Yanzhihong Hu

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ABOUT ME

I am a Senior student of University of Illinois Urbana-Champaign maijoring in Mathematics, my research interests focus on low-dimensional topology and geometric group theory. I am good at dealing with mathematical topics that combine Geometry with Algebra.

EDUCATION

Bachelor of Science in Mathematics JAN 2023-present

University of Illinois Urbana-Champaign

- *GPA*: 3.89/4.0
- *Upper-Level Courses*: Abstract Linear Algebra, Real Variables Intro to Abstract Algebra II, Set Theory and Topology, Complex Variables, Abstract Algebra(Graduate), General Topology(Graduate), Algebraic Topology I(Graduate), Intro to Algebraic Geometry(Graduate), Intro to Geometric Group Theory(Graduate), Intro to Differential Manifold I(Graduate, Ongoing), Modern Algebraic Geometry(Graduate, Ongoing), Algebraic Topology II(Graduate, Ongoing).

RESEARCH EXPERIENCE

Reading Course Supervised by Jake Rasmussen about 4-Manifolds and Kirby Calculus

Mar 2024-present

- Generally follow the book *4-Manifolds and Kirby Calculus*, learning the theory about handle decomposition, Heegaard splitting and Kirby diagrams etc.
- Now planning to learn the things toward h-corbodism theorm.

Research Project Supervised by Igor Mineyev about Unknotting Conjecture and Whitehead Conjecture

Jan 2024-present

- Follow several articles by Akio Kawauchi that claim to have solved several long-standing open problems in topology/geometric group theory. Which include Unknotting Conjecture and Whitehead Conjecture. And try to determine whether the results are true and try to make it more concise and shorter.
- Now we are planning to figure out the proof of free-ribbon Lemma which can be used to prove whitehead conjecture.

Polymath REU Supervised by Alex Zupan and Jeffrey Meier

May 2024- Aug 2024

- In the project, we examine connections between the minimal number of self-intersections in any ribbon disk bounded by a ribbon knot K, called the ribbon number of K, and other knot invariants, such as the knot determinant and Alexander polynomial of K. Schedule
- More concise, our team has tried to characterize Symmetrically Maximal Ribbon Knots and to figure out can the difference between the symmetric ribbon number and the ribbon number can be arbitrarily large.
- For the first question we use union presentation and partial diagram and Christoph Lemma and for the second question we try to break ribbon disks into ekementray pieces.

Geodesics on integral affine manifolds mentored by Florian Zeiser.
June 2024 - July 2024

- In this project we study the geodesics associated to the connections on integral affine manifolds in dimension 2. We first recall the necessary theory for manifolds, before focusing on integral affine manifolds and their special properties. And we also investigated such manifolds in dimension 3.

Research project about Poisson structures and their cohomology mentored by Florian Zeiser.
Jan 2024 - May 2024

- In this project we understand the underlying foliation, infinitesimal automorphisms and deformations by means of the associated cohomology groups, i.e. Poisson cohomology, for some of the linear Poisson brackets.

Research project Linear Poisson structures in dimension 4 and their cohomolog mentored by Florian Zeiser.
Aug 2023 - Dec 2023

- In this project we understand the underlying foliation, infinitesimal automorphisms and deformations by means of the associated cohomology groups, i.e. formal Poisson cohomology, for some of the linear Poisson brackets.

AWARDS

- 2023 - 2024 Dean's List of College of Liberal Arts & Sciences of University of Illinois Urbana - Champaign

SKILLS

Program Language

- MATLAB
- Python

Other Skills

- LaTeX
- Presentation
- Teaching