Soham Ghosh

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Research Interests

- **Algebraic geometry with an arithmetic flavour**: Brauer groups, Azumaya algebras, twisted sheaves, moduli and stacks, K-theory.
- **Tropical and non-archimedean geometry**: intersection theory of non-archimedean cycles and currents, tropical cohomology, tropical abelian varieties, and Fourier–Mukai transforms.
- **Birational geometry**: study of various positivity conditions on bundles, foliations and resulting characterizations of special Fano varieties.
- **Commutative algebraic aspects of algebraic geometry**

Education

University of Washington, *Seattle, WA* 2022–Present
Ph.D. in Mathematics
Advisors: Max Lieblich and Farbod Shokrieh

University of Washington, *Seattle, WA* 2022–2024
M.S. in Mathematics
GPA: 4.0/4.0

Indian Statistical Institute, *Bangalore, India* 2019–2022
Bachelor of Mathematics (Honors)
Grade: 97.18%, First division with distinction

Publications and Preprints

[1] *Characterizations of products of projective spaces and quadrics* (with Sándor Kovács), submitted (November 2026). arXiv:2611.16529

[2] *Torelli theorem for the moduli spaces of twisted vector bundles on smooth projective curves* (with Ting Gong and Max Lieblich), submitted (October 2026). arXiv:2610.25500

[3] *Torelli Theorem for moduli stacks of vector bundles on tame Deligne Mumford curves* (with Ting Gong and Max Lieblich), submitted (September 2026). arXiv:2609.29011

[4] *Characterizing contractions and weighted blowdowns* (with Tyson Klingner), submitted (September 2026). arXiv:2609.04023

[5] *Kovács' conjecture on characterization of projective space and hyperquadrics*, submitted (January 2026). arXiv:2601.10055

[6] *Tropical Poincaré bundle, Fourier–Mukai transform, and a generalized Poincaré formula* (with Farbod Shokrieh), submitted (March 2025). arXiv:2503.12835

[7] *A conditional proof of the Casas-Alvero Conjecture*, submitted (updated: November 2026). arXiv:2501.09272

[8] *A dimension bound towards the Casas-Alvero Conjecture*, submitted (updated: October 2026). arXiv:2402.18717

[9] *The Zariski covering number for vector spaces and modules*, Communications in Algebra **50** (2022), No. 5, pages 1994–2017. doi:10.1080/00927872.2021.1995741

Selected Awards and Honors

Gerald B. Folland Endowed Graduate Fellowship, *University of Washington* — Fall 2026

Lee and Cozette McFarlan Travel Fellowship, *University of Washington* — Spring 2026
For travel to attend conferences and give talks

Jane Street Graduate Research Fellowship — 2026
Finalist, among applicants across EECS, mathematics, physics, statistics

Simons Dissertation Fellowship in Mathematics — 2025
40 fellowships awarded annually across US, by the Simons Foundation

Selected for Summer Research Institute in Algebraic Geometry 2025 Bootcamp — Summer 2025
Fully funded

Departmental Research Assistantship, *University of Washington, Seattle* — Summer 2025

Graduate School Conference Presentation Award, *University of Washington, Seattle* — 2024

Graduate Research Assistantship, *University of Washington, Seattle* — Summer 2024
Partially funded by NSF CAREER DMS-2044564 and NSF FRG DMS-2151718 grants

Academic Excellence Award, *University of Washington, Seattle* — 2023

Provost Scholarship, *University of Washington, Seattle* — 2022 & 2023

Academic Excellence Award, *Indian Statistical Institute, Bangalore* — 2020, 2021, & 2022

Invited Talks and Poster

Microtalk @ Western Algebraic Geometry Symposium, *Utah* — December 2026

Kennesaw, Georgia, *AMS Fall Southeastern Sectional Meeting* — October 2026
Special session on "Geometry and topology of hypersurfaces"

Indian Association for Cultivation of Science (IACS) Kolkata, *Geometry Seminar* — September 2026

Indian Statistical Institute (ISI) Kolkata, *Department Colloquium* — September 2026

Junior Algebraic Geometry Workshop 2026, *University of California Los Angeles (UCLA)* — July 2026

University of California San Diego (UCSD), *Algebraic Geometry Seminar* — May 2026

Poster @ Jane Street Graduate Research Workshop, *New York* — April 2026

Indian Institute of Science (IISc) Bangalore, *Geometry and Topology Seminar* — August 2025
(joint with Algebra and Combinatorics Seminar)

Indian Statistical Institute (ISI) Bangalore, *Department Colloquium* — August 2025

University of Washington (UW), *Algebra and Algebraic Geometry Seminar* — May 2025

