

# Brandon William Allen Levin

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## EDUCATION

2013            Ph.D. in Mathematics, Stanford University  
                  Dissertation: “G-valued flat deformations and local models of Shimura varieties”  
                  Advisor: Brian Conrad  
2008            Certificate of Advanced Study in Pure Mathematics, University of Cambridge  
2007            B.S. in Mathematics, *summa cum laude*, Duke University

## EMPLOYMENT

2022 -            Assistant Professor, Rice University, Department of Mathematics  
2017 - 2022    Assistant Professor, University of Arizona, Department of Mathematics  
2014 - 2017    L.E. Dickson Instructor, University of Chicago, Department of Mathematics  
2013 - 2014    Invited Member, Institute for Advanced Study, Princeton, NJ, School of Mathematics

## AWARDS AND DISTINCTIONS

2021            Sloan Research Fellowship, Alfred P. Sloan Foundation  
2007            Churchill Scholarship, Winston Churchill Foundation of the United States  
2006            Barry M. Goldwater Scholarship, Barry Goldwater Scholarship & Excellence in Education Foundation  
2003            Angier B. Duke Memorial Scholarship, Duke University

## RESEARCH GRANTS

2023 - 2028    National Science Foundation CAREER Grant (PI) \$450,000  
2020 - 2023    National Science Foundation FRG Collaborative Grant (PI) \$315,214  
2018 - 2023    Simons Collaboration Grant in Mathematics (PI) \$42,000  
2016 - 2018    France and Chicago Collaborating in the Sciences Grant (PI)

## OTHER GRANTS

2022 - 2025    National Science Foundation Grant for Southwest Center for Arithmetic Geometry (PI)  
                  \$448,399

2022	National Security Administration Conference Grant for Arizona Winter School (PI) \$25,000
2020	National Security Administration Conference Grant for Arizona Winter School (PI) \$25,000
2018	Research in Pairs Award, MFO Oberwolfach, Germany
2018	Research in Pairs Award, Centro De Giorgi, Italy
2017	Research in Pairs Award, CIRM Luminy, France
2016	Research in Paris Program Award, Institut Henri Poincaré, France

## VISITING POSITIONS

01/2023 - 07/2023    Max Planck Institute for Mathematics, Bonn

## PUBLICATIONS

1. “G-valued crystalline deformation rings in the Fontaine-Laffaille range,” joint with J. Booher, to appear in *Compositio* (2023).
2. “Reductions of 2-dimