

Ayush Khaitan

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Research Interests

Automated reasoning and machine learning, Combinatorics, Differential Geometry.

Employment

Rutgers University, New Brunswick

Hill Assistant Professor

2023–Present

Education

Penn State University

Ph.D., Mathematics

Advisor: Jeffrey Case

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

Publications

2023: **Ambient metric for manifolds with density and the Ricci flow** (accepted at Advances in Mathematics)

[arXiv link](#).

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** (accepted at Journal of Geometric Analysis). [arXiv link](#)

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

Preprints

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](#).

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

[arXiv link.](#)

Research activities

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

Rutgers

A Lean based Intro to Proofs (Honors course): Rutgers University, one semester

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

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

Selected conferences and workshops attended

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

Awards

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