

# CHRIS XU

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## EDUCATION

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**University of California-San Diego (UC San Diego)**

September 2021 - June 2027

*3rd year PhD student in Mathematics*

*La Jolla, CA*

- Interests: number theory, arithmetic geometry, Langlands program, homotopy theory
- Student-ran seminars I ran or attended (references in parentheses): p-adic modular forms (Gouvea), class field theory (Cassels-Frohlich), Weil II (Kiehl-Weissauer), abelian varieties (Bhatt), Falting's theorem (Bhatt-Snowden), the Fargues-Fontaine curve (Scholze), prismatic F-gauges (Bhatt), Falting's theorem (Lawrence-Venkatesh)
- Conferences attended: p-adic L-functions and Eigenvarieties (Notre Dame, 07/22), Arithmetic and Topology over Global Fields (UW-Madison, 10/22), Spring School on Eigenvarieties (Heidelberg, 03/23), Spring School in Arithmetic Statistics (CIRM, 05/23), LuCaNT (ICERM, 07/23), Workshop on p-adic Arithmetic Geometry (IAS, 11/23), Arizona Winter School 2024 (UofA, 03/24)
- Doctoral advisors: Kiran Kedlaya, Aaron Pollack

**Massachusetts Institute of Technology (MIT)**

August 2017 - January 2021

*B.S. in Mathematics*

*Cambridge, MA*

- Relevant coursework: linear algebra, differential equations, analysis, abstract algebra, algebraic number theory, algebraic geometry, algebraic topology, algebraic groups, elliptic curves, probabilistic combinatorics

## CURRENT PROJECTS

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**Model-free quadratic Chabauty for modular curves**

- Almost all current methods for finding rational points on modular curves involve first finding a plane model before implementing quadratic Chabauty. With Kiran Kedlaya, I am currently developing a way to work directly with the moduli of elliptic curves without using any defining equations.

**Special cycles on  $G_2$**

- With Aaron Pollack, I am investigating relations between cohomology classes of certain special cycles on  $G_2$ , which involves producing half-integral weight modular forms via theta lifting.

## SELECTED PAPERS

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**Skelet #17 and the determination of  $BB(5)$**

February 2024

- [Proves non-halting](#) of a certain Turing machine dubbed "Skelet #17", arguably the most difficult remaining obstruction to proving Scott Aaronson's conjecture that  $BB(5) = 47,176,870$ .

## UNDERGRAD

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Here are three mini-projects I worked on during my undergraduate.

**MIT Department of Mathematics**

June 2020 - August 2020

*Undergraduate Researcher, UROP+ Program*

*Cambridge, MA*

- [Computed](#) cohomologies of determinant twists of a certain ring spectrum.
- Learned significant amounts of homotopy theory on the side, working with graduate mentor Robert Burklund.

**MIT Department of Mathematics**

June 2019 - August 2019

*Summer Program in Undergraduate Research (SPUR)*

*Cambridge, MA*

- [Computed](#) the traces of CM values of nonholomorphic weight 0 Maass forms.
- Built off of previous work of Bruinier and Funke for traces of modular functions.

- Collaborated with graduate mentor Yongyi Chen every day over a six week period.

**MIT Department of Mathematics**

*Undergraduate Researcher, UROP+ Program*

June 2018 - August 2018

Cambridge, MA

- Studied the signatures of irreducible matrix representations.
- [Conjectured](#) a polynomial pattern using *Atlas of Lie Groups and Representations*.
- Assisted in its [proof](#).

**AWARDS**

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<b>\$25,000 UW-Madison Van Vleck Scholarship Winner</b>	2012
<b>Math Olympiad Summer Program (MOSP) Qualifier</b>	2015
<b>Putnam Honorable Mention</b>	2018, 2019