Jeremy Booher | Curriculum Vitae

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Research Interests

Algebraic number theory and arithmetic geometry, especially:

- curves and Abelian varieties in characteristic p
- Galois representations
- computational number theory and arithmetic geometry

Employment

2022- **Assistant Professor**, *University of Florida*.

2019-2022 **Postdoctoral Fellow and Teaching Lecturer**, *University of Canterbury*.
Mentor: Felipe Voloch

2016-2019 **Postdoctoral Research Associate**, *University of Arizona*.
Mentor: Bryden Cais

Education

2011-2016 **PhD in Mathematics**, *Stanford University*.
Thesis: *Geometric Deformations of Orthogonal and Symplectic Galois Representations*, advised by Brian Conrad.

2010-2011 **Master of Advanced Study in Mathematics**, *Cambridge University*.

2006-2010 **A.B. in Mathematics**, *Harvard University*.
Secondary Field: computer science. Senior thesis on moonshine advised by Dick Gross.

Research

- Jeremy Booher, Everett W. Howe, Andrew V. Sutherland, José Felipe Voloch, Doubly isogenous curves of genus two with a rational action of D_6, preprint. [paper, code]
- Jeremy Booher, Sean Cotner and Shiang Tang, Lifting G-Valued Galois Representations when $\ell \neq p$, preprint. [paper]
- Jeremy Booher, Ross Bowden, Javad Doliskani, Tako Boris Fouotsa, Steven D. Galbraith, Sabrina Kunzweiler, Simon-Philipp Merz, Christophe Petit, Benjamin Smith, Katherine E. Stange, Yan Bo Ti, Christelle Vincent, José Felipe Voloch, Charlotte Weitkämper, and Lukas Zobernig, Failing to hash into supersingular isogeny graphs, to appear in The Computer Journal. [paper, conference]

- Jeremy Booher and Bryden Cais, Iwasawa Theory for p-torsion Class Group Schemes in Characteristic p, Nagoya Mathematical Journal, Volume 250, June 2023, pp. 298-351. [paper, code]
- Vishal Arul, Jeremy Booher, Steven R. Groen, Everett W. Howe, Wanlin Li, Vlad Matei, Rachel Pries, and Caleb Springer, Doubly isogenous genus-2 curves with D_4-action, Math. Comp. 93 (2024), 347-381. [paper, code]
- Jeremy Booher and Felipe Voloch, Recovering affine curves over finite fields from L-functions, Pacific Journal of Mathematics 314-1 (2021), 1–28. [paper]
- Jeremy Booher and Brandon Levin, G-Valued Crystalline Deformation Rings in the Fontaine-Laffaille Range, Compositio Mathematica, Volume 159, Issue 8, August 2023, pp. 1791 - 1832. [paper]
- Renee Bell, Jeremy Booher, William Chen, and Yuan Liu, Tamely Ramified Covers of the Projective Line with Alternating and Symmetric Monodromy, Algebra & Number Theory 16 (2022), no. 2, 393 – 446. [paper]
- Jeremy Booher and Felipe Voloch, Recovering Algebraic Curves from L-functions of Hilbert Class Fields, Research in Number Theory 6, 43 (2020). [paper]
- Jeremy Booher and Rachel Pries, Realizing Artin-Schreier Covers of Curves with Minimal Newton Polygon in Positive Characteristic, Journal of Number Theory, Volume 214, (2020) pages 240-250. [paper]
- Fiona Abney-McPeek, Hugo Berg, Jeremy Booher, Sun Mee Choi, Viktor Fukala, Miroslav Marinov, Theo Müller, Paweł Narkiewicz, Rachel Pries, Nancy Xu, and Andrew Yuan, Realizing Artin-Schreier covers with minimal a-numbers in characteristic p, Involve 15 (2022), no. 4, 559–590. [paper]
- Jeremy Booher and Bryden Cais, a-Numbers in Artin-Schreier Covers, Algebra & Number Theory, Vol. 14 (2020), No. 3, 593–653. [paper, code]
- Jeremy Booher and Stefan Patrikis, G-Valued Galois Deformation Rings when $\ell \neq p$, Mathematical Research Letters, Vol. 26, No. 4 (2019), pp. 973-990. [paper]
- Jeremy Booher, Minimally Ramified Deformations when $\ell \neq p$, Compositio Mathematica, Volume 155 / Issue 1 (2019) pages 1-37. [paper]
- Jeremy Booher, Producing Geometric Deformations of Orthogonal and Symplectic Galois Representations, Journal of Number Theory, Volume 195, (2019) pages 115-158. [paper]
- J. Booher, A. Etropolski, and A. Hittson, Evaluations of cubic twisted Kloosterman sheaf sums, International Journal of Number Theory, 6 (2010), pages 1349-1365. [paper]

Awards and Fellowships

2023-2028 Simons Foundation: Travel Support for Mathematicians, *Arithmetic Geometry in Positive Characteristic*

2018-2020 AMS-Simons Travel Grant

2010-2011 Harvard Herchel Smith Fellowship for study at Cambridge

2008 Certificates of Excellence and Distinction in Teaching from Harvard (for linear algebra)

Research Talks

March 2024 Toronto Number Theory Seminar, *Geometric Iwasawa Theory*

February 2024 UF Algebra Seminar, *Isogeny Correspondences and Unlikely Intersections*

October 2023 Purdue Automorphic Forms and Representation Theory Seminar, *Geometric Iwasawa Theory*

September 2023 UF Algebra Seminar, *Lifting G-Valued Galois Representations when $\ell \neq p$*

June 2023 Arithmetic, Geometry, Cryptography and Coding Theory conference, *Geometric Iwasawa Theory*

May 2023 Fragment Seminar at Colorado State, *Towers of Curves, Motivic Class Groups, and Equicharacteristic L-Functions*

March 2023 Ohio State Number Theory Seminar, *Lifting G-Valued Galois Representations when $\ell \neq p$*

November 2022 Dwork Seminar, *Towers of Curves and Motivic Class Groups*

October 2022 AMS Special Session on Iwasawa Theory, *Towers of Curves, Motivic Class Groups, and Equicharacteristic L-Functions*

September 2022 Lehigh University Seminar, *Can You Hear the Shape of a Curve*

September 2022 University of Florida Algebra Seminar, *Iwasawa Theory for p-torsion Class Group Schemes in Characteristic p*

May 2022 University of Canterbury Number Theory Seminar, *G-Valued Crystalline Deformation Rings in the Fontaine-Laffaille Range*

February 2022 VIASM Arithmetic Geometry Online Seminar, *Iwasawa Theory for p-torsion Class Group Schemes in Characteristic p*

February 2022 University of Utah Number Theory and Representation Theory Seminar, *G-Valued Crystalline Deformation Rings in the Fontaine-Laffaille Range*

November 2021 University of Florida Colloquium, *Can You Hear the Shape of a Curve*

October 2021 University of Canterbury Seminar, *Can You Hear the Shape of a Curve*

September 2021 Number Theory Down Under, *Can You Hear the Shape of a Curve*

May 2021 University of Auckland Algebra and Combinatorics Seminar, *Invariants in Towers of Curves over Finite Fields*

April 2021 Perspectives on Algebra, Geometry and Number Theory, *Doubly isogenous genus-2 curves with D_4-action*

January 2021 POINT Seminar, *Invariants in Towers of Curves over Finite Fields*

November 2020 VaNTAGe Seminar, *Can You Hear the Shape of a Curve?*

November 2020 New Zealand Number Theory Day, *Tamely Ramified Covers of the Projective Line and Markoff Triples*

October 2020 Number Theory Down Under, *Invariants in Towers of Curves over Finite Fields*

August 2020 CCR Colloquium, *Invariants in Towers of Curves over Finite Fields*

June 2020 CTNT, *G-Valued Crystalline Deformation Rings in the Fontaine-Laffaille Range*

