

# Oishee Banerjee

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Department of Mathematics,  
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## Research Interests

Primarily a topologist, I use techniques from homotopy theory, sheaf theory and algebraic geometry to understand the topology of moduli spaces of algebro-geometric origins, oftentimes having interesting arithmetic consequences.

## Publication and Preprints

- Cohomology of the space of polynomial maps on  $\mathbb{A}^1$  with prescribed ramifications, *Advances in Mathematics Volume 359*, 7 January 2020, 106881
- Filtration of cohomology via symmetric semisimplicial spaces, <https://arxiv.org/pdf/1909.00458.pdf>, *submitted*
- On the cohomology of certain subspaces of  $Sym^m(\mathbb{P}^1)$  Occam's razor for Hodge structures, *Research in the Mathematical Sciences volume 8*, Article number: 25, April 2021
- Étale cohomological stability of the moduli space of stable elliptic surfaces, with Jun-Yong Park and Johannes Schmitt, arXiv:2207.02496 (2022), *submitted*
- Moduli of curves on toric varieties and their stable cohomology (*preprint*)

## Work in progress

- Stability in cohomology via the symmetric simplicial category, *in preparation*
- Moduli space of nondegenerate maps on a smooth projective curve, with Claudio Gómez-González, *in preparation*
- Unirationality of Hurwitz spaces of degree 4 branched covers of  $\mathbb{P}^1$  with prescribed ramification and monodromy group  $D_4$ , *in preparation*

## Employment

August 2019-August 2022 **Postdoc**, Hausdorff Centre for Mathematics, Bonn, Germany.

September 2022-July 2023 **Postdoctoral Member**, Institute for Advances Studies, School of Mathematics, Princeton, NJ, USA.

## Education

- 2013-2019 **Ph.D, Mathematics**, *Advisor: Benson Farb, Co-advisor: Alexander Beilinson*, University of Chicago, USA.
- 2015 **M.S., Mathematics**, University of Chicago, USA.
- 2010-2013 **B.Math**, (*Bachelor in Mathematics*), *with distinction*, Indian Statistical Institute (ISI), Bangalore.

## Awards, Scholarships and Grants

- Summer 2012 **VSRP fellowship**, *by Tata Institute of Fundamental Research*, for undergraduate research under the supervision of Amalendu Krishna.
- 2010-2013 **INSPIRE fellowship**, *Department of Science and Technology*, Government of India.
- 2010-2013 **Scholarship awarded by the ISI**, (*declined in favor of INSPIRE fellowship*).
- September 2022-July 2023 **NSF Grant No. DMS-1926686**, *Institute for Advanced*, Princeton.

## Teaching Experience

- 2015-2018 Math 131/2/3: Elementary Functions and Calculus I/II/III (Instructor)
- 2014-2015 Worked as TA for Kevin Corlette, George Glauberman, and Ridgeway Scott
- Winter 2018 Grader for Graduate Algebraic Geometry, Madhav Nori
- Spring 2017 Grader for Graduate Complex Analysis, Greg Lawler
- Summer '14, '16, '18 Mentor, Research Experience for Undergraduates, University of Chicago, on topics spanning Percolation Theory, Riemannian Geometry, Complex Analysis, Topology, Galois theory etc., supervised about 15 undergraduate projects

## Invited Talks

- April 2019 Columbia University, *Topology seminar*
- April 2019 University of California, Irvine, *AG-Topology seminar*
- April 2019 Caltech, *Algebraic Geometry seminar*
- June 2019 Junior Participant Presentations, *PIMS Workshop on Arithmetic Topology*
- Nov 2019 Tata Inst. of Fundamental Research, Mumbai
- Dec 2019 ISI Kolkata, Colloquium
- March 2021 University of Maryland, *Algebra-Number Theory seminar*
- Nov 2021 University of Copenhagen
- Nov 2021 Utah Algebraic Geometry and Number Theory Seminar
- Jan 2022 Goethe-Universität, Institut für Mathematik
- March 2022 Purdue University, *Topology seminar*
- May 2022 University of Bath, *Number theory seminar*
- Sept 2022 IAS, *Postdoc Short talk*
- Nov 2022 Columbia University, *Algebraic Geometry and Number Theory seminar*
- Nov 2022 Princeton University, *Algebraic Geometry and Number theory seminar*

- Jan 2023 Louisiana State University, *colloquium*
- April 2023 Institute for Advanced Study, *member colloquium*
- July 2023 Purdue University, *Workshop on Stability in Topology, Arithmetic and Representation theory*

## Other talks

- March 2017 Pizza Seminar, *University of Chicago*
- March 2019 Farb and Friends Students' Seminar, *University of Chicago*
- Feb. 2020 Geometry Student Seminar, *University of Bonn*
- June 2020 Virtual Complex Geometry Informal Preprint Seminar
- Nov 2020 TIFR Students' Seminar
- Jan. 2021 Picard group of  $K_g$  for small  $g$ , after Greer, Li, and Tian, *Joint working group (Bonn-Paris): Moduli spaces of K3 surfaces and hyperkähler varieties.*

## Professional Services

- Referee Geometry and Topology, Advances in Mathematics
- Second Crelle opinion

## Research visits and conferences

- August 2017 Stony Brook University *Hodge Theory, Moduli and Representation Theory*
- June 2018 University of Chicago *The roots of topology: miracles of algebraic geometry, braids, and Hilbert's 13th problem*
- Feb. 2019 IPAM, UCLA *Braids, Resolvent Degree and Hilbert's 13th Problem*
- March 2019 University of Arizona, Tucson *Arizona Winter School 2019: Topology and Arithmetic*
- June 2019 PIMS, Vancouver *Workshop on Arithmetic Topology*
- Nov. 2019 TIFR, Mumbai *Research visit*
- Dec. 2019 Indian Statistical Institute, Kolkata *Research visit*
- Feb. 2020 Hausdorff Center for Mathematics *Perverse Sheaves in Enumerative Geometry*
- Nov 2021 University of Copenhagen *Workshop on Homology and Homotopy of Configuration Spaces*
- August 2022 TIFR, Mumbai *Research visit*
- May 2022 University of Bath, Bath *Research visit*
- July 2023 Purdue University *Workshop on Stability in Topology, Arithmetic and Representation theory*