Dexuan Hu

Ithaca, NY 14850 | dexuan.hu0928@gmail.com | link233zr.github.io

Research Interests

My research focuses on mathematical logic, particularly descriptive set theory. I am interested in understanding descriptive set-theoretic structures in objects from other areas of mathematics, such as model theory and commutative algebra.

Education

Cornell University, Ph.D. in Mathematics 2019 - 2025(expected)
Supervisor: Sławomir Solecki.
Thesis title: Polish module, topological complexity and singletons

University of Oxford, MMath 2018 - 2019
Dissertation topic: The Morley Categoricity Theorem

University of Oxford, BA Mathematics 2015 - 2018

Selected Awards and Honors

Robert J. Bättig Graduate Prize 2022-2023
Awarded by Cornell University's Department of Mathematics in recognition of notable research contributions and academic impact.

Cornell Graduate School Recruiting Fellowship 2019-2020
Awarded by the graduate school to first-year graduate students based on scholastic ability.

Lady Margaret Hall Undergraduate Scholarship 2016-2019
Presented termly by Lady Margaret Hall, University of Oxford, to students demonstrating strong academic performance in mathematics.

Singapore Ministry of Education SM1 Scholarship for Chinese Students 2010-2014
Full scholarship awarded based on academic merit through a competitive national selection process.

Publications

Polish Modules over subrings of $\mathbb{Q}$,[arXiv]
Israel Journal of Mathematics, accepted (2024), joint with Sławomir Solecki
We give a method of producing a Polish module over an arbitrary subring of $\mathbb{Q}$ from an ideal of subsets of $\mathbb{N}$ and a sequence in $\mathbb{N}$. This allows us to construct Polish $\mathbb{Q}$-vector spaces that answer a question of Frisch and Shinko.

Invited and Contributed Talks

Logic Seminar, Cornell University, USA Fall 2024
Title: *Borel equivalence relations and the complexity of Lascar strong types*.

2024 North American Annual Meeting of ASL, Iowa State University, USA Spring 2024
Title: *Polish Modules over subrings of* $\mathbb{Q}$.

Caltech Logic Seminar, USA Fall 2022
Title: *Polish Modules over subrings of* $\mathbb{Q}$.

Logic Seminar, Cornell University, USA Fall 2022
Title: *Incomparable Polish vector spaces over* $\mathbb{Q}$.

Seminar Talks

2024
Student Logic Seminar, Cornell University, one talk on *Contractible type and contractible maps*.
Logic Seminar, Cornell University, two talks on *Effective Descriptive Set Theory*.

2023
Logic Seminar, Cornell University, one talk on *Shelah's solution to Whitehead's problem*.

2022
Logic Seminar, Cornell University, two talks on *On homomorphism graphs*.
Logic Seminar, Cornell University, two talks on *Borel actions of Polish groups come from continuous actions*.

2021
Logic Seminar, Cornell University, two talks on *The Lodha-Moore group*.

2020
Logic Seminar, Cornell University, one talk on *Introduction to the Lascar Galois group*.
Logic Seminar, Cornell University, one talk on *Analytic P-ideals and Tukey reducibility*.

Teaching Experiences

– Cornell University

Instructor, **Calculus I**(MATH 1110). Fall 2024

Teaching Assistant, **Linear Algebra for Engineers**(MATH 2940). Spring 2025

Teaching Assistant, **Linear Algebra**(MATH 4310). Spring 2024

Teaching Assistant, **Linear Algebra for Engineers**(MATH 2940). Fall 2023

Teaching Assistant, **Prove it!**(MATH 3040). spring 2023

Teaching Assistant, **Linear Algebra**(MATH 2210). Fall 2022

Teaching Assistant, **Linear Algebra**(MATH 2210). Spring 2022

Teaching Assistant, **Introduction to Topology**(MATH 4530). Fall 2021

Teaching Assistant, **Prove it!**(MATH 3040). Spring 2021

Teaching Assistant, for **Mathematical Logic**(MATH 4810). Fall 2020

Preprints and Research in Progress

Topological complexity of Lascar strong types, joint with Bilge Koksal and Sławomir Solecki.
We introduce a new topological notion to compare the complexities of K_σ-equivalence relations on compact zero-dimensional spaces. This comparison arises naturally in the study of Lascar strong types. We provide examples of theories that gives Lascar strong types of distinct complexities.

Skills

Programming: Python, C, TensorFlow, Scikit-learn
Tools: LaTex
Languages: English (fluent), Chinese (native)