., Huse, D. A., Schauss, P., Bakr, W. S.
  2018; 14 (2): 173-+
- **Entanglement of purification: from spin chains to holography** *JOURNAL OF HIGH ENERGY PHYSICS*
  Phuc Nguyen, Devakul, T., Halbasch, M. G., Zaletel, M. P., Swingle, B.
  2018
- **Correlation function diagnostics for type-I fracton phases** *PHYSICAL REVIEW B*
  Devakul, T., Parameswaran, S. A., Sondhi, S. L.
  2018; 97 (4)
- **Obtaining highly excited eigenstates of the localized XX chain via DMRG-X** *PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A-MATHEMATICAL PHYSICAL AND ENGINEERING SCIENCES*
  Devakul, T., Khemani, V., Pollmann, F., Huse, D. A., Sondhi, S. L.
  2017; 375 (2108)
- **Anderson localization transitions with and without random potentials** *PHYSICAL REVIEW B*
  Devakul, T., Huse, D. A.
  2017; 96 (21)
- **Probability distribution of the entanglement across a cut at an infinite-randomness fixed point** *PHYSICAL REVIEW B*
  Devakul, T., Majumdar, S. N., Huse, D. A.
  2017; 95 (10)
- **Many-body localization phase transition: A simplified strong-randomness approximate renormalization group** *PHYSICAL REVIEW B*
  Zhang, L., Zhao, B., Devakul, T., Huse, D. A.
  2016; 93 (22)
- **Nonzero-temperature entanglement negativity of quantum spin models: Area law, linked cluster expansions, and sudden death** *PHYSICAL REVIEW E*
  Sherman, N. E., Devakul, T., Hastings, M. B., Singh, R. R. P.
  2016; 93 (2): 022128
- **Unusual corrections to scaling and convergence of universal Renyi properties at quantum critical points** *PHYSICAL REVIEW B*
  Sahoo, S., Stoudenmire, E., Stephan, J., Devakul, T., Singh, R. R. P., Melko, R. G.
  2016; 93 (8)
- **Early Breakdown of Area-Law Entanglement at the Many-Body Delocalization Transition** *PHYSICAL REVIEW LETTERS*
  Devakul, T., Singh, R. R. P.

2015; 115 (18): 187201