

Yu (Leon) Liu

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http://leon2k2k2k.github.io

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Education

- **The University of Texas at Austin** September 2017 - December 2020
B.S. in Mathematics Austin, Texas
 - Major: Pure Mathematics
 - Cumulative GPA: 3.93/4.0
 - Mathematics GPA: 3.93/4.0
 - Expected Graduation: December 2020

Research Projects

- **Abelian Duality in Topological Field Theory** August 2020 - December 2020
Mathematical Physics
 - See [here](#).
 - Senior thesis with Professor Dan Freed.
 - I proof electromagnetic duality for finite abelian gauge groups as equivalences of topological field theories (up to tensoring with an invertible TFT), following [FT] .
- **The Geometry of Soergel Bimodules** May 2020 -
Geometric Representation theory, Homotopy Theory
 - In collaboration with Aaron Mazel-Gee (Cal-Tech) and David Reutter (Max Planck), both postdocs.
 - We are constructing a spectral version of Soergel bimodules and their braid group actions, using the formalism of spherical functors.

Organizations

- **Electromagnetic Duality** September 2020- December 2020
Organizer
 - Organized a seminar about electromagnetic duality in 4D supersymmetric gauge theories and the connection to the geometric Langlands program.
 - Responsible for scheduling talks, inviting speakers.
- **UT Mathematics Club** January 2018 - December 2020
President 2019-2020, Vice President 2018-2019
 - Organized weekly meetings, responsible for contacting professors, scheduling the lectures, as well as preparing food and drinks for the lectures.
 - Created a platform where undergraduate mathematics students can practice their lecture skills.
 - Created workshops for Latex, GRE, and organized graduate student panels for UT undergraduates who are interested in math grad school.
- **Homotopy Type Theory Class** January 2020- May 2020
Organizer
 - Created joint CS-mathematics course on Homotopy Type Theory.
 - Creating an Arend documentation for the theorems and proofs in *Homotopy Type Theory: an Univalent Foundation*.
- **Sunday Morning Math Group** January 2020 - May 2020
Volunteer
 - Volunteered at UT's Sunday Morning Math Group (SMMG).
 - Introduced interesting math concepts to K-12 students.

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** 2018-2020
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
- **EM Duality in N=2 SUSY Yang-Mills** September 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 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 Stacks of Perfect Complexes** May 2019
Derived Algebraic Geometry Seminar
- **Derived Stack of Perfect Complexes and Its Cotangent Bundle** April 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
- **Bar Construction** January 2019
UT Math Club
- **Moduli Space of Triangles** September 2018
UT Math Club
- **Category Theory and Linear Algebra** April 2018
UT Math Club
- **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