March 2020 University of Canterbury COGENT Seminar, *Tamely Ramified Covers of the Projective Line and Markoff Triples*

January 2020 JMM Special Session on Explicit Methods in Characteristic p, *Tamely Ramified Covers of the Projective Line and Markoff Triples*

December 2019 West Coast Number Theory, *Tamely Ramified Covers of the Projective Line and Markoff Triples*

August 2019 New Zealand Number Theory Day, *a-Numbers of Curves in Artin-Schreier Covers*

May 2019 Barrett Memorial Lectures, *a-Numbers of Curves in Artin-Schreier Covers*

April 2019 Emory Algebra and Number Theory Seminar, *a-Numbers of Curves in Artin-Schreier Covers*

March 2019 Hawai'i Number Theory Day and AMS Sectional Meeting, *a-Numbers of Curves in Artin-Schreier Covers*

September 2018 Front Range Number Theory Day, *a-Numbers in Artin-Schreier Covers*

September 2018 University of Arizona Number Theory Seminar, *a-Numbers in Artin-Schreier Covers*

November 2017 UCSD Number Theory Seminar, *G-Valued Galois Deformation Rings when $\ell \neq p$*

October 2017 University of Arizona Algebra and Number Theory Seminar, *G-Valued Galois Deformation Rings when $\ell \neq p$*

July 2017 Journées Arithmetique, *Geometric Deformations of Symplectic and Orthogonal Galois Representations*

September 2016 University of Arizona Algebra and Number Theory Seminar, *Geometric Deformations of Symplectic and Orthogonal Galois Representations*

December 2015 Bay Area Algebraic Number Theory and Arithmetic Geometry Day, *Geometric Deformations of Symplectic and Orthogonal Galois Representations*

November 2015 Junior Number Theory Day at Rutgers University-Newark, *Geometric Deformations of Symplectic and Orthogonal Galois Representations*

November 2015 Princeton and IAS Number Theory Seminar, *Geometric Deformations of Symplectic and Orthogonal Galois Representations*

November 2015 University of Utah Representation Theory and Number Theory Seminar, *Geometric Deformations of Symplectic and Orthogonal Galois Representations*

Selected Workshops and Conferences Attended

July 2023 LuCaNT (LMFDB, Computation, and Number Theory) at ICERM

June 2023	Arithmetic, Geometry, Cryptography and Coding Theory at CIRM
January 2022	NZMRI Summer Workshop: Number Theory and Related Topics
January 2021	NZMRI Summer Meeting
July 2020	ANTS-XIV
June 2020	ICERM Workshop on Arithmetic Geometry, Number Theory, and Computation
October 2019	Banff/CMO: Modularity and Moduli Spaces
June 2019	MRC: Explicit Methods in Characteristic p
June 2018	Mathematics is a long conversation: a celebration of Barry Mazur
July 2017	Journées arithmétiques
May 2015	UC Berkeley: p-adic Methods in Number Theory
February 2014	MSRI: Perfectoid Spaces and their Applications
	Arizona Winter School 2013, 2014, 2015, 2017, 2018, 2019

Teaching Experience

University of Florida

spring 2024	MAS7397: Computational Algebra and Number Theory
fall 2023	MAS7396: The Arithmetic of Elliptic Curves
2022-2023	MAS 6331 and 6332 : Graduate Algebra

University of Canterbury

semester 1, 2022	Math 201: Multivariable Calculus (18 lectures)
semester 1, 2022	EMth 118: Engineering Math 1A (24 lectures)
semester 2, 2021	EMth 211: Engineering Linear Algebra and Statistics (24 lectures)
semester 2, 2021	Math 324 : Cryptography and Coding Theory (12 lectures)

