Dr. Tathagata Banerjee

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Nationality

Indian

Date Of Birth

31.12.1985

Education/ Employment

Joined as an assistant professor in the Department of Mathematics, Cochin University of Science and Technology, Kochi, Kerala from 15th January, 2021.

D.S. Kothari Post-doctoral fellow with Prof. Tirthankar Bhattacharyya at the Indian Institute of Science, Bangalore from May, 2020 to 14th January,2021.

Visiting scientist at ISI, Bangalore from September, 2019 to March, 2020.

NPDF (National Postdoctoral Fellowship) scholar at the Indian Statistical Institute, Bangalore with Prof. B.V. Rajarama Bhat from 1st September, 2017 to 31st August, 2019.

Visiting Scientist at ISI, Bangalore from January to August, 2017.

Ph.D. in Mathematics from Georg-August-Universitaet Göttingen(University of Göttingen), Germany. The position started from May, 2011 and thesis defended successfully on 25th November, 2015. Final submission of thesis and degree awarded on 23rd November, 2016.

Dissertation: "Coarse Geometry for noncommutative Spaces".

Supervisor 1: Prof. Dr. Ralf Meyer.

supervisor 2: Prof. Dr. Thomas Schick

June, 2010 - April 2011 Short stay as a research student under N.B.H.M. Ph.D. scholarship at R.K.M.V.U. Belur and Indian Statistical Institute, Delhi.

M.Sc. in Mathematics; *First class, 8.1 C.G.P.A*; Ramakrishna Mission Vivekananda University, Belur, India; 2008 - 2010.

B.Sc. with Physics Honours; *First class*, overall marks of 70.37%; St. Stephen's College, Delhi; University of Delhi, India; 2005 - 2008.

Research Experience

Post-doctoral research: Mainly focused on the extension of my Ph.D. thesis work.

Ph.D. thesis: Four and a half years on my dissertation topic of "Coarse geometry for Noncommutative spaces" at Georg-August-Universität Göttingen,Germany. With the help of my supervisor Prof. Ralf Meyer we developed for the first time an understanding of coarse geometry (also called large-scale geometry) for non-compact, noncommutative spaces.

Master Project (Book oriented): Studying about Gauge Fields from the book "Gauge Fields, Knots and gravity" by J. Baez and Muniain ; at R.K.M.V.U. Belur, India; January 2010 – May 2010.

Summer Project: Study of Harmonic Analysis and Functional Analysis under Prof. V.S. Sunder at the Institute for Mathematical Sciences, Chennai, India; May 2009 – July 2009.

Articles

1. Joint article title "C*-extreme points of positive operator valued measures and unital completely positive maps" published in Communications in Mathematical Physics, 2021.
   https://link.springer.com/article/10.1007/s00220-021-04245-1
   DOI: https://doi.org/10.1007/s00220-021-04245-1

2. Joint article title "Noncommutative Coarse Geometry" published in the Journal of Noncommutative Geometry, 2019
   https://www.ems-ph.org/journals/show_abstract.php?issn=1661-6952&vol=13&iss=3&rank=8
   DOI: 10.4171/JNCG/346

3. Ph.D. thesis "Coarse Geometry for Noncommutative Spaces"
   http://ediss.uni-goettingen.de/handle/11858/00-1735-0000-002B-7CB9-3
   .

Fields of Research Interest

- Toeplitz algebra and Berezin transform: The main examples in our formulation of noncommutative coarse geometry come from Rieffel deformation of C$^*-$algebras. In this direction the algebra of Toeplitz operators on interesting domains inside $\mathbb{C}^n$ are important examples to study. Efforts are on to understand the existing literature in this direction in our framework of noncommutative coarse geometry

- Operator algebras: Rieffel deformation of C$^*-$algebras by strongly continuous action of an abelian group and more generally 2-cocycle deformation and the associated completely positive maps. This direction of my interest also includes to a certain extent the topic of deformation quantization in Mathematical Physics.

- Study of completely positive maps in the direction of C$^*-$extreme points, CP-convexity with special interest in the theory for commutative C$^*-$algebras from the perspective of noncommutative coarse geometry.

- Coarse geometry and higher index theory in the direction of work by Prof. John Roe.

- Geometric boundaries of groups from the perspective of probability theory.

Teaching Statement

At Cochin University of Science and Technology, Kochi I have taken the following courses so far from the year 2021 to present:

1. Real Analysis for M.Sc. Mathematics 1st semester.
2. ODE-PDE for Integrated M.Sc. 6th semester.
3. Measure theory and Integration for M.Sc. Mathematics 2nd semester.
4. Topology-II for M.Sc. Mathematics 3rd semester.
5. Calculus-II for Integrated M.Sc. 3rd semester.
6. Elective- Algebraic Topology for M.Sc. Mathematics 4th semester.
7. Functions of several variables and geometry for M.Sc. Mathematics 2nd semester.
8. Complex Analysis for Integrated M.Sc. 5th semester.
9. Linear Algebra and Geometry in $\mathbb{R}^n$ for Integrated M.Sc. 5th semester.

Teaching assistant for the course Operator theory, taken by Prof. Rajarama Bhat for M.Math IInd year students at ISI, Bangalore from January to May, 2017. It involved taking four classes in the absence of the instructor apart from checking homework assignments.

Teaching assistant for the course Writing of Mathematics, taken by Prof. Siva Athreya for B. Math Ist year students at ISI, Bangalore from July to November, 2017.

