

BIO DATA

1. Name and full correspondence address: Tirthankar Bhattacharyya, Department of Mathematics, Indian Institute of Science, Bangalore, Karnataka, 560012

2. Email and contact number: tirtha@iisc.ac.in
Phone: +91 9448279673

3. Date of Birth: 7 February 1968

4. Gender: Male

5. Academic Qualification: Ph.D. 1997, Indian Statistical Institute

6. Ph.D. thesis title:

Some Problems in Joint spectral theory.

Guide's name: *Professor Rajendra Bhatia*

7. Work experience:

S. No	Position	Name of the Institute	From	To
1.	Professor (HAG)	Department of Mathematics at the Indian Institute of Science	February 2022	present
1.	Professor	Department of Mathematics at the Indian Institute of Science	February 2012	January 2022
2.	Associate Professor	Department of Mathematics at the Indian Institute of Science	February 2006	January 2012
3.	Assistant Professor	Department of Mathematics at the Indian Institute of Science	February 2000	January 2006
4.	PIMS post-doctoral fellow	University of Victoria, Canada	September 1999	January 2000
5.	Poorna Prajna post-doctoral fellow	Indian Statistical Institute, Bangalore	December 1998	August 1999
6.	Killam post-doctoral fellow	University of Calgary, Canada	November 1997	November 1998
7.	Post-doctoral fellow	Institute of Mathematical Sciences, Chennai.	April 1997	October 1997

8. Professional Recognition/ Award/ Prize/ Certificate, Fellowship received:

S. No	Name of Award	Awarding Agency	Year
1.	Killam post-doctoral fellowship	Izaak Walton Killam Memorial Fund for Advanced Studies	1997-1998
2.	PIMS post-doctoral fellowship	Pacific Institute for the Mathematical Sciences	1999-2000
3.	C. L. Chandna award for research and teaching	Indo-Canadian Math Foundation	2004
4.	Raja Ramanna Fellowship	Department of Science and Technology, India	2006-2009. Extended to March, 2010.
5.	Fellow of the Indian Academy of Sciences FASc.	Indian Academy of Sciences	2016
6.	Fellow of the Indian National Science Academy FNA	Indian National Science Academy	2021
7.	Fellow of the National Academy of Sciences, India FNASc	National Academy of Sciences, India	2021
8.	IISc Alumni award for excellence in research in science.	Indian Institute of science	2022
9.	J. C. Bose Fellowship.	SERB	2022
10.	SPARC	DST	2023

9. Books.

Book: Dilations, Completely Positive Maps and Geometry (with B V Rajarama Bhat), [Indian edition](#) by Hindustan Book Agency, 2023. [International edition](#) by Springer, 2023.

Books edited:

- T. Bhattacharyya, M. A. Dritschel (Eds.), Operator Algebras and Mathematical Physics, Operator Theory: Adv. and Appl., Vol. Nr. 247, Springer Basel AG, Basel, 2015.
- T. Bhattacharyya, R. A. Horn and T. S. S. R. K. Rao (Eds.), In the matrix mould, Expository articles by Rajendra Bhatia. Hindustan Book Agency, New Delhi, 2013.

