

Shubham Sinha

CONTACT INFORMATION

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EMPLOYMENT

University of British Columbia, Vancouver, Canada

Postdoctoral Fellow, Mathematics, 2026-till date

Mentor: Jim Bryan

International Centre for Theoretical Physics, Trieste, Italy

Postdoctoral Fellow, Mathematics, 2023-2026

Mentor: Alina Marian

EDUCATION

University of California San Diego, La Jolla, USA

Ph.D. in Mathematics, 2023

Advisor: Dragos Oprea

Thesis: Numerical invariants of Quot schemes of curves

Indian Institute of Science, Bangalore, India

B.S. in Mathematics, 2017

Advisor: Arvind Ayer

SUBMITTED WORK

- [1] *Intersection theory of hyperquot schemes on curves*
with R. Ontani and W. Xu
arXiv:2512.00578
- [2] *A Borel-Weil-Bott theorem for Quot schemes on $\mathbb{P}^1$*
with A. Gautum and F. Lin
arXiv:2511.03519

PUBLISHED WORK

- [3] *A short way of counting maps to hypersurfaces in Grassmannians*
with A. Marian
Ann. Scuola Norm. Super. Pisa Cl. Sci. (to appear)
- [4] *Quantum K-invariants via Quot schemes II*
with M. Zhang
J. London Math. Soc. 114 (2026), e70623
- [5] *Quantum K-invariants via Quot schemes I*
with M. Zhang
J. Math. Pures Appl. 213 (2026) P.103946
- [6] *The virtual intersection theory of isotropic quot schemes*
J. Geom. Phys. 198 (2024), P.105128, 39 pp.
- [7] *Euler characteristics of tautological bundles over quot schemes of curves*
with D. Oprea
Adv. Math. 418 (2023), P.108943, 45 pp.

- [8] *Cores of partitions in rectangles*
with A. Ayer
Electron. J. Comb. 31 (1) (2024), P.1.47, 14 pp
- [9] *Bergman-Einstein metrics on 2-dimensional Stein spaces*
with S. Ganguly
Mich. Math. J. 76 (2026), no. 1, 203–224.
- [10] *The size of t -cores and hook lengths of random cells in random partitions*
with A. Ayer
Ann. Appl. Probab. 33 (2023), no. 1, 85–106.
- [11] *Random t -cores and hook lengths in random partitions*
with A. Ayer
Sémin. lothar. comb. 84B (2020), Art. 58
- [12] *Driving chemical reactions with polariton condensates*
with S. Pannir-Sivajothi, J. Campos-Gonzalez-Angulo, L. Martínez-Martínez,
J. Yuen-Zhou
Nat. Commun. 13 (2022), 1–9

AWARDS

Powell Dissertation award, UC San Diego, 2023
Best Poster Award, Richmond Geometry Festival, 2022
James B.Ax Graduate Fellowship, UC San Diego, 2017-18
International Mathematical Olympiad (silver medal), Colombia, 2013
KVPY (young scientist) Fellowship, India, 2012-2017

TALKS

Conference Talks:

- International Conference on Combinatorics, Indian Institute of Science, Bangalore 2026: *Twisted quantum cohomology of Grassmannians*
- Workshop on Geometric Representation Theory, Amiens, France 2026: *Twisted quantum cohomology of Grassmannians*
- Current Developments in Moduli Theory, International Centre for Theoretical Physics, 2025: *Intersection Theory of Hyperquot Schemes on Curves*
- Helvetic Algebraic Geometry Seminar (HAGS), SwissMAP Research Station, 2025 : *Tautological bundles on Quot schemes of curves*
- Moduli stacks and enumerative geometry (VBAC), Isaac Newton Institute, Cambridge, 2024 : *Quantum K -invariants via Quot scheme*
- Categorical methods in moduli theory, University of Pennsylvania, 2023 : *Schur bundles over Quot schemes of $\mathbb{P}^1$* (short talk)
- The 32nd international conference on Formal Power Series and Algebraic Combinatorics (FPSAC) 2020 : *Random t -cores and hook lengths in random partitions*,

Seminar Talks:

- University of Trieste March, 2026 : *A Borel-Weil-Bott theorem for Quot schemes on the projective line*
- UC Berkeley January, 2026 : *Intersection theory of Hyperquot schemes on curves*

- UC Davis January, 2026 : *A Borel-Weil-Bott theorem for Quot schemes on the projective line*
- UC San Diego January, 2026 : *A Borel-Weil-Bott theorem for Quot schemes on the projective line*
- Institute for Advanced Study, Princeton April, 2025 : *Quantum K-invariants of Grassmannian*
- California Institute of Technology April, 2025 : *Counting Maps to Hypersurfaces in Grassmannians*
- UC Berkeley April, 2025 : *K-theoretic invariants of the Quot scheme of curves*
- UC San Diego March, 2025 : *Counting Maps to Hypersurfaces in Grassmannians*
- Indian Institute of Science January, 2025 : *Quantum K-invariants of Grassmannian*
- EPFL Lausanne November, 2024 : *K-theoretic invariants of the Quot scheme of curves*
- University of Vienna November 2024 : *K-theoretic invariants of the Quot scheme of curves*

ORGANIZATION

- Winter school on Graph Theory in Kathmandu, Nepal (2026), under the *Physics Without Frontiers* (PWF) initiative by ICTP.
- Trino (2024-till date), a joint seminar in Trieste, with ICTP, SISSA (International School for Advanced Studies), and the University of Trieste.

MENTORING

Students

- Amar Aldakheel, Diploma program ICTP 24-25
Thesis: *Vector Bundles and Topological K-Theory*
- Aubert Voalaza Mahavily Romuald, Diploma program ICTP 24-25
Thesis: *Lie Groups and Lie Algebras: Curvature and Representations*

Outreach Activity

- RTG graduate directed reading for undergraduates, *Algebraic curves and Riemann surfaces*, UC San Diego, Spring 2021
- RTG graduate directed reading for undergraduates, *27 lines on a cubic surface*, UC San Diego, Spring 2020
- Training Indian team for the International Mathematical Olympiads, 2014-2017.

TEACHING

Instructor (at ICTP)

- Algebraic Geometry, Winter 2026
- Complex Analysis, Fall 2024

Instructor (at UC San Diego):

- Calculus 1, Summer 2023
- Calculus 2, Summer 2022

- Calculus 2, Summer 2021

Teaching Assistant (at ICTP and UCSD):

- Algebraic Geometry (graduate), Spring 2024
- Complex Analysis (graduate), 2022-2023 and 2020-2021
- Extremal Combinatorics and Graph Theory, Winter 2023
- Applied Complex Analysis, Winter-Spring 2022
- Mathematical Reasoning, Fall 2021
- Discrete Math and Graph Theory, Spring 2023, Fall 2022, Spring 2021 and Winter 2018
- Modern Algebra, 2019-2020
- Number Theory, 2018-2019
- Enumerative Combinatorics, Spring 2018
- Vector Calculus, Spring 2019-20

SERVICE

Referee work for International Mathematics Research Notices, Advances in Mathematics, American Mathematical Monthly, Selecta Mathematica, ICTS conference proceedings, FPSAC conference proceedings