Alex J. Best

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EDUCATION & WORK

Ph.D. Mathematics, Boston University, 2016 – 2021 (expected)
Advisor: Jennifer Balakrishnan
Funded in part by the Simons Collaboration on Arithmetic Geometry, Number Theory, and Computation #550023.
Awarded Hariri Institute for Computing graduate student fellowship.

Scientific assistant/software developer, University of Kaiserslautern, 2016
Worked on the MPIR library, funded by the EU Horizon 2020 project OpenDreamKit.

M.A.St. Pure Mathematics, University of Cambridge, 2014 – 2015
Essay title: Serre's Conjecture

B.Sc. Discrete Mathematics, First class, University of Warwick, 2011 – 2014
Awarded department prize for the best overall graduating B.Sc. student in Discrete Mathematics.

PUBLICATIONS & PREPRINTS

- *A user's guide to the local arithmetic of hyperelliptic curves*, joint with L. Alexander Betts, Matthew Bisatt, Raymond van Bommel, Vladimir Dokchitser, Omri Faraggi, Sabrina Kunzweiler, Céline Maistret, Adam Morgan, Simone Museli, Sarah Nowell, preprint arxiv:2007.01749, submitted.
- *Elliptic curves with good reduction outside of the first six primes*, joint with Benjamin Matschke, to appear in proceedings volume for the Simons Collaboration "Arithmetic Geometry, Number Theory, and Computation".
- *Two Recent p-adic Approaches Towards the (effective) Mordell Conjecture*, joint with Jennifer Balakrishnan, Francesca Bianchi, Brian Lawrence, Steffen Müller, Nicholas Triantafillou and Jan Vonk, arXiv:1910.12755, to appear, Regulators IV: An international conference on arithmetic L-functions and differential geometric methods, Paris.
- *Computing Classical Modular Forms*, joint with Jonathan Bober, Andrew R. Booker, Edgar Costa, John Cremona, Maarten Derickx, Min Lee, David Roe, Andrew V. Sutherland, and John Voight arXiv:2002.04717, to appear in proceedings volume for the Simons Collaboration "Arithmetic Geometry, Number Theory, and Computation".
- *Square Root Time Coleman Integration on Superelliptic Curves*, to appear in proceedings volume for the Simons Collaboration "Arithmetic Geometry, Number Theory, and Computation".
- *Explicit Coleman Integration in Larger Characteristic*, Proceedings of the Thirteenth Algorithmic Number Theory Symposium, doi:10.2140/obs.2019.2.85.
- *Computing Zeta Functions of Cyclic Covers in Large Characteristic*, joint with Vishal Arul, Edgar Costa, Richard Magner, Nicholas Triantafillou, Proceedings of the Thirteenth Algorithmic Symposium, doi:10.2140/obs.2019.2.37.

TEACHING

Teaching Assistant, MA225 Multivariable Calculus – BU Fall 2017
Teacher Teacher (T^2), PROMYS for Teachers – BU Summer 2 2017
Lecturer, MA123 Calculus I – BU Summer 1 2017
Teaching Assistant, EK102 Linear Algebra – BU Spring 2017

Teaching Assistant, MA121 Calculus for Life and Social Sciences 1 – BU Fall 2016
Seminar Tutor, CS137 Discrete Maths and its Applications 2 – Warwick 2014

TALKS GIVEN

Conference/External:

- *The S-unit equation and non-abelian Chabauty in depth 2*, Freiburg Freitagsseminar 2021 (planned).
- *Building the topological hierarchy*, Lean for the curious mathematician, Online 2020, `https://youtu.be/RTfjSlwbKjQ`.
- *Computations with p-adic polylogarithms in SageMath*, Global Virtual SageDays 109, Online 2020.
- *Explicit computation with Coleman integrals*, Journées Arithmétiques XXXI, University of Istanbul, 2019.
- *Explicit computation with Coleman integrals*, Boston University – Keio University workshop, 2019.
- *Zeta functions and p-adic integrals; computations and applications*, AMS Graduate Student Conference in Algebra/Number Theory, Brown, 2019.
- *(Explicit) Coleman Integration in Larger Characteristic*, ANTS XIII 2018.

Expository/Local:

- *Introduction to Abhyankar's conjecture, Extension of Rigid covers, and Semi-stable curves*, BU Number Theory Expository Seminar, Spring 2020.
- *The Gauss-Manin connection*, STAGE, MIT, Spring 2020.
- *Serre-Tate moduli, Applications of Gross-Zagier to Heegner point computation, and Goldfeld's work on the class number problem*, BU Number Theory Expository Seminar, Fall 2019.
- *Something to LEAN on; fun with interactive theorem provers*, BU Math Retreat Lightning Talks, Spring 2019.
- *The Brauer-Siegel theorem*, STAGE, MIT, Spring 2019.
- *Explicit non-abelian Chabauty, I & II*, Math 258, Harvard, Spring 2019.
- *Explicit Galois deformations*, BU Number Theory Expository Seminar, Spring 2019.
- *The Kodaira-Parshin construction*, STAGE, MIT, Fall 2018.
- *Quaternion Algebras*, and *Descent and Canonical models*, BU Number Theory Expository Seminar, Fall 2018.
- *The (inescapable) p-adics*, BU Math Retreat Lightning Talks, Spring 2018.
- *A Smörgåsbord of Dessins d'Enfants* and *Dessins, integer points on elliptic curves and a proof of the ABC conjecture*, BU Number Theory Expository Seminar, Spring 2018.
- *Neutral Tannakian categories and (pro-)unipotent algebraic groups*, STAGE, MIT, Spring 2018.
- *Complex Theory of Abelian Varieties*, *Polarizations & Étale Cohomology* and *The Rosati involution*, BU Number Theory Expository Seminar, Fall 2017.
- *The Cotangent Complex*, BU Perfectoid Spaces learning seminar, Spring 2017.
- *Ribet's Converse to Herbrand: Cuspstruction*, STAGE, MIT, Spring 2017.
- *Rigid Analytic Spaces*, and *Mumford Curves*, BU Rigid Geometry learning seminar, Fall 2016.
- *Serre's Conjecture*, Ulm University Oberseminar, 2016.
- *Singular Moduli*, Cambridge Part III Seminar Series, 2014.
- *Singular Moduli*, Warwick Imperial Autumn Meeting, 2014.
- *Riemann Hypotheses*, Warwick Mathematics Society talks, 2014.
- *Category Theory* (with Ben Wormleighton), Warwick Mathematics Society talks, 2013.
- *Introduction to Abstract Algebra revision lecture*, for Warwick first year mathematics cohort, 2013.
- *Geometric approaches to solving Diophantine equations*, Tomorrow's Mathematicians Today, University of Greenwich, 2013.

