Aravind Karthigeyan

Phone: (972)-806-1076
Email:
aravindkarthigeyan@utexas.edu

Education

University of Texas at Austin Austin, TX
Dual B.S. Degree Candidate in Physics and Mathematics, May 2026 Major GPA: 4.0/4.0
Courses: Solid-State II, Topology, Quantum Complexity, Optical Spectroscopy, Density Functional Theory

Experience

SUPREME REU at MIT Summer 2025 – Present
Advisor: Luqiao Liu

- Developed numerical simulations of magnonic spin-wave propagation and nonlinear dynamics using MATLAB
- Modeled cavity–magnon coupling and investigated parametric down-conversion of magnon-polaritons
- Analyzed spin-wave dispersion relations, stability, and mode patterns in nonlinear magnonic systems

Topological Condensed Matter Theory Fall 2024 – Present
Advisor: Junyeong Ahn

- Investigated models of topological phases of matter characterized by Stiefel-Whitney classes
- Analyzed nodal-line systems and computed conductivities of topological semimetals using the Kubo formula
- Performed numerical calculations using Python and Julia to verify theoretical analysis

Quantum Complexity Project Spring 2025 - Summer 2025
Partner: Sarvesh Raghuraman

- Project for Graduate Quantum Complexity Course taught by Scott Aaronson
- Analyzed continuous-time quantum search with non-interacting bosons and fermions on the complete graph K_N
- Utilized permutation symmetry and Schwinger-boson representation to map bosonic dynamics to a collective spin-J system ($J = M/2$)

Center for Complex Quantum Systems Spring 2023 – Fall 2024
Advisor: Keji Lai

- Investigated exfoliation techniques, band theory, microwave engineering, and electric/magnetic materials
- Analyzed excitons in ReS_2 and heterostructures of WS_2 and WSe_2
- Performed few-layer exfoliation, stacking, and transfer of TMDs and hBN
- Applied Microwave Impedance Microscopy to measure conductance at the mesoscale noninvasively

Quantum Computing Spring 2023 – Fall 2024
Advisor: Noah Davis

- Implemented several quantum algorithms, such as Shor's and Grover's on Qiskit
- Implemented Hamiltonian simulation models of the 2D Transverse-Field Ising model on a variety of lattices
- Helped incoming students implement their own research projects

Directed Reading Program (DRP) Spring 2023 – Fall 2024
Mentors: Zhixin Fan, Amir Raz, Jiwoong Park

- Simulated relativistic plasma physics using Maxwell's equations and particle-in-cell code
- Analyzed exact solutions to the 2D Ising Model using condensed matter field theory
- Investigated combinatorial Lie Groups and the Young Tableaux

Quantum Optics Lab Summer 2023

Advisor: Brian LaCour

- Operated Class 3B laser systems
- Demonstrated basic laws of quantum optics such as Malus's Law and Born's rule
- Quantified the entanglement achieved using our setup using concurrence and entropy of formation

Honors and Awards

Roger Bengston Undergraduate Research Endowment Summer 2024

University Honors Spring 2024

Darrell W. Moffitt, Jr. Memorial Endowed Presidential Scholarship in Physics Summer 2023

Conferences/Talks

TECHCON (SRC) - *Nondegenerate Parametric Down-Conversion of Magnons* - Fall 2025
Texas State APS - *Characterization and Preparation of* ReS_2 - Fall 2024
Math DRP Symposium - *Combinatorial Representation Theory and Young Tableaux* - Fall 2024
Particle Pints - *Texas Superconducting Supercollider* - Spring 2024
Physics DRP Symposium - *2D Ising Model Euclidean Field Theory* - Fall 2023
Physics DRP Symposium - *Relativistic Plasma Physics* - Spring 2023

Academic Involvement

Grader/Undergraduate Learning Assistant Fall 2023 - Present

Professor: Scott Aaronson, Noah Davis

- Hosted Office Hours and Discussion Sessions for people in the Quantum Computing FRI Stream
- Taught the basics of quantum computing, through the IBM Quantum Experience and Qiskit
- Aided in-class discussions; graded homework; proctored exams

Gender Matters in Physics Spring 2023 - Spring 2024

Role: Treasurer

- Coordinated with the department for the purchase of weekly snacks and for the funding of outreach events such as Prospective Students Day, Longhorn Halloween, and the Partial Eclipse Celebration
- Coordinated with local businesses to raise money through profit shares

Physics Committees Fall 2023 - Present

- Leaded the development of the Undergrad Physics Repository Website: https://sites.utexas.edu/physicsrepository/
- Helped facilitate testimonials with undergraduates; explain key concepts about the degree plan; and gave resources about possible career paths after undergrad

Skills

Technical Skills

- LaTeX
- Python
- Wolfram Mathematica
- Numerical Analysis