10. Publications (List of papers in year wise descending order).

- 52) Kernels with complete Nevanlinna-Pick factors and the characteristic function, co-authored with Abhay Jindal. Submitted to journal and arXiv identifier is 2307.10595.
- 51) On factorization of the shift semigroup, co-authored with Shubham Rastogi, Kalyan Bidhan Sinha and Vijaya Kumar U. Submitted to journal and arXiv identifier is 2306.15343.
- 50) Doubly commuting and dual doubly commuting semigroups of isometries, co-authored with Shubham Rastogi and Vijaya Kumar U. To appear in Journal of Operator Theory and arXiv identifier is 2306.14183.
- 49) A note on the dilation of a certain family of tetrablock contractions, co-authored with Mainak Bhowmik. To appear in Operator and Matrix Theory, Function Spaces, and Applications: Proceedings of the International Workshop on Operator Theory and its Applications (IWOTA 2022) and arXiv identifier is 2204.10753.
- 48) Sequences of operator algebras converging to odd spheres in the quantum Gromov-Hausdorff distance, co-authored with Sushil Singla. Submitted to journal and arXiv identifier is 2211.04321.
- 47) A dilation theoretic approach to approximation by inner functions, co-authored with Daniel Alpay, Abhay Jindal and Poornendu Kumar. To appear in Bull. Lond. Math. Soc. and arXiv identifier is 2203.10936.
- 46) *Complete Nevanlinna-Pick kernels and the characteristic function*, co-authored with Abhay Jindal. Advances in Mathematics, Volume 426, 1 August 2023, 109089. DOI is [10.1016/j.aim.2023.109089](https://doi.org/10.1016/j.aim.2023.109089) and arXiv identifier is 2110.00223.
- 45) *On the structure and joint spectrum of a pair of commuting isometries*, co-authored with Shubham Rastogi and Vijaya Kumar U. Complex Analysis and Operator Theory, (2022) 16:83. DOI is [10.1007/s11785-022-01257-0](https://doi.org/10.1007/s11785-022-01257-0) arXiv link is <https://arxiv.org/pdf/2105.02134.pdf>
- 44) *On the geometry of the symmetrized bidisc*, co-authored with A. Biswas and A. Maitra. Indiana Univ. Math. J., Volume 71 (2022), Issue 2, pages 685-713. DOI is [10.1512/iumj.2022.71.8896](https://doi.org/10.1512/iumj.2022.71.8896) and arXiv link is <https://arxiv.org/pdf/2005.00289.pdf>
- 43) *Distinguished varieties through the Berger--Coburn--Lebow Theorem*, co-authored with P. Kumar and H. Sau. Analysis & PDE, Volume 15 (2022), Number 2, pages 477-506. DOI is [10.2140/apde.2022.15.477](https://doi.org/10.2140/apde.2022.15.477) and arXiv link is <https://arxiv.org/pdf/2001.01410.pdf>
- 42) *Toeplitz operators and pseudo-extensions*, co-authored with B. Krishna Das and H. Sau. International Journal of Mathematics, (2022) 2250076. DOI is [10.1142/S0129167X22500768](https://doi.org/10.1142/S0129167X22500768) and arXiv link is <https://arxiv.org/pdf/1906.01313.pdf>

- 41) *Interpolating sequences and the Toeplitz corona theorem on the symmetrized bidisk*, co-authored with H. Sau. *Journal of Operator Theory*, Volume 87 (2022), Issue 2, pp. 435-459. DOI is [10.7900/jot.2020oct07.2311](https://doi.org/10.7900/jot.2020oct07.2311) and arXiv link is <http://arxiv.org/abs/1909.03237>
- 40) *Some thoughts in composition operators on subspaces of the Hardy space*, co-authored with J. Anand and S. Srivastava, *Archiv der Mathematik*, 114 (2020), 431–444. DOI is [10.1007/s00013-019-01406-6](https://doi.org/10.1007/s00013-019-01406-6).
- 39) *Toeplitz operators on the symmetrized bidisc*, co-authored with B. Krishna Das and H. Sau, *International Mathematics Research Notes (IMRN)* Volume 2021, Issue 11, June 2021, Pages 8763–8805 and arXiv link is <https://arxiv.org/pdf/1706.03463.pdf>
- 38) *On the Nevanlinna problem - Characterization of all Schur-Agler class solutions affiliated to a given kernel*, co-authored with A. Biswas and V. Singh Chandel. To appear in *Studia Mathematica* and arXiv link is <https://arxiv.org/pdf/1905.04301.pdf>
- 37) *Survey of last ten years of work done in India in some selected areas of functional analysis and operator theory*, co-authored with T S R K Rao, *Indian Journal of Pure and Applied Mathematics*, September 2019, Volume 50, *Issue 3*, pp 599–617. DOI is [10.1007/s13226-019-0345-4](https://doi.org/10.1007/s13226-019-0345-4). Available online and free at https://www.insa.nic.in/writereaddata/UpLoadedFiles/IJPAM/Vol50_2019_3_ART02.pdf
- 36) *Holomorphic functions on the symmetrized bidisk -- realization, interpolation and Extension*, coauthored with H. Sau, *J. Funct. Anal.* 274 (2018), 504-524. DOI is [10.1016/j.jfa.2017.09.013](https://doi.org/10.1016/j.jfa.2017.09.013) and arXiv link is <https://arxiv.org/pdf/1511.08962.pdf>
- 35) *Analytic model of doubly commuting contractions*, co-authored with E. K. Narayanan and J. Sarkar, *Oper. Matrices* 11 (2017), no. 1, pages 101–113. DOI is [10.7153/oam-11-07](https://doi.org/10.7153/oam-11-07) and arXiv link is <https://arxiv.org/pdf/1310.0950.pdf>
- 34) *Γ -unitaries, dilation and a natural example*, co-authored with H. Sau, *Publ. Res. Inst. Math. Sci.* 53 (2017), no. 2, pages 261–285. DOI is [10.4171/PRIMS/53-2-2](https://doi.org/10.4171/PRIMS/53-2-2) and arXiv link is <https://arxiv.org/pdf/1311.1577.pdf>
- 33) *Explicit and unique construction of tetrablock unitary dilation in a certain case*, co-authored with H. Sau, *Complex Anal. Oper. Theory* 10 (2016), no. 4, pages 749–768. DOI is [10.1007/s11785-015-0472-9](https://doi.org/10.1007/s11785-015-0472-9) and arXiv link is <https://arxiv.org/pdf/1412.4363.pdf>
- 32) *Admissible fundamental operators*, co-authored with S. Lata and H. Sau, *Journal of Mathematical Analysis and Applications* 425 (2015), pages 983–1003. DOI is [10.1016/j.jmaa.2015.01.006](https://doi.org/10.1016/j.jmaa.2015.01.006) and arXiv link is <https://arxiv.org/pdf/1404.5819.pdf>
- 31) *The tetrablock as a spectral set*, *Indiana Univ. Math. J.* 63 (2014), no. 6, pages 1601–1629. DOI is [10.1512/iumj.2014.63.5407](https://doi.org/10.1512/iumj.2014.63.5407) and arXiv link is <https://arxiv.org/pdf/1207.3395.pdf>
- 30) *A functional model for pure Gamma contractions*, co-authored with S. Pal, *Journal of Operator Theory* 71 (2014), no. 2, pages 327–339. DOI is [10.7900/jot.2012mar21.1946](https://doi.org/10.7900/jot.2012mar21.1946) and arXiv link is <https://arxiv.org/pdf/1202.3841.pdf>
- 29) *Characterization of Birkhoff-James orthogonality*, co-authored with P. Grover, *Journal of*

