Jackson Van Dyke

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Education

UT Austin 2019-Present
Ph.D. in Mathematics

UC Berkeley 2015-2019
B.A. in Mathematics
Honors thesis title: Non-sectorial gluing of Fukaya categories

Interests

Mirror symmetry (2d and 3d), algebraic geometry (derived and categorical), category theory, symplectic geometry, low-dimensional topology, geometric Langlands.

Honors and Awards

Frank Gerth III teaching excellence awards: Fall 2019-Spring 2020
Departmental awards which are "given each year to students who are proven teaching assistants or assistant instructors."

NSF Graduate Research Fellowship Program: Spring 2020
Honorable Mention

Dean's Honors List - College of Letters and Science:
UC Berkeley Spring 2018, Fall 2019
The Dean's Honors List recognizes outstanding academic achievement each fall and spring semester. To earn Dean's Honors for a semester, the criteria are:

- 13 or more letter-graded units that semester
- Semester GPA in the top 10% of L&S undergraduates
- No disqualifying grades that semester (I, NR, or NP grades or courses for which no grades have been submitted).

International Dean's Summer Scholarship:
University College London Summer 2017
I spent the summer of 2017 doing research under Professor Michael Singer with support from the International Dean's Summer Scholarship from UCL. This is analogous to an REU opportunity in the United States.

Research Experience

Reading course
UT Austin Fall 2019, Spring 2020
Under the guidance of Professor David Ben-Zvi, I have been learning about the 2-category of sheaves of categories. I plan to continue to explore this topic in ways motivated by $3d$ mirror symmetry in Spring 2020.

Undergraduate senior thesis:
UC Berkeley Fall 2018, Spring 2019
Under the guidance of Professor Vivek Shende, I used microlocal sheaf theory, homotopy theory, and other tools to study certain symplectic manifold arising in low-dimensional topology. This resulted in two works in preparation [6, 5].

Research project on Dean's Scholarship:
University College London Summer 2017
I was awarded the Dean's Summer Scholarship at UCL for the summer of 2017. **This opportunity was effectively equivalent to an REU.** I completed a research project under the supervision of Professor Michael Singer investigating the asymptotic behavior of partial density functions on hermitian line bundles. My particular work primarily involved Kähler geometry and complex analysis, and resulted in some original contributions [3].

Fission Reaction Event Yield Algorithm:
Lawrence Berkeley National Laboratory Spring 2017 - Present
Over the past year I have worked on developing an analysis methodology that allows us to fix the parameters in the fission simulator FREYA.

Publications

[1] Antonio Alfieri and Jackson Van Dyke, *An introduction to knot Floer homology and curved bordered algebras*, arXiv e-prints (2018), arXiv:1811.07348.

[2] J. Van Dyke, L.A. Bernstein, and R. Vogt, *Parameter optimization and uncertainty analysis of freyafor spontaneous fission*, Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment **922** (2019), 36 – 46.

[3] J. Ross, M. Singer, and J. Van Dyke, *Asymptotics of partial density functions*, In preparation. 2

[4] A. Schmah, N. Buechel, S. Garrett, M. Lomnitz, X. Sun, J. Van Dyke, J. Xu, and J. Zhang, *Radiation Hardness Test of Eljen EJ-500 Optical Cement*, ArXiv e-prints (2017).

[5] J. Van Dyke, *The Fukaya category of some objects in low-dimensional topology*, In preparation (2019). 2

[6] ———, *Non-sectorial gluing of fukaya categories*, In preparation (2019). 2

Talks Given

Junior Geometry Seminar
UT Austin Spring 2020
Junior Geometry and String Theory Seminar
UT Austin Fall 2019, Spring 2020

Triangulation conjecture Seminar
UT Austin Fall 2019

Scholarship Project Presentation
University College London August 2017

University Program Review (UPR) Presentation
University of Michigan, Ann Arbor June 2018

Nuclear Fission Conference (NA22 collaboration):
Santa Fe, NM March 2017

Seminars organized

Jr. Geometry seminar
UT Austin Spring 2021

Teaching Experience

Teaching assistant: Multivariable Calculus, Series, Sequences
University of Texas, Austin Fall 2019, Spring 2020
I held section, wrote and administered quizzes, graded assignments, and held office hours.

Undergraduate Student Instructor: Calculus, ODEs, Linear Algebra
University of California, Berkeley Fall 2018
I held section, wrote and administered quizzes, graded assignments, and held office hours.

Summer Program in Nuclear Physics:
University of Oslo, Oslo, Norway May 2017
I helped developed the curriculum for, and teach a course concerning the physics of nuclear fission and our ability to model it. This happened in conjunction with my research in theoretical nuclear physics developing the fission event algorithm FREYA.

Conferences Attended

New Perspectives in Gromov-Witten Theory:
IMJ-PRG, Sorbonne Universit, Paris June 3 - June 7, 2019

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Princeton Summer School in Low-dimensional Topology and Symplectic Geometry:
Princeton University, Princeton, NJ June 11 - June 29, 2018

Enumerative Geometry Beyond Numbers:
MSRI, Berkeley CA January 22, 2018 - January 26, 2018

Skills

Type-setting: I have been typesetting all of my assignments and notes with LaTeX for multiple years. I take a large majority of my notes in real time.

Computer science: High level: Python, Low-level: C++, fortran, bash. I have also worked extensively with clusters and techniques such as parallel processing for working with computationally intensive projects. Specifically I have had experience with both computational geometry and analysis of large data sets.