CONFERENCE & WORKSHOP ATTENDANCE

- PCMI Summer School: Number Theory Informed by Computation 202?. (TA for David Harvey's course on "Counting points on curves over finite fields") (Postponed)
- Modern Breakthroughs in Diophantine Problems, BIRS/Online, 2020.
- Lean for the curious mathematician (Speaker and tutor for exercise sessions throughout), Online 2020.
- Algorithmic Number Theory Symposium (ANTS) XVI 2020.
- Workshop on Arithmetic Geometry, Number Theory, and Computation, ICERM (Online), 2020.
- Global Virtual SageDays 109, Online, 2020.
- Arizona Winter School 2020: Quadratic Chabauty.
- p-adic Langlands correspondence: a constructive and algorithmic approach, Centre Henri Lebesgue, IRMAR, Université de Rennes 1, 2019.
- Arithmetic of Connections, ETH Zurich, 2019.
- p-adic modular forms, Istanbul Center for Mathematical Sciences, Boğaziçi University, 2019.
- Journées Arithmétiques XXXI, University of Istanbul, 2019.
- BU–Keio University Workshop, BU, 2019.
- CMI–HIMR Summer School in Computational Number Theory, Bristol, 2019. (TA for Céline Maistret's class on Computational aspects of the Birch and Swinnerton-Dyer Conjecture)
- Arithmetic of low dimensional abelian varieties, ICERM, 2019.
- AMS Graduate Student Conference in Algebra/Number Theory, Brown, 2019.
- Arizona Winter School 2019: Topology and Arithmetic.
- LMFDB Development Workshop, Modular forms, MIT, 2018.
- Arithmetic Geometry, Number Theory, and Computation, MIT, 2018.
- Arithmetic Statistics and Diophantine stability, Fondation des Treilles, 2018.
- Algorithmic Number Theory Symposium (ANTS) XIII, University of Wisconsin, Madison, 2018.
- Homotopy Theory and Arithmetic Geometry: Motivic and Diophantine Aspects, Imperial College London, 2018.
- Explicit and computational approaches to Galois representations, University of Luxembourg, 2018.
- Mathematics is a long conversation: a celebration of Barry Mazur, Harvard, 2018
- CTNT 2018 Conference.
- UNCG Summer School in Computational Number Theory 2018: Algorithms for Extensions of Large Degree.
- 32nd Automorphic Forms Workshop, Tufts, 2018.
- Arizona Winter School 2018: Iwasawa Theory.
- Boston Graduate Math Colloquium, December 2017 & February 2018.
- AGNES 2017, Northeastern.
- Advanced School and Workshop on the Arithmetic of Hyperelliptic Curves, ICTP Trieste, 2017.
- Sage Days 87: p-adics in Sage and the LMFDB, University of Vermont, 2017.
- Distribution of modular symbols and L-values: computations and applications, Harvard, 2017.
- Arizona Winter School 2017: Perfectoid Spaces.
- Current Developments in Mathematics 2016, Harvard.
- Super QVNTS: Kummer Classes and Anabelian Geometry, University of Vermont, 2016.
- 7th European Congress of Mathematics, Berlin, 2016.
- Shimura Varieties, Leiden, 2016.
- Arizona Winter School 2015: Arithmetic and Higher-Dimensional Varieties.
- Elliptic curves, Modular Forms and Iwasawa Theory, Cambridge, 2015.
- Joint BMC/BAMC, Cambridge, 2015 (Student volunteer).
- Warwick-Imperial Autumn (2014 & 2015) & Spring (2015) Meetings.
- Heilbronn Annual Conference, University of Bristol, 2014.

- Summer School on Number Theory for Cryptography, University of Warwick, 2013.
- Tomorrow's Mathematicians Today, 2013 & 2014.

SERVICE

- Organiser for BU community seminar, Fall 2020
- Organiser for BU number theory expository seminar, Spring 2020
- Mentored BU undergraduate (Benedikt Arnarsonn), Spring 2019 – present.
- Mentor for undergraduate directed reading programme (DRP) 2018 – 2020; mentored Yuan Liao (Multiplicative number theory), David Alvarez (The hyperreals), and Benedikt Arnarsonn ×2 (Galois cohomology, and Modular forms and elliptic curves).