Mathematical Analysis and Applications 407 (2013), pages 350-358. DOI is [10.1016/j.jmaa.2013.05.022](https://doi.org/10.1016/j.jmaa.2013.05.022), open access

28) *The Defect sequence for contractive tuples*, co-authored with B. Krishna Das, S. Sarkar, Linear Algebra and Its Applications, 438 (2013), pages 315 – 330. DOI is [10.1016/j.laa.2012.07.041](https://doi.org/10.1016/j.laa.2012.07.041) and arXiv link is <https://arxiv.org/pdf/1211.5898.pdf>

27) *Completely bounded kernels*, co-authored with M. A. Dritschel and C. S. Todd, Acta Sci. Math. (Szeged), vol. 79, issues 1-2(2013), pages 191-217. DOI is not known, arXiv link is <https://arxiv.org/pdf/1001.3590.pdf>

26) *Hilbert W^* modules and coherent states*, co-authored with S. Shyam Roy, Journal of Physics A: Math. Theor., vol. 45, 244020 (6pp), 2012. DOI is [10.0.4.64/1751-8113/45/24/244020](https://doi.org/10.0.4.64/1751-8113/45/24/244020)

25) *Dilation of Gamma contractions by solving operator equations*, co-authored with S. Pal and S. Shyam Roy, Advances in Mathematics, 230 (2012), pages 577 – 606. DOI is [10.1016/j.aim.2012.02.016](https://doi.org/10.1016/j.aim.2012.02.016) and arXiv link is <https://arxiv.org/pdf/1108.0774.pdf>

24) *Coincidence of Schur Multipliers of the Drury-Arveson Space*, co-authored with A. Bhattacharya, Acta Sci. Math. (Szeged), vol. 78, issues 1-2 (2012), pages 265-277. DOI is not known, the arXiv link is <https://arxiv.org/abs/0911.3488>

23) *Abstract characteristic function*, *Complex Analysis and Operator Theory*, vol. 6, issue 1, pages 91- 103. DOI is [10.0.3.239/s11785-010-0065-6](https://doi.org/10.0.3.239/s11785-010-0065-6)

22) *Coherent states on Hilbert modules*, co-authored with S. T. Ali and S. Shyam Roy, Journal of Physics A, vol. 44, no. 27, 275202, 16 pages. DOI is [10.0.4.64/1751-8113/44/27/275202](https://doi.org/10.0.4.64/1751-8113/44/27/275202) and the arXiv link is <https://arxiv.org/pdf/1007.0798.pdf>

21) *Coherence of the real symmetric Hardy algebra*, co-authored with A. Sasane, Operators and Matrices, vol. 5 no. 2, pages 303–308. DOI is [10.0.27.241/oam-05-21](https://doi.org/10.0.27.241/oam-05-21)

20) *Complete Pick Positivity and Unitary Invariance*, co-authored with A. Bhattacharya, Studia Mathematica, 200, pages 149-162. DOI is [10.0.15.224/sm200-2-3](https://doi.org/10.0.15.224/sm200-2-3) and the arXiv link is <https://arxiv.org/abs/0910.5093>

