Aritra Bhattacharya

Personal Information

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Date of Birth	1995/02/03
Nationality	Indian

Education

2024–Current	Postdoc in Mathematics, Beijing International Center for Mathematical Research, Peking University, China Mentor: Yibo Gao
2018–2024	PhD in Mathematics, The Institute of Mathematical Sciences, Chennai, India Advisor: Sankaran Viswanath
2016–2018	MSc in Mathematics, Savitribai Phule Pune University, Pune, India
2013–2016	BSc with honors in Mathematics, University of Calcutta, Kolkata, India

Research Interests

My research focuses on Algebraic Combinatorics, with a central theme of understanding relations between families of symmetric functions and establishing positivity results. I work primarily with Macdonald polynomials and their specializations (Hall-Littlewood and q-Whittaker functions), as well as LLT polynomials. To study these objects, I employ combinatorial models involving Young tableaux and Dyck paths, alongside algebraic tools from finite, affine, and double affine Hecke algebras and the representation theory of Kac-Moody Lie algebras.
Recently, I have engaged with Kazhdan-Lusztig theory, incorporating geometric techniques from the theory of perverse sheaves to prove a generalization of the classical Kazhdan-Lusztig positivity theorems.
I regularly use computer programming tools such as `SageMath` to experiment and formulate conjectures.

Publications

- **A tableaux formula for q-rook numbers**, with Tirtharaj Basu,
  Algebraic Combinatorics, Vol. 9 (2026) No. 1,
  arxiv: 2507.00766, 2025.
- **Equating Inv-Quinv formulas for the q-Whittaker and modified Hall-Littlewood functions**,
  The Electronic Journal of Combinatorics, Volume 32, Issue 4 (2025)
  arxiv: 2412.09929, 2024
- **Monomial expansions for q-Whittaker and modified Hall-Littlewood polynomials**, with T V Ratheesh and Sankaran Viswanath,

FPSAC 2024 extended abstract, Séminaire Lotharingien de Combinatoire, 91B.61 (2024), arxiv: 2311.07904, 2023

- **Clebsch-Gordan coefficients for Macdonald polynomials**, with Arun Ram, Algebras and Representation Theory, Volume 27, 2024 arxiv: 2310.10846 , 2023
- **Haglund's positivity conjecture for multiplicity one pairs**, Séminaire Lotharingien de Combinatoire, vol. 87, 2023 arxiv: 2205.11802, 2022

Preprints

- **On factorization of matrix of Kazhdan-Lusztig polynomials**, with Ashish Mishra and Shraddha Srivastava, arxiv: 2602.19508.
- **q-Whittaker polynomials: bases, branching and direct limits**, with T V Ratheesh and Sankaran Viswanath, arxiv: 2412.00116, 2024
- **The monomial expansion formula for Hall-Littlewood P-polynomials** arxiv: 2407.14652, 2024

Lectures and Presentations

- Talk on *On factorization of matrix of Kazhdan-Lusztig polynomials* at Workshop on Combinatorics, Algebra and Geometry Seminar of Tianyuan Mathematics Research Center, May 13, 2026.
- Talk on *On factorization of matrix of Kazhdan-Lusztig polynomials* at Chinese Academy of Sciences, April 23, 2026.
- Talk on *On factorization of matrix of Kazhdan-Lusztig polynomials* at CART seminar, April 17, 2026.
- Talk on *On factorization of matrix of Kazhdan-Lusztig polynomials* at BICMR, March 9, 2026.
- Lecture series on *Introduction to Macdonald Polynomials* at Shandong University, October 13–October 16, 2025.
- Talk on *An Introduction to q-Whittaker Polynomials* at BICMR, March 10, 2025.
- Poster presentation on *The Monomial Expansion formula for Hall-Littlewood Polynomials* at MERU 2024.
- Talk on *The Clebsch-Gordan coefficients for Macdonald polynomials* in Algebraic and Combinatorial Methods in Representation Theory, ICTS, November 14, 2023, slides.
- Talk on *The Clebsch-Gordan rules for Macdonald polynomials* at IMSc, October 26, 2023.
- Talk on *Haglund's positivity conjecture for Macdonald polynomials* in Meru Combinatorics Conference, May 29, 2023.
- Poster presentation on *The Clebsch-Gordan rules for Macdonald polynomials* at ALCOVE 2023.
- Talk on *Haglund's positivity conjecture for Macdonald polynomials* in University of Melbourne, March 2023.
- Lecture series on *Macdonald polynomials* at IMSc, September–November, 2022.

- Talk on *Macdonald Symmetric Functions and Haglund's conjecture* in Graduate Online Combinatorics Colloquium, 2022, video: Recorded Talk.
- Talk on *Haglund's Conjecture for Multiplicity one pairs* in Summer School in Algebraic Combinatorics, Kraków, 2022, slides: https://www.impan.pl/ mdolega/AlgCom22/Bhattacharya.pdf.

Organization

- Weekly IMSc Algebraic Combinatorics Seminar 2023, 2024 (jointly organized with Amritanshu Prasad)
- Moderator for discussion session BIRS-CMI workshop "25w5354: Quivers in representation theory", November 30 - December 5, 2025.