University of Washington (UW), *Student Algebraic Geometry Seminar* — May 2025, February 2026

University of California Los Angeles (UCLA), *Birational Geometry Seminar* — May 2025

San Antonio, Texas, *AMS Fall Central Sectional Meeting* — September 2024
Special session on "Non-Archimedean, Algebraic, tropical geometry and Applications"

Conferences and Workshops

- *Western Algebraic Geometry Symposium Fall 2026* at University of Utah — December 2026
- *AMS Fall Southeastern Sectional Meeting* at Kennesaw State University, Georgia — October 2026
- *Junior Algebraic Geometry Workshop* at University of California Los Angeles — July 2026

- *Jane Street Graduate Research Workshop* at New York — April 2026
- *Western Algebraic Geometry Symposium Spring 2026* at University of California San Diego — March 2026
- *Summer Research Institute in Algebraic Geometry 2025 Weeks 1–3* at Colorado State University — July 2025
- *Summer Research Institute in Algebraic Geometry 2025 Bootcamp* at Colorado State University — July 2025
- *Arithmetic, K-theory and Algebraic cycles 2025* at Ohio State University — May 2025
- *Western Algebraic Geometry Symposium Fall 2024* at University of Arizona, Tucson — November 2024
- *AMS Fall Central Sectional Meeting* at University of Texas San Antonio — September 2024
- *Arizona Winter School 2024: Abelian Varieties* — March 2024
- *Western Algebraic Geometry Symposium Fall 2023* at Washington University St. Louis — November 2023
- *FRG workshop on Brauer groups and derived categories* at Northwestern University — October 2023
- *Western Algebraic Geometry Symposium Spring 2023* at the University of Washington — April 2023
- *Arizona Winter School 2023: Unlikely intersections* — March 2023

Teaching

Teaching Assistant and Grader, *University of Washington, Seattle* — Autumn 2022–Present

Math 124	Calculus I	Autumn 2022, 2 sections
Math 125	Calculus II	Winter 2023, 2 sections
Math 327	Introduction to Real Analysis I	Spring 2023
Math 394	Probability I	Summer 2023
Math 381	Discrete Mathematical Modelling	Autumn 2023
Math 407	Linear Optimization	Winter 2024, 2 sections
Math 534	Graduate Complex Analysis	Spring 2024 and Autumn 2024
Math 300	Mathematical Reasoning	Winter 2025
Math 424	Fundamental Concepts of Analysis	Spring 2025
Math 402	Introduction to Modern Algebra: Rings and Fields	Autumn 2025
Math 505	Graduate Algebra: Galois theory	Winter 2026
Math 404	Introduction to Modern Algebra: Galois theory	Spring 2026
Math 504	Graduate Algebra: Group theory	Autumn 2026

Mentoring and Outreach

Mentor, Washington Directed Reading Program for undergraduates — 2026–

University of Washington, Seattle

Mentored Larry Wen on Commutative Algebra following Atiyah–Macdonald, and Max Han on Representation theory following Serre's *Linear Representations of Finite Groups* during Spring 2026.

Instructor, Husky Math Academy — 2024–2025

University of Washington, Seattle

Instructor for weekly problem-solving and discussion sessions for grades 7–9 students, covering diverse and advanced topics and designing classroom activities. Link: https://www.huskymath.org.

Service

Refereeing for journals

Communications in Algebra, *Journal of Commutative Algebra*, *Journal of Algebraic Combinatorics*, *Experimental Mathematics*, *American Mathematical Monthly*, *Indian Journal of Pure and Applied Mathematics*.

Other Academic Achievements

- **Indian Institute of Technology** Joint Entrance Exam (IIT-JEE) Advanced 2019: **All India Rank (AIR) 878** out of 161,319 students shortlisted from JEE-Mains
- **Indian Institute of Technology** Joint Entrance Exam (IIT-JEE) Mains 2019: **All India Rank (AIR) 1516** out of

1,147,125 students

- **Indian Statistical Institute** Entrance Exam 2019: **All India Rank (AIR) 27** out of $\approx$50,000 students
- **Chennai Mathematical Institute** Entrance Exam 2019: offered *Sriram fellowship*, covering full tuition fee and a monthly stipend for the course duration, awarded to top scorers in the exam (*declined*)
- Selected for **Indian National Mathematics Olympiad 2018** via Regional Mathematics Olympiad 2017.
- **Kishore Vaigyanik Protsahan Yojana (KVPY)** Exam 2017: **All India Rank (AIR) 201** out of $\approx$60,000 students. Awarded fellowship for bachelor's and master's studies in sciences in India, funded by the Department of Science and Technology, Government of India.