KYLE ROKE

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EDUCATION

MASSACHUSETTS INSTITUTE OF TECHNOLOGY **2022-Present**

- Class of 2026
- **B.S. Mathematics** (anticipated 2026)
- 5.0 GPA

Notable Coursework

- Physics I/II/III
- Analysis and Manifolds and Geometry of Manifolds
- Algebra I/II
- Commutative Algebra
- Representation Theory
- Introduction to Topology
- Algebraic Topology I/II
- Kan Seminar on Algebraic Topology
- Algebraic Geometry I/II
- Fundamentals of Programming

COMMONWEALTH HIGH SCHOOL **2018-2022**

- Graduated 2022
- 5.05 GPA

RESEARCH

- **Reading project in systolic geometry at MIT with Jonathan Zung** (**2024**)
  Directed reading and problem solving across varied topics in topology and geometry

- **UROP+ at MIT in chromatic homotopy theory under Jeremy Hahn** (**2024**)
  Read existing literature on chromatic homotopy theory and ring spectra
  Performed computations of power operations of MU using Maple
  Conjectured and proved statements about E-infinity ring spectra using power operations
  Authored a paper on our results and suggested a counterexample to chromatic blueshift conjecture

- **Directed reading project in algebraic topology at MIT with Natalia Pacheco-Tallaj** (**2025**)
  Directed reading and problem solving focused on generalized cohomology theories, vector bundles, spectral sequences, and more to understand Atiyah & Rees' "Vector Bundles on Projective 3-Space"

- **Research in stable homotopy theory and category theory with Peter May at the UChicago Math REU** (**2025 and ongoing**)
  Read literature on operads, pseudoalgebras, and Segalic infinite loop space machines
  Worked on new research into proving conjectures about permutative categories and Segalic Γ-categories
  Worked toward producing a better infinite loop space machine to construct highly structured spectra

Co-authored a paper on our results
Ongoing work on further research

TEACHING EXPERIENCE

- **Grader for 18.701: Algebra I** (**2023**)
  MIT Math Department; taught by Zhiwei Yun
  Graded problem sets and exams

- **Undergraduate Assistant for 18.702: Algebra II** (**2025**)
  MIT Math Department; taught by Ju-Lee Kim
  Graded problem sets and exams
  Hosted office hours and exam review sessions

- **Undergraduate Assistant for 18.701: Algebra I** (**2025**)
  MIT Math Department; taught by Henry Cohn
  Graded problem sets and exams
  Hosted office hours

EXPOSITORY TALKS

- **Vector bundles on complex projective 3-space** (**Jan 31, 2025**)
  MIT Directed Reading Program Symposium

- **Adams on the Construction of the Stable Homotopy Category** (**Feb 28, 2025**)
  MIT Kan Seminar

- **Quillen on Model Categories and Homotopical Algebra** (**Apr 7, 2025**)
  MIT Kan Seminar

- **Selick on Odd-Primary Torsion in** $\pi_\star(S^3)$ (**May 9, 2025**)
  MIT Kan Seminar

- **Symmetric monoidal categories, operadic categories, and Segal categories** (**Aug 7, 2025**)
  UChicago Math REU
  With Jiasen Liu, Hongyi Zhang, and Keming Zhou

SKILLS

- Software: Maple, Python, Java, Latex

LEADERSHIP EXPERIENCE

- MIT Men's Ultimate Frisbee Team Captain (**2023-Present**)
- Vice President of Mass. Theta Chapter of Pi Lambda Phi Fraternity (**2024**)