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

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

Doctoral Dissertation Advisor (AC)

Tixuan Tan, Nicole Ticea

Doctoral Dissertation Co-Advisor (AC)

Charles Yang

Doctoral Dissertation Reader (NonAC)

Kangning Yang

Doctoral (Program)

Andreas Tsantilas, 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.
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- **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.
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- **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