

Abhishek Shivkumar

CONTACT INFORMATION

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EDUCATION

University of Texas, Austin Fall 2022 - Present

Ph.D. in Mathematics (in progress)
Provost's Graduate Excellence Fellow

Relevant Coursework:

Gauge Theory and Four-Manifold Topology

Elliptic Curves

Geometric Topics in Field Theory

Literature Seminar in Geometry

(similar to the Kan Seminar)

University of California, Berkeley Fall 2017 - Spring 2021

Bachelor of Arts in Mathematics

High Honors in Mathematics and General Distinction in Scholarship

Honors Thesis: *Quantum Cohomology and Counting Curves*
advised by Professor Martin Olsson

Graduate Coursework:

202A: Analysis, Topology, and Measure Theory

205: Complex Analysis

249: Algebraic Combinatorics

215A: Algebraic Topology

250AB: Algebra

(Full Year Sequence)

256AB: Algebraic Geometry

(Full Year Sequence)

254AB: Number Theory

(Full Year Sequence)

RESEARCH EXPERIENCES

NSF Funded Summer Research Summer 2020

advised by Professor David Nadler

- Studied the Hitchin fibration on parabolic Higgs bundles via the geometry of the moduli space of multiple flags
- Produced novel combinatorial descriptions of this fibration via elementary geometric methods in low-dimensional cases

University of Michigan REU Summer 2020

accepted but unable to attend due to COVID-19

- Received and accepted an offer to conduct individual research on dimer processes and asymptotic/thermodynamic properties of certain combinatorial families

UCLA REU: Research in Industrial Projects for Students Summer 2019

at the Institute for Pure and Applied Mathematics, University of California, Los Angeles

- Applied dynamical systems theory to provide a framework to reconstruct chaotic data from a limited set of observables
- Built a fully parallelized parameter inference framework using optimal transport theory and gradient descent

Lawrence Berkeley National Laboratory Sept. 2017 - Jan. 2019

- Worked on the upcoming DUNE experiment, initially by using the CERN ROOT toolkit to parse simulation data and optimize beamline design

- Authored a technical note on sources of error in hadron production and the focusing system for the DUNE particle beam
- Designed and implemented a neural network for classifying proton decay, authored a technical note and gave a talk to the DUNE working group at LBNL to present my findings in this area

DIRECTED STUDY **Independent Study - *advised by Professor David Nadler*** **Fall 2019**

- Studied recent connections between random matrix theory and combinatorics, especially as related to asymptotic and thermodynamic properties of dimer models; primarily I studied the tilings of Aztec diamonds, and the connections thereof to quantum groups
- Prepared short talks periodically to prove these results in a seminar-style setting with other students

Math Department Directed Reading Program **Spring 2018**

- Studied general relativity independently via several textbooks
- Met regularly with a graduate student mentor to discuss and clarify the material
- Prepared a short talk to explain basic general relativity to a general audience

AWARDS AND HONORS

- UT Austin Provost's Graduate Excellence Fellow **2022-Present**
- Graduated with High Honors in Mathematics **2021**
- Graduated with General Distinction in Scholarship **2021**
- Putnam Exam - 87th percentile, placed in top 500 **2019**
- Putnam Exam - 83rd percentile **2017**
- Edward Frank Kraft Award **2017**

SERVICE AND OUTREACH

Directed Reading Program Mentor **Fall 2022-Present**
Worked one-on-one with students on guided independent study projects of their own choice as part of the UT Austin Directed Reading Program. Topics included knot theory and analytic number theory.

SKILLS

TYPESETTING I have been live-typesetting all class notes (as well as all of my assignments) in \LaTeX for several years, and I generally publish my notes online. I maintain an open source note-taking template and have participated in collaborative projects to typeset and modernize classic texts in mathematics.

PROGRAMMING Highly experienced with PYTHON, JULIA, and the CERN ROOT library. Some experience with MACAULAY2, SINGULAR, and other similar computer algebra systems. Extensive experience with the analysis and efficient manipulation of large data sets.