Chirantan Mukherjee

Contact Information

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Research Interests

Algebraic topology, homotopy theory, and category theory- especially higher category theory

Education

Università di Trento

M.Sc. in Mathematics, Sep 2019–Anticipated Mar 2022

- Dissertation Topic: Complete Segal Spaces as a model of Higher Categories
- Advisor: Nima Rasekh and Edoardo Ballico

Erasmus+ Study in University of Warsaw

Institute of Mathematics and Applications

B.Sc. in Mathematics and Computing, Aug 2015–Apr 2018

- Dissertation Topic: Set Theory and Foundation of Mathematics
- Advisor: Shashi Mohan Srivastava

Publications

In Preparation

Twisted Arrow Construction for Segal Spaces.

Research Experience

2021–Present École Polytechnique Fédérale de Lausanne

- Provide a comprehensive characterisation of the Kan model structure on simplicial sets by reviewing categorical homotopy theory and the theory of model categories. Examine simplicial spaces, especially complete Segal spaces, as a model of $(\infty, 1)-$categories
- Generalizing the twisted arrow construction to complete Segal spaces
- Proving the projection map $Tw(W) \to W^{op} \times W$ is a left fibration of complete Segal spaces

2017–2018 Indian Statistical Institute

- Investigate how Cantor's solution of a unique representation of a function by trigonometric series led to the discovery of ordinal numbers and the general notion of topology
- Examine how Cantor developed the notion of transfinite numbers by taking indefinite derivatives of a set
- Understanding Gödel's and Cohen's proof of the (generalized) continuum hypothesis, as well as its relationship to the ZFC axioms

Honors and Awards

2021–2022 Thesis Research Abroad, University of Trento
2020–2021 Erasmus+ Grant, Italian Erasmus+ Agency
2017 Summer Research Programme, The Institute of Mathematical Sciences
2015–2018 National Board for Higher Mathematics Scholarship, Government of India

Research Schools and Internships Attended

2022	Higher Category Lecture, Australian National University Instructors: Yoshihiro Maruyama and Florrie Verity
2021	Masterclass on Topological Field Theories and Factorization Homology, University of Copenhagen Instructors: Adrien Brochier; Quantum character varieties and TFTs, and Claudia Scheimbauer; Dualizabitility, higher categories and TFTs
2021	EPFL Topology Seminar Spring 2021, EPFL Seminar on algebraic topology and category theory
2021	Intensive Research Programme: Higher Homotopical Structures, Centre de Recerca Matemàtica (CRM) Development of higher-categorical tools for theory and computations in algebraic K-theory and related theories
2020	Scuola Matematica Interuniversitaria *(Interuniversity Mathematical Summer School)*, University of Perugia Instructors: Barbara Nelli; Differential geometry, and Frédérichch Robert; Functional Analysis
2017	Summer Research Programme, The Institute of Mathematical Sciences Advisor: Pralay Chatterjee
2017	Project on basic set topology, Indian Statistical Institute Advisor: Goutam Mukherjee

Talks and presentations

Mar 2021	*The $Conf_2$ space of rational homology of S^3 and propagators* University of Warsaw
Jan 2021	*Differentiable manifolds and forms, de Rham cohomology* University of Warsaw
Dec 2020	*Products and cochains of equivariant cohomology theories* University of Warsaw
Nov 2020	*Polish spaces* University of Warsaw

Teaching Experience

Jun 2017	Regional Mathematical Olympiad Training Camp Train junior mathematical olympiad 2016 awardees for mathematical olympiad
Jun 2017	Training Camp for Pathani Samanta Mathematics Scholarship Nurturing of talents in mathematics from rural India
May 2016	Training Camp for Pathani Samanta Mathematics Scholarship Nurturing of talents in mathematics from rural India
2015–2018	Sunday Morning Problem Solving Classes Interactive classes for school children, with emphasis on children from vernacular schools

Technical Skills

Languages:	C/C++, Java
Softwares:	LaTeX, Mathematica, Octave

Relevant Skills

Languages:	English (Fluent), Bengali (Native), Hindi (Native)
Extra:	Poet (Published a book of poems), Swimmer and Life Guard