

# Ayush Khaitan

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🌐 [ayushkhaitanrutgers.github.io](https://ayushkhaitanrutgers.github.io)

## Research Interests

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Automated reasoning and machine learning, Differential Geometry, Combinatorics.

## Employment

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Rutgers University, New Brunswick

*Hill Assistant Professor*

9/2023–5/2026

## Education

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Penn State University

*Ph.D., Mathematics*

University Park, PA

2017–2023

Birla Institute of Technology and Science

*Bachelor of Engineering*

Pilani, India

2011–2015

SJI International

*International Baccalaureate, Keppel Magus scholar from India*

Singapore

2008–2010

## Selected preprints

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2025: **An LLM-CAS framework for proving asymptotic inequalities** with [Vijay Ganesh](#) (Submitted). [arXiv link](#). Our [tool](#) was recently [highlighted](#) by Terence Tao.

2025: **Elementary symmetric polynomials under the fixed point measure** with [Bhargav Narayanan](#) and [Ishan Mata](#) (submitted). [arXiv link](#).

2026: **Local and global conformal invariants of submanifolds** with [Jeffrey Case](#), [Yueh-Ju Lin](#), [Aaron Tyrell](#) and [Wei Yuan](#) (submitted). [arXiv link](#)

## Publications

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2022: **The weighted ambient metric** with [Jeffrey S. Case](#), SIGMA **18** (2022), 086, 21 pages. [Journal Link](#)

2022: **GJMS operators of smooth metric measure spaces**, Journal of Geometric Analysis. [arXiv link](#)

2022: **Weighted renormalized volume coefficients**, Differential Geometry and its Applications. [arXiv link](#)

2023: **Ambient metric for manifolds with density and the Ricci flow**, Advances in Mathematics (2026), Article reference: YAIMA\_110787. [Journal link](#).

2024: **Computing renormalized curvature integrals on Poincaré-Einstein manifolds** with [Jeffrey Case](#), [Yueh-Ju Lin](#), [Aaron Tyrell](#) and [Wei Yuan](#), Advances in Mathematics. [arXiv link](#).

## Research activities

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**Co-organizer:** JMM Panel on the use of AI tools to aid Mathematics research. [Panel website](#). Joint Mathematics Meetings, 2025 in Seattle

**Co-organizer:** LLMs in Mathematics research group, Rutgers University. [Research group website](#). 2023–Present

**Co-organizer:** Complex geometry and Harmonic analysis seminar, Rutgers University. [Seminar website](#). 2024–Present

**Co-organizer:** Special session on recent developments in geometric analysis, AMS Eastern Sectional Meeting 2024, Howard University, Washington D.C. [Meeting website](#). April, 2024

**Co-organizer:** AI and Math seminar, Rutgers University. 2024–Present

## Teaching

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### Rutgers

**A Lean based Intro to Proofs (Honors course):** Rutgers University, two semesters

**Machine learning and AI tools in Math Research (Graduate course):** Rutgers University, one semester

**Linear algebra:** Rutgers University, one semester

**History of Mathematics:** Rutgers University, one semester

**Calculus for engineers:** Rutgers University, one semester

### Penn State

**Calculus I:** Penn State University, Multiple semesters

**Calculus II:** Penn State University, Multiple semesters

**Linear Algebra:** Penn State University, One semester

**Plane trigonometry:** Penn State University, One semester

## Invited Talks

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2022: Geometry, Topology and Dynamical Systems seminar, University of Texas at Dallas

2022: Geometry Luncheon seminar, Penn State University

2023: Geometric Analysis Seminar, Rutgers University

2023: Nonlinear Analysis Seminar, Rutgers University

2023: Geometry, Topology and Dynamical Systems seminar, University of Texas at Dallas

2023: Geometry/Topology seminar, Stony Brook University

2024: Colloquium, Rutgers University, Newark

2025: Geometry and Topology seminar, University of Washington, St Louis

2025: Special session on geometric analysis and PDEs, AMS Eastern Sectional Meeting, 2025, Hartford, CT

2025: CUNY Geometric Analysis Seminar, City University of New York, NY

2025: Brown University Geometric Analysis Seminar, Providence, RI  
2025: AI and Math seminar, Rutgers University, New Brunswick, NJ  
2025: AI Seminar, Simon Fraser University, CA  
2025: AI/ML talk, Penn State University, PA  
2026: Presentation at Stanford University, CA  
2026: Presentation at Kerala School of Mathematics, Kerala, India  
2026: Presentation at AMS Spring Eastern Sectional Meeting, Boston College, MA

## **Selected conferences and workshops attended**

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2016: MSRI Summer School on Tropical Geometry. Berkeley  
2019: Geometry festival. Princeton University, Princeton  
2023: International Doctoral Summer School in Conformal Geometry. IMAG, Granada  
2025: AI for the working Mathematician. ICERM, Providence  
2025: AI for Mathematics and Theoretical Computer Science. Simons Institute for the Theory of Computing, Berkeley  
2025: Lean workshop, Simons Institute, New York City  
2025: Problem-solving Workshop, Computational Geometric Analysis. CUNY, New York City  
2025: Mathematical Congress of the Americas. Miami, FL  
2026: AMS Eastern Sectional Meeting, Boston College  
2026: Southern California Geometric Analysis Seminar, San Diego  
2026: Techniques and Tools for the Formalization of Analysis, ICERM, Providence, RI

## **Awards**

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2008: Keppel Magus Scholarship (\$40,000), IB Diploma in Singapore, one scholar from Calcutta, India  
2009: Bronze medal, Singapore Math Olympiad  
2017: Distinguished Graduate Fellowship, Penn State University, given to 10 incoming graduate students across all departments  
2022: Pritchard Dissertation Fellowship, Penn State University, given to 2 graduating PhD students in the Mathematics department  
2024-2026: AIM SQuaRE Grant with Jeffrey Case, Yueh-Ju Lin, Aaron Tyrell and Wei Yuan  
2025: AMS Travel grant, Mathematical Congress of the Americas