

# BARINDER SINGH BANWAIT

✉ [barinder.s.banwait@gmail.com](mailto:barinder.s.banwait@gmail.com)

🔗 [members.vistaserv.net/barinder](https://members.vistaserv.net/barinder)

🐙 [github.com/barinderbanwait](https://github.com/barinderbanwait)

🇬🇧 British

## RESEARCH INTERESTS

Algebraic Number Theory

Arithmetic Geometry

Abelian Varieties

Modular Forms

## ACADEMIC APPOINTMENTS

Postdoctoral researcher in Mathematics

[Ruprecht-Karls-Universität Heidelberg](#)

📅 Oct 2021 – present

📍 Heidelberg, Germany

Mentor: Prof. Dr. Gebhard Böckle

Postdoctoral researcher in Mathematics

[Harish-Chandra Research Institute](#)

📅 Feb – Sep 2021

📍 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.** *Research in Number Theory*. 7(55) (2021)
- **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)

- Bhaskaracharya Pratishthana, Pune, India (online), Feb 2022
- Arithmetic Geometry Seminar, Universität Bayreuth (online), July 2021
- 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.

# OPEN SOURCE SOFTWARE CONTRIBUTIONS

## Absolutely simple endomorphism rings - Sage


 2021

- First functionality to check for geometric simplicity of Jacobians of genus 2 curves over  $\mathbb{Q}$ .
- Scheduled for inclusion into sage-9.5.

# 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.

# REFeree DUTIES FOR JOURNALS

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

# 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.

# LANGUAGES

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