Teaching assistant for the course Functional Analysis, taken by Prof. Jaydeb Sarkar for M.Math Ist year students at ISI, Bangalore from January to May, 2018. It involved taking one tutorial class per week during the last two months of the course apart from checking homework assignments.

Teaching assistant for the course Point-set Topology, taken by Dr. Santhosh Kumar, for B.Math IInd year students at ISI Bangalore from January to May, 2019 which involved mainly correction of homework assignments.

Teaching assistant for the course Introduction to Stochastic processes, taken by Prof. Parthanil Roy, for B.Math IIIrd year students at ISI Bangalore from July to November, 2019.

Fellowships and Awards

Qualified for the NET Junior Research Fellowship exam (with rank 46) conducted by CSIR, India on 20th December, 2009.

Awarded the NBHM Ph.D. scholarship in Mathematics, 2010 from the National Board of Higher Mathematics, India.

Stipend for doctoral studies from the GRK 1493 "Mathematical Structures in Modern Quantum Physics" funded by Deutsche Forschungsgemeinschaft (German Research Foundation) during the period 2011-2014.

Extension of stipend for completion of Ph.D. studies from personal grant of supervisors, 2014-2015.

Participated with fellowship at the Hausdorff trimester programme on "Non-commutative geometry and its applications" at the Hausdorff Institute for Mathematics, Bonn, Germany from 12th October to 1st November, 2014.

Participated with fellowship at the Simons semester on "Noncommutative geometry the next generation" at the Institute of Mathematics of the Polish Academy of Sciences, Warsaw from 1st of September to 30th November, 2016.

Awarded the National Post-doctoral fellowship (NPDF) by Science and Engineering Research Board (SERB), India in August, 2017 for post-doctoral research under the mentorship of Prof. B.V. Rajarama Bhat at the Indian Statistical Institute, Bangalore centre.

Awarded the D.S. Kothari Post-doctoral fellowship in March, 2020 to work under the mentorship of Prof. Tirthankar Bhattacharyya at the Indian Institute of Science, Bengaluru.

Conference and Seminar Presentations

Attended NCGOA Annual Spring Institute on Non-commutative Geometry and Operator Algebras 2012, which was on "Conformal Field Theory and Von Neumann Algebras"; Department of Mathematics, Vanderbilt University, USA,May 4-10,2012.

Presented a short talk "Trying Coarse Geometry for Non-commutative Spaces"at SFB Mini-workshop on C^*-algebras ,C^*-bundles and group actions; Mathematisches Institute, University of Münster, Germany, November 25-29, 2013.

Presented a short talk "Coarse Geometry for Non-commutative Spaces" at the Conference KInd on K-Theory and Index Theory at Institut Elie Cartan Metz, Universit de Lorraine, Metz, France, June 2-6, 2014.

Participated at conferences within the Hausdorff trimester programme on "Non-commutative geometry and its applications" at HIM, Bonn, Germany from 12th October to 1st November, 2014.

Presented a talk on "Coarse geometry for noncommutative spaces via compactifications" at the Conference Noncommutative methods in Topology and Geometry at Université Claude Bernard Lyon, Lyon, France, 1-5 June, 2015.

Presented a talk on my thesis at the Kleines seminar of the group on Non-commutative Geometry and topology under the research training group SFB 878 at Mathematics Institute, Münster, Germany on 16th November, 2015 during my visit to Prof. Dr. Siegfried Echterhoff.

Presented a talk on my thesis on 21st December 2015 at ISI, Bangalore, India during my visit to Prof. Rajarama Bhat for a week.

Presented a series of four talks on my thesis during my visit to Prof. Debashish Goswami at ISI, Kolkata, India from February to April, 2016

Presented talks on my thesis during my visit to Prof. Partha Sarathi Chakraborty at IMSc, Chennai, India from June to August, 2016.

Participated at the summer school "Coarse Index theory" held at the University of Freiburg, Germany from 26th September to 30th September, 2016.

Participated at conferences within the Simons semester on "Noncommutative geometry the next generation" from 1st of September to 30th November, 2016.

Participated and presented a talk on "Noncommutative coarse geometry" at the conference "Recent advances in Operator theory and Operator algebras 2016" held at the Indian Statistical Institute, Bangalore from December 13 - 22, 2016.

Participated at the conference "Noncommutative Analysis" held at the Institute of Mathematical Sciences, Chennai from February 6 - 11, 2017.

Participated at the workshop "Groups, Geometry and Dynamics" held at ICTS, Bangalore from 6th November to 24th November, 2017.

Participated (along with some minor organizational duties) at the conference "Recent advances in Operator theory and Operator algebras 2018" held at the Indian Statistical Institute, Bangalore from December 13 - 19, 2018.

Participated at the two week workshop "Probabilistic methods in negative curvature" held at ICTS, Bangalore from March 11 - 22, 2019.

Participated at the conference on "Noncommutative geometry and its applications" held at NISER, Bhubaneshwar from January 06-10, 2020.

Participated and part of organizing committee for "International conference on semigroups, algebras and operator theory" held in online mode at Cochin University of Science and Technology, Kochi from March 28-31, 2022.

Participated in the conference "Operator theory and Complex Geometry" held at IISER, Kolkata from November 24-26, 2022.

Participated in the "CIMPA school on Geometric structures on surfaces, moduli spaces and dynamics", held at BHU, Varanasi from December 12-22, 2022.