

KYLE ROKE
Massachusetts Institute of Technology

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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
- Algebra I/II
- Commutative Algebra
- Introduction to Topology
- Algebraic Topology I/II
- Algebraic Geometry
- Fundamentals of Programming

COMMONWEALTH HIGH SCHOOL

2018-2022

- Graduated 2022
- 5.05 GPA

Notable Coursework

- Differential Equations
- Linear Algebra
- Theoretical Calculus

RESEARCH

- Reading project in systolic geometry with Jonathan Zung (**2024**)
- UROP+ in chromatic homotopy theory under Jeremy Hahn (**2024**)
- Directed reading project in algebraic topology with Natalia Pacheco-Tallaj (**2025**)

SKILLS

- Software: Maple, Python, Java
- Broad and deep mathematical background
- Leadership role on multiple sports teams and clubs

LEADERSHIP EXPERIENCE

- MIT Men's Ultimate Frisbee Team Captain (**2023-2025**)
- Vice President of Mass. Theta Chapter of Pi Lambda Phi Fraternity (**2024**)

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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 Segal infinite loop space machines
Worked on new research into proving conjectures about permutative categories and Segal 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 $\pi_*(S^3)$ (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 role on multiple sports teams and clubs

LEADERSHIP EXPERIENCE

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- Vice President of Mass. Theta Chapter of Pi Lambda Phi Fraternity (**2024**)