

Samir Panja

POST DOCTORAL FELLOW · STATISTICS AND MATHEMATICS UNIT

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Education

Indian Institute of Technology Bombay

Mumbai, India

PHD MATHEMATICS

2017 - 2023

Indian Institute of Technology Kanpur

Kanpur, India

MASTER OF SCIENCE IN MATHEMATICS

2014 - 2016

Vidyasagar University (Kharagpur College)

Midnapore, West Bengal, India

BACHELOR OF SCIENCE IN MATHEMATICS HONOURS

2011 - 2014

Academic appointments

JANUARY, 2024 - PRESENT

Post Doctoral Fellow

Statistics and Mathematics Unit

Indian Statistical Institute Bangalore Centre, Bangalore, India

MENTOR: PROF. JAYDEB SARKAR

AUGUST - DECEMBER, 2023

Institute Post Doctoral Fellow

Department of Mathematics

Indian Institute of Technology Bombay, Mumbai, India

MENTOR: PROF. BATA KRISHNA DAS

APRIL - JUNE, 2023

Research Associate

Department of Mathematics

Indian Institute of Technology Bombay, Mumbai, India

MENTOR: PROF. BATA KRISHNA DAS

Area of specialization

Mathematics: FUNCTIONAL ANALYSIS, COMPLEX ANALYSIS, OPERATOR THEORY, FUNCTION THEORY

Research focuses: *Working on the interface of operator theory, functional analysis, complex analysis, and function theory. More precisely on dilation and commutant lifting, reproducing kernel Hilbert spaces, complete Nevanlinna–Pick spaces, de Branges–Rovnyak spaces, Toeplitz and Hankel operators, and noncommutative function theory. Also, interested in developing the theoretical foundations of machine learning and exploring their applications.*

Publications, preprints, and book chapters

- Sneha B., N. Bala, **S. Panja**, and J. Sarkar, *Lifting and invariant subspaces of Hankel operators*, Publicacions Matemàtiques 70 (2026), 379 - 396.
- B.K. Das and **S. Panja**, *Isometric dilation and Sarason's commutant lifting theorem in several variables*, Canadian Journal of Mathematics 78 (2026), 1047 - 1079.
- H. Ahmed, B.K. Das, and **S. Panja**, *de Branges-Rovnyak spaces which are complete Nevanlinna-Pick spaces*, Journal of Geometric Analysis 35 (2025), no. 2, Paper No. 61.
- **S. Panja**, *Factorization of Toeplitz operators*, New York Journal of Mathematics 29 (2023), 848 - 873.
- M. Bhattacharjee, B.K. Das, R. Debnath, and **S. Panja**, *Dilations and operator models of $\mathcal{W}$ -hypercontractions*, Complex Anal. Oper. Theory 17 (2023), no. 2, Paper No. 22.
- S. Barik and **S. Panja**, *Noncommutative commutant lifting, interpolation, and shift-invariant subspaces*, arXiv:2609.11410.
- S. Barik, S. Jain, and **S. Panja**, *Doubly commuting invariant and co-invariant subspaces*, arXiv:2610.18403.

Book chapters:

- M. Bhattacharjee, B.K. Das, R. Debnath and **S. Panja**, *Dilations and operator models of $\mathcal{W}$ -hypercontractions*, Multivariable operator theory, Birkhäuser/Springer, Cham (2023), pp - 119 - 154.

Awards and recognitions

- 2023 **Post Doctoral Fellowship award**, National Board for Higher Mathematics (NBHM)
- 2017 **Ph. D. Scholarship**, National Board for Higher Mathematics (NBHM)
- 2017 **Ph. D. Scholarship**, Council of Scientific and Industrial Research (CSIR) NET
- 2017 **Eligibility for Lectureship**, Council of Scientific and Industrial Research (CSIR) LS-NET
- 2017 **Graduate Aptitude Test in Engineering (GATE)**, IITs and IISc
- 2015 - 2016 **Merit-cum-Means (MCM) Scholarship**, IIT Kanpur
- 2014 **Joint Admission Test for Masters (JAM)**, IITs and IISc
- 2012 - 2014 **Merit-cum-Means (MCM) Scholarship**, Government of West Bengal

Teaching experience

Instructor, ISI Bangalore Centre Autumn 2024
Function Spaces, B.Math. 3rd year (Designed and taught the course)

Teaching Assistant, ISI Bangalore Centre Spring 2026
Functional Analysis, M.Math 1st year.

Teaching Assistant, IIT Bombay

Semester	Course	Student cohort
Spring 2018	Introduction to Numerical Analysis	B.Tech, 2nd year
Autumn 2018	Calculus	B.Tech, 1st year
Spring 2019	Ordinary Differential Equations	B.Tech, 1st year
Autumn 2019	Linear Algebra	B.Tech, 1st year
Spring 2020	Introduction to Numerical Analysis	B.Tech, 2nd year
Autumn 2020	Real Analysis	M.Sc., 1st year
Spring 2023	Calculus	B.Tech, 1st year

Teaching Assistant, Advanced Instructional School June 2023
 BITS Pilani, Goa Campus: *Function Spaces; Operator Theory and Operator Algebras*.

Conference Talks

- JANUARY, 2025 On “**Which de Branges-Rovnyak Spaces have Complete Nevanlinna-Pick Property?**”, PDF-RS Annual Symposium 2025, Indian Statistical Institute Bangalore Center, India
- MARCH, 2024 On “**Isometric Dilation and Commutant Lifting of Operator Tuples with Defect Zero**”, Conference on National Conference on Operator Theory and Function Spaces, Shiv Nadar University, India
- FEBRUARY, 2023 On “**Isometric Dilation and Sarason’s Commutant Lifting Theorem in Several Variables**”, Conference on Functional Analysis and Related Topics, Department of Mathematics, IIT Bombay, India
- SEPTEMBER 2022 On “**Dilations and Operator Models of $\mathcal{W}$ -hypercontractions**”, International Workshop on Operator Theory and its Applications (IWOTA) at University of Agriculture in Krakow, Poland

Academic service and professional development

Conference organization: Conference on Functional Analysis and Related Topics, IIT Bombay, February 2023.

Conferences and workshops attended:

- Noncommutative Analysis and Probability, IISc Bangalore (January 2026);
- Operator Algebra and Related Topics, IIT Bombay (February 2025);
- PDF-RS Annual Symposium, ISI Bangalore (January 2025);
- Noncommutative Mathematics and Applications, ISI Bangalore (October 2024);
- National Conference on Operator Theory and Function Spaces, Shiv Nadar University (March 2024);
- Functional Analysis and Related Topics, IIT Bombay (February 2023);
- IWOTA, Krakow (September 2022);
- Fields Institute Focus Program on Analytic Function Spaces and Their Applications, online (July–December 2021);
- ATM School on Operator Theory, IIT Kanpur (December 2019);
- Functional Analysis conference, IIT Bombay (October 2019).

Technical skills and languages

Programming: Lean, Python, C++. **Tools:** $\text{\LaTeX}$, Excel, Word, HTML, CSS.

Languages: English, Bengali, Hindi.

Referees

Prof. Bata Krishna Das — Department of Mathematics, IIT Bombay.

bata436@gmail.com Tel.: 022 2576 9460.

Prof. Jaydeb Sarkar — Statistics and Mathematics Unit, ISI Bangalore.

jaydeb@gmail.com Tel.: +91 80 2698 5479.