

BARINDER SINGH BANWAIT

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RESEARCH INTERESTS

Computational 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.

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

GCSEs and A-Levels

Langley Grammar School

📅 Sep 1998 – June 2005

📍 Langley, UK

10 GCSEs, all A*. 3 A-Levels (Maths, Further Maths, Chemistry), all A

INVITED TALKS

(recent)

- Effective Methods in Algebraic Geometry (online conference), 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

ਪੰਜਾਬੀ (Punjabi)

Deutsch

हिंदी (Hindi)

Français

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Python

Sage

C

Matlab

Magma

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RIGHT TO WORK

United Kingdom

India