University of Arizona

spring 2019	Math 446/546: Theory of Numbers
fall 2018	Math 313: Linear Algebra (two sections)
spring 2018	Math 432/532: Topological Spaces
fall 2017	Math 313: Linear Algebra (two sections)
spring 2017	Math 446: Theory of Numbers
spring 2017	Math 129: Calculus II
fall 2016	Math 125: Calculus I

Teaching Assistant at Stanford

winter 2016	Math 51: Linear Algebra and Differential Calculus of Several Variables
spring 2015	Math 53: Differential Equations
spring 2014	Math 51: Linear Algebra and Differential Calculus of Several Variables
fall 2012	Math 51: Linear Algebra and Differential Calculus of Several Variables

multiple	Course Assistant for various undergraduate and graduate algebra, number theory, and representation theory courses

Expository Talks

October 2023	*The Transcendence of* e, UF Undergraduate Math Society
November 2022	*A Very Gentle Introduction to the Langlands Program*, UF Simple Words Seminar
October 2022	*Brussels Sprouts and the Euler Characteristic*, UF Undergraduate Math Society
January 2022	A Gentle Introduction to the Langlands Program for the NZMRI Summer Workshop (3 talks)
2020- 2021	Talks for UC Student Colloquium: The Transcendence of e, Brussels Sprouts and the Euler Characteristic, Square Roots Modulo n and Zero Knowledge Proofs
October 2020	Talk for secondary school students: Brussels Sprouts and the Euler Characteristic
June 2020	*Zeta Functions of Curves and the Weil Conjectures* for ANTS Summer School
July 2019	PROMYS Guest Lecture: Brussels Sprouts and the Euler Characteristic
2011-2016	Multiple talks for high school students as part of the SPLASH program at Stanford

Service

PhD Students

2024-	Eros Sunny (UF)
2023-	Darren Schmidt (UF)
2023-	David Shi (UF)

Outreach through Teaching

fall 2022 -	organizer, presenter, and assistant for weekly University of Florida Math Circle and annual Math Festival
spring 2017-spring 2019	presenter and assistant for weekly Tucson Math Circle
summers 2013 - 2016	Teaching Assistant at Stanford University Mathematics Camp
summer 2007, 2008, 2010, 2011	Counselor at PROMYS

Student Research

summer 2023	PROMYS returning student project *Counting Lattice Points for Fun and Profit*
2021-2022	University of Canterbury Summer Project on Cohen-Lenstra Heuristcs for Artin-Schreier Curves
2020-2021	University of Canterbury Summer Project on Covers of Non-Ordinary Curves
summer 2019	PROMYS returning student project on covers with minimal a-numbers
summer 2016	PROMYS returning student project on the dynamics of superballs
summer 2012	Stanford Undergraduate Research in Mathematics project on class numbers

Undergraduate Independent Study and Mentoring

2023-2024	Senior Thesis on Strong Multiplicity One
2019	Reading Course in Measure Theory and Support Applying to Graduate School
2017,2018	Mentor for Undergraduate Teaching Assistant Program
2017-2018	Reading Course/Honors Project on Number Theory and p-adic Numbers
2017	Mentor for Linear Algebra Honors Project
2015-2016	Mentor for Enhancing Diversity in Graduate Education Program
2014-2016	Mathematics Department Mentoring for new graduate students
winter 2015	Mentoring for first time TA's
2007-2010	Mentor for youth prison tutoring program

Professional Service

2022-	Organizer of University of Florida Algebra Seminar
2021	Co-organizer of the University of Canterbury Math and Statistics Seminar
2016-2019	Organizer of University of Arizona Algebra and Number Theory Seminar
ongoing	Reviewer for Algebra and Number Theory, Algorithmic Number Theory Symposium, Finite Fields and Their Applications, IMRN, Journal of the London Math Society, Journal of Number Theory, Journal de Théorie des Nombres de Bordeaux, Journal of Pure and Applied Algebra, Math Reviews, Math. Computation, MRL, Math. Zeitschrift, Research in Number Theory, Pacific Journal of Mathematics, Proc. AMS, ...