

BARINDER SINGH BANWAIT

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RESEARCH INTERESTS

Algebraic Number Theory

Arithmetic Geometry

Abelian Varieties

Modular Forms

ACADEMIC APPOINTMENTS

Postdoctoral researcher in Mathematics

[Harish-Chandra Research Institute](#)

📅 Feb 2021 – Present

📍 Prayagraj, India

Visiting Scientist

[Max-Planck-Institut für Mathematik](#)

📅 Oct 2016 – Dec 2016

📍 Bonn, Germany

Host: Prof. Alex Bartel

Postdoctoral researcher in Mathematics

[Universität Duisburg-Essen](#)

📅 Jan 2015 – Jan 2017

📍 Essen, Germany

Mentor: Prof. Dr. Ulrich Görtz

Postdoctoral researcher in Mathematics

[Institut national de recherche en informatique et en automatique \(INRIA\)](#)

📅 Jan – Dec 2014

📍 Bordeaux, France

Mentor: Dr. Andreas Enge

PAPERS AND PREPRINTS

- **Explicit isogenies of prime degree over quadratic fields.** *arXiv:2101.02673*. 2021, submitted
- **Examples of abelian surfaces failing the local-global principle for isogenies.** Accepted in *Research in Number Theory*. To appear, 2021. *arXiv:2007.13583*.
- **Del Pezzo surfaces over finite fields and their Frobenius traces**, with F. Fité and D. Loughran. *Mathematical Proceedings of the Cambridge Philosophical Society*. 167(1) (2019) 35-60.
- **Tetrahedral Elliptic Curves and the local-global principle for isogenies**, with J. Cremona. *Algebra and Number Theory*. 8:5 (2014) 1201-1229.

IN PREPARATION

- **Computing non-surjective primes associated to Galois representations of genus 2 curves**, with A. Brumer, H. J. Kim, Z. Klagsbrun, J. Mayle, P. Srinivasan and I. Vogt.
- **Cyclic Isogeny degrees over quadratic fields**, with O. Adascalitei and F. Najman.
- **Explicit isogenies of prime degree over number fields**, with M. Derickx.
- **Sign changes in Fourier coefficients of Bianchi modular forms**, with K. Krishnarjun.

INDUSTRY EXPERIENCE

Quantitative Analyst

[Quantile](#)

📅 Sep 2019 – Mar 2020

📍 London, UK

- Linear, mixed-integer, and multi-objective optimisation for compression of interest-rate derivative portfolios.
- Visualisation of FX trading datasets across several client investment banks.

Research Engineer

CMR Surgical

📅 Jan 2018 – Sep 2019

📍 Cambridge, UK

- Research and implementation of motion control algorithms for a laparoscopic surgical robotic system.
- Development of machine learning algorithms to detect degradation in robotic joint sensors.
- Embedded and cloud software development in C, Python, and Matlab.

EDUCATION

PhD Mathematics

University of Warwick

📅 Jan 2010 – Sep 2013

📍 Coventry, UK

Supervisor: Prof. John Cremona

Thesis: On some local to global phenomena for abelian varieties

BA and MMath Mathematics

University of Cambridge - Christ's College

📅 Oct 2005 – June 2009

📍 Cambridge, UK

MMath (*Part III of the Mathematical Tripos*) - Distinction

Part III Essay: Class Field Theory (Cohomological Approach), supervised by Dr. Tim Dokchitser

INVITED TALKS

(recent)

- VaNTAGe Seminar (online), June 2021
- Effective Methods in Algebraic Geometry (online conference), June 2021
- Algebra Seminar, Rijksuniversiteit Groningen (online), June 2021
- Mathematics Colloquium, Indian Institute of Technology, Hyderabad (online), June 2021
- University of Washington Number Theory Seminar (online), June 2021
- Séminaire de Théorie Algorithmique des Nombres, Bordeaux (online), May 2021
- Stat-Math Unit, Indian Statistical Institute, Delhi (online), Apr 2021
- Mathematics Colloquium, Indian Institute of Science Education and Research, Mohali (online), Apr 2021
- Joining Seminar, Harish-Chandra Research Institute, Prayagraj (online), Feb 2021
- Zagreb Number Theory Seminar (online), Jan 2021
- Number Theory Seminar, Indian Institute of Science Education and Research, Pune, Jan 2020

ACADEMIC MEMBERSHIPS



Member of the *L-functions and Modular Forms Database*. 8 pull requests merged since October 2020 across the codebase, including Classical and Bianchi Modular Forms, Testing utilities, and Dirichlet Characters.

TEACHING EXPERIENCE

Course Lecturer

Vertiefung Zahlentheorie

📅 Apr - July 2016

📍 Essen, Germany

Representability of primes via quadratic forms - from Fermat, Euler, Gauss, and to Artin Reciprocity. Three hours per week for 15 weeks. Lectures given in German.

Einführung in das Computer-Algebra-Paket Sage

📅 Sep 2015

📍 Essen, Germany

Introductory week-long course on Sage aimed at final year undergraduates. Course given in German.

Algebraic Number Theory

📅 July 2009 📍 Linyi, China

Introductory course at summer school aimed at second year undergraduates.

Seminar Organiser

Algebraic Surfaces

📅 Oct 2015 - Jan 2016 📍 Essen, Germany

Masters level seminar organised with Prof. Görtz.

Teaching Assistant

Linear Algebra	📅 Apr - July 2015	🎓 Vytautas Paškūnas	🏛️ Universität Duisburg-Essen
Modular Forms	📅 Oct - Dec 2012	🎓 Mehmet Haluk Şengün	🏛️ University of Warwick
Algebraic Number Theory	📅 Jan - Mar 2012	🎓 Johan Bosman	🏛️ University of Warwick
Elliptic Curves	📅 Oct - Dec 2011	🎓 Lassina Dembélé	🏛️ University of Warwick
Algebraic Number Theory	📅 Jan - Mar 2010	🎓 William Hart	🏛️ University of Warwick

Undergraduate Supervisor

📅 Oct 2010 - Apr 2013 🏛️ University of Warwick

Holding supervisions of groups of 5 undergraduates.

STEP Mentor

📅 Apr 2007 – 2009 🏛️ University of Cambridge

Coaching groups of 10 A-Level students in the STEP mathematics entrance exams to increase diversity and access at Cambridge.

AWARDS

Engineering and Physical Sciences Research Council, UK

📅 Jan 2010

- Full funding for PhD studies.

Whelan Prize

📅 Oct 2007

- Awarded by Christ's College, University of Cambridge, for outstanding examination performance (top of college in mathematics).

Nuffield Trust, UK

📅 Jul 2007

- Undergraduate Research Bursary to conduct summer research project.
- Supervisor: Dr. Jon Bevan, University of Surrey, UK.

REFeree DUTIES FOR JOURNALS

- Mathematics of Computation
- International Journal of Number Theory
- Algebra and Number Theory
- Research in Number Theory

LANGUAGES

English	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>	Python	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
ਪੰਜਾਬੀ (Punjabi)	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>	Sage	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Deutsch	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>	C	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
हिंदी (Hindi)	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>	PARI/GP	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>
Français	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>	Magma	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>

RIGHT TO WORK

- United Kingdom
- India