Curriculum Vitæ

Sayantan Khan
sayantangkhan@gmail.com

Education

- **Bachelor of Science (Research)**: Major – Mathematics August, 2014 – April, 2018
  Indian Institute of Science, Bangalore

Mathematical Experience

Bachelor's Thesis Project

- **Laplacian on Riemannian Manifolds** August, 2017 – April, 2018
  In this project, I studied elliptic partial differential operators on Riemannian manifolds, in particular the Laplace-Beltrami operator. I looked at the Hodge decomposition theorem, and some applications of that. I also studied the links between the spectrum of the Laplacian and the geometry of the manifold the Laplacian is defined on.

Summer Projects

- **Results on homotopy groups of some spaces and spectra** May, 2017 – July, 2017
  Study of proofs of various results in classical homotopy theory, including homotopy excision theorem, Brown representability theorem, and how unoriented cobordism theory is represented by the Thom spectrum. This study was done in University of Münster, based on a series of lectures by Prof. Dr. Michael Joachim.
- **Computing L^2 Betti numbers of some simple spaces** May, 2017 – July, 2017
  This was as a part of a seminar on L^2-invariants organzied by Prof. Dr. Arthur Bartels at the University of Münster.
- **Fourier analysis and applications to number theory** May, 2016 – July, 2016
  Study of some classical results in Fourier analysis, and Fourier analytic proofs of Weyl's equidistribution theorem for linear and quadratic polynomials, and Roth's theorem on three-term arithmetic progressions. This project was done under the mentoring of Dr. Manjunath Krishnapur at Indian Institute of Science.
- **Automated Theorem Proving and Homotopy Type Theory** May, 2015 – July, 2015
  Contribution to the ProvingGround project (link), which aims to automate and assist theorem proving under the foundations of Homotopy Type Theory. This project also involved learning some combinatorial group theory and algebraic topology. This was done under the mentoring of Dr. Siddhartha Gadgil, at the Indian Institute of Science.

Expository Articles

- The Laplacian on Riemannian Manifolds (link)
- Technical results in Homotopy Theory (link)
- Weyl's equidistribution theorem for linear and quadratic polynomials (link)
- Fourier analytic proof of Roth's theorem on 3-term arithmetic progressions (link)

Talks

- **The Laplacian on Riemannian Manifolds**: Talk given at Indian Institute of Science as a part of undergraduate thesis presentation.
- **Gromov-Hausdorff convergence, ultralimits, and applications to metric geometry**: Talk given at the University of Münster as a part of the geometry seminar.
- **Morse Lemma and Morse Theory**: An exposition of the Morse lemma, and its various consequences in Morse theory. Talk given at the Indian Institute of Science.
- **Abelian category theory**: Exposition on the basics of abelian category theory, and how many results in homological algebra of groups and modules carry over to general abelian categories. Talk given at Indian Institute of Science.

Fellowships

- **DAAD WISE Fellowship, 2017**: Fellowship offered by the German Academic Exchange Service to students in science to spend a summer in Germany.
- **KVPY SX Scholarship, 2014**: Scholarship offered by Department of Science and Technology, Govt. of India, to undergraduates studying science.

Awards

- **Third prize, Madhava Mathematics Competition**: Madhava Mathematics Competition is an Indian national level mathematics competition for undergraduates studying mathematics.

Summer and Winter Schools

- **AIS on Basic Algebraic Geometry (2018):** A three week long instructional school on algebraic geometry held at IISER Pune. Its audience consisted of advanced undergraduate and beginning graduate students. It focused on the basics of classical algebraic geometry, i.e. affine and projective varieties, and in the latter half, focused on non-singular varieties and algebraic curves.
- **Geometry, Groups and Dynamics (2017):** A three week advanced program focusing on geometry, group actions, and dynamical systems. Its audience consisted of graduate students and young researchers. This was held in the International Centre for Theoretical Sciences, Bangalore in November 2017.
- **ITCSC-INC Winter School (2017):** A week long advanced school in theoretical computer science. Its audience consisted of senior undergraduate students from across Asia. This was held in the Chinese University of Hong Kong in January 2017.

College Activities

- **Chief Editor**: Chief Editor of Quarks, the undergraduate magazine of IISc — Sep, 2015 – Aug, 2016
- **Coordinator**: Coordinator of Samasya, the undergraduate mathematics club — Aug, 2015 – Jul, 2016

Computer skills

- **Programming languages**: Python, Rust, Haskell, Scala, TEX
- **Mathematical tools**: Maple, Lean Theorem Prover