

Yu (Leon) Liu

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http://leon2k2k2k.github.io

December 11, 2020

Education

- **The University of Texas at Austin**

August 2017 - December 2020

B.S. in Mathematics

Austin, Texas

- Major: Pure Mathematics
- Cumulative GPA: 3.93/4.0
- Mathematics GPA: 3.93/4.0

Research Projects

- **The Geometry of Soergel Bimodules**

May 2020 - Present

Geometric Representation Theory, Homotopy Theory

- In collaboration with Aaron Mazel-Gee (Caltech) and David Reutter (Max Planck), both postdocs.
- We are constructing spectral versions of the Hecke categories and their braid group actions, using the formalism of spherical functors.

- **Abelian Duality in Topological Field Theory**

August 2020 - Present

Mathematical Physics

- Senior thesis with Professor Dan Freed.
- I prove electromagnetic duality for finite abelian gauge groups as equivalences of topological field theories (up to tensoring with an invertible TFT), following [FT] .
- See [here](#).

Organizations

- **S-Duality and Geometric Langlands**

September 2020 - December 2020

Organizer

- Organized a seminar about S-duality in 4D supersymmetric gauge theories and the connection to the geometric Langlands program.
- Responsible for scheduling talks and inviting speakers.

- **UT Mathematics Club**

January 2018 - May 2020

President 2019-2020, Vice President 2018-2019

- Organized weekly meetings, contacted professors, and scheduled lectures.
- Organizer for MUST, a platform for undergraduates to practice giving talks to their peers and receive constructive feedback.
- Created GRE and LaTeX workshops.

- **Homotopy Type Theory Class**

January 2020 - May 2020

Organizer

- Co-organized joint CS-mathematics course on Homotopy Type Theory.

- **Sunday Morning Math Group**

January 2020 - May 2020

Volunteer

- An UT outreach program aimed to encourage K-12 students to pursue STEM in college and beyond.

Conference & Summer Programs

- **Tensor Categories and Topological Quantum Field Theories**

March 2020

MSRI, moved online

- **(∞, n) -Categories, Factorization Homology, and Algebraic K-Theory** March 2020
MSRI, moved online
- **Summer School on Homological Algebra in Mirror Symmetry** August 2019
Fields Institute, Toronto
- **Park City Mathematics Institute: QFT and Manifold Invariants** July 2019
Park City, Utah
- **Arizona Winter School: Topology and Arithmetic** March 2019
University of Arizona, Arizona
- **Texas Algebraic Geometry Symposium** February 2019
UT Austin, Texas
- **Between Topology and Quantum Field Theory** January 2019
UT Austin, Texas
- **Texas Algebraic Geometry Symposium** November 2018
Texas A&M, Texas

Honors and Awards

- **Emory and Ella Peterson Endowed Presidential Scholarship** April 2020
UT Austin
- **Jennifer T. Barrett Undergraduate Scholarship** September 2019
UT Austin
- **UT Distinguished College Scholar** August 2018 - May 2020
UT Austin

Selected Talks Given

- **Fourier Theory and Categorification** November 2020
Junior Geometry
- **Abelian Dualities in Topological Field Theory** November 2019
Junior Geometry and String Theory
- **EM Duality in N=4 SUSY Yang-Mills** October 2020
EM duality and Geometric Langlands Seminar
- **Electromagnetic Duality and Magnetic Monopoles** September 2020
Junior Geometry and String Theory Seminar
- **Representation Theory in Physics: Classification of Particles in QFT** April 2020
Junior Geometry
- **Renormalization of Perturbative Quantum Field Theories** February 2020
Junior Geometry and String Theory Seminar
- **Spontaneously Broken Symmetry and Higgs Mechanism** February 2020
Dynamics of QFT Seminar
- **Line Bundles and Divisor Correspondence** February 2020
Junior Algebraic Geometry Seminar
- **Proof of the Triangulation Conjecture** November 2019
Triangulation Conjecture Seminar
- **T-duality on 2D Sigma Models** November 2019
Junior Geometry and String Theory Seminar
- **Seibert-Witten Equation and the Coulomb Gauge** October 2019
Triangulation Conjecture Seminar
- **Topological Hochschild Homology and Applications to Arithmetic Geometry** May 2019
Directed Reading Program
- **2-shifted Symplectic Structure on the Derived Stack of Perfect Complexes** May 2019
Derived Algebraic Geometry Seminar

- **Shifted Symplectic Structure on Intersections of Lagrangians** April 2019
Derived Algebraic Geometry Seminar
- **Bauer-Furuta Invariants** April 2019
Furuta 10/8 Seminar
- **A_∞ categories and derived Fukaya categories** March 2019
Floer Lagrangian Seminar
- **Introduction to Morse Theory via Pictures** February 2019
UT Math Club
- **Finite Dimensional Approximations to the Monopole Map** February 2019
Furuta 10/8 Seminar
- **27 Lines** February 2018
UT Math Club
- **Elliptic Curves are Group Schemes** November 2017
Directed Reading Program
- **Bezout's Theorem** October 2017
UT Math Club