19) *A learning algorithm for risk-sensitive cost*, co-authored with A. Basu and V. S. Borkar, Mathematics of Operations Research, vol. 33, No. 4, pages 880-898. DOI is [10.1287/moor.1080.0324](https://doi.org/10.1287/moor.1080.0324)

18) *On $c.n.c$ commuting contractive tuples*, co-authored with J. Eschmeier and J. Sarkar, Proc. Indian Acad. Sci., Math. Sci., vol. 116, no. 3, pages 299 – 316. DOI is [10.0.3.239/BF02829747](https://doi.org/10.0.3.239/BF02829747) and the arXiv link is <https://arxiv.org/pdf/math/0509162.pdf>

17) *Contractive and completely contractive maps over planar algebras*, co-authored with G. Misra, Illinois Journal of Mathematics, 49, no. 4, pages 1181–1201. Permanent link is <http://projecteuclid.org/euclid.ijm/1258138134> and the arXiv link is <https://arxiv.org/pdf/math/0505251.pdf>

16) *Two parameter uniformly elliptic Sturm-Liouville problems with eigenparameter dependent boundary conditions*, co-authored with J. P. Mohandas, Proceedings of Edinburgh Mathematical Society, vol. 48, no. 3, pages 531--547. DOI is [10.0.3.239/1-4020-2623-4_2](https://doi.org/10.0.3.239/1-4020-2623-4_2)

- 15) *Characteristic function for polynomially contractive commuting tuples*, co-authored with J. Sarkar, *Journal of Mathematical Analysis and Applications*, vol. 321, No. 1, pages 242–259. DOI is [10.0.3.248/j.jmaa.2005.07.075](https://doi.org/10.0.3.248/j.jmaa.2005.07.075)
- 14) *Characteristic function of a pure commuting contractive tuple*, co-authored with J. Eschmeier and J. Sarkar, *Integral Equations Operator Theory*, vol. 53, no. 1, pp. 23-32. DOI is [10.1007/s00020-004-1309-5](https://doi.org/10.1007/s00020-004-1309-5)
- 13) *Standard non-commuting and commuting dilations of commuting tuples*, co-authored with B.V.R. Bhat and S. Dey, *Transactions of American Math. Society*, vol.356, No.4, pp. 1551-1568. DOI is [10.0.4.66/S0002-9947-03-03310-5](https://doi.org/10.0.4.66/S0002-9947-03-03310-5)
- 12) *Dilation of contractive tuples: a survey*, *Surveys in Analysis and Operator Theory*, vol. 40, CMA, Australian National University, pp. 89-126, 2002.
- 11) *Right definite multiparameter Sturm-Liouville problems with eigenparameter dependent boundary conditions*, co-authored with T. Kosir and B. Plestenjak, *Proceedings of Edinburgh Mathematical Society*, vol. 45, pp. 565-578, 2002. DOI is [10.1017/S0013091501000207](https://doi.org/10.1017/S0013091501000207)
- 10) *Some thoughts on Ando's theorem and Parrott's example*, co-authored with B. Bagchi and G. Misra, *Linear Algebra and Its Applications*, vol.341, pages 357-367, 2002. DOI is [10.1016/S0024-3795\(01\)00454-2](https://doi.org/10.1016/S0024-3795(01)00454-2)
- 9) *A model theory for q -commuting contractive tuples*, co-authored with B.V. R. Bhat, *Journal of Operator Theory*, vol.47, pages 97-116, 2002. Stable URL: <http://www.jstor.org/stable/24715527>
- 8) *Commuting compact self-adjoint operators on a Pontryagin Space*, co-authored with T. Kosir, *Integral Equations and Operator Theory*, vol.39, pages 377-386, 2001. DOI is [10.1007/BF01203319](https://doi.org/10.1007/BF01203319)
- 7) *Multiparameter Sturm-Liouville problems with eigenparameter dependent boundary conditions*, co-authored with P.A. Binding and K. Seddighi, *Journal of Mathematical Analysis and Applications*, vol.264, pages 560-576, 2001. DOI is [10.1006/jmaa.2001.7695](https://doi.org/10.1006/jmaa.2001.7695)
- 6) *Two parameter right definite Sturm-Liouville problems with eigenparameter dependent boundary conditions*, co-authored with P.A. Binding and K. Seddighi, *Proceedings of Royal Society of Edinburgh Sect. A*, vol. 131, pages 45-58, 2001. DOI is [10.1017/S0308210500000780](https://doi.org/10.1017/S0308210500000780)
- 5) *On finite-dimensional commutative non-hermitian fusion algebras*, *Linear Algebra and Its Applications*, vol.287, pages 87-103, 1999. DOI is [10.1016/S0024-3795\(98\)10135-0](https://doi.org/10.1016/S0024-3795(98)10135-0)
- 4) *On tuples of commuting compact operators*, *RIMS Kyoto Univ.* vol. 32, no. 5, pages 785-795, 1996. DOI is [10.2977/prims/1195162382](https://doi.org/10.2977/prims/1195162382)
- 3) *On the joint spectral radius of commuting matrices*, co-authored with R. Bhatia, *Studia Mathematica*, vol.114, pages 29-38, 1995. Online access at <http://matwbn.icm.edu.pl/ksiazki/sm/sm114/sm11413.pdf>
- 2) *A generalization of the Hoffman-Wielandt Theorem*, co-authored with R. Bhatia, *Linear Algebra and Its Applications*, vol. 179, pages 11-17, 1993. DOI is [10.1016/0024-3795\(93\)90318-I](https://doi.org/10.1016/0024-3795(93)90318-I)

1) *A Henrici theorem for joint spectra of commuting matrices*, co-authored with R. Bhatia, Proceedings of American Math. Society, vol.118 pages 5-14, 1993. Online access at <http://www.ams.org/journals/proc/1993-118-01/S0002-9939-1993-1160292-7/S0002-9939-1993-1160292-7.pdf>

11. Any other Information:

Conference talks (invited speaker, last few years)

Plenary speakers in many conferences in India.

- Invited speaker at IWOTA 2022 at Krakow.
- Invited speaker at the 28th International Conference on Operator Theory, organized jointly by the Institute of Mathematics of the Romanian Academy and the West University of Timisoara, July 2020.
- Session speaker at IWOTA 2018 at Shanghai. Session speaker at IWOTA 2016 at Washington University, St. Louis.
- Oberwolfach conference “Hilbert Modules and Complex Geometry” from 20 to 26 April, 2014.
- Session speaker at IWOTA 2014 at Amsterdam.
- ICMS (Edinburgh) conference “Function theory in several complex variables in relation to modelling uncertainty” from 21 to 25 July, 2014.
- Session speaker at IWOTA 2012 at Sydney.
- ICMS (Edinburgh) conference “Quantum Probability, Noncommutative Geometry and Quantum Information” from 16 to 18 January, 2012.
- Invited speaker at IWOTA 2008 at Berlin.

Conference organization: Many, most notably the following three.

- AMS-India Conference of December 2003 – massive conference. This meeting was a precursor to ICM 2010, testing infrastructure, facilities and temperament.
- Matrices and Operators of December 2012, an international conference on Hilbert space operators and matrices in honour of the sixtieth birth-year of Rajendra Bhatia. It was widely participated by many Indian and foreign mathematicians working in the broad area of mathematical analysis.
- IWOTA at Indian Institute of Science, in December, 2013. IWOTA is the biggest annual global event in operator theory. This was the twenty-third IWOTA and the first one in India. Responsible for bringing this conference to India by negotiation and interaction with the Steering Committee of IWOTA. Was a great success, benefiting many Indian mathematicians.

Students guided for Ph.D. and their present placements:

- 1) Prof. Jaydeb Sarkar (Ph.D. 2006) is presently a professor at Indian Statistical Institute, Bangalore.
- 2) Dr. J. P. Mohandas finished (Ph.D. 2007) is presently an assistant professor at Government College, Kasaragod.
- 3) Dr. Sourav Pal (Ph.D. 2012) is presently an assistant professor at IIT, Bombay.
- 4) Dr. Santanu Sarkar (Ph.D. 2014) is presently an assistant professor at IIT Ropar.
- 5) Dr. Haripada Sau (Ph.D. 2016) is presently an assistant professor at IISER, Pune.
- 6) Dr. Anindya Biswas (Ph.D. 2021) is presently a post-doctoral fellow at Masaryk University, Czech Republic.
- 7) Dr. Poornendu Kumar (Ph.D. 2023) is presently a research associate at IISc. Scheduled to join post-doctoral fellowship at the University of Manitoba, Canada.
- 8) Mr. Shubham Rastogi has submitted his Ph.D. thesis in July, 2023.

Three Ph.D. students are working now with Tirthankar Bhattacharyya. Two of them are PMRF recipients.

International organization

Tirthankar Bhattacharyya is in the steering committee of IWOTA. See here <https://www.math.wustl.edu/~iwota/>

Some metrics from google scholar

	All	Since 2018
Citations	649	329
h-index	14	10
i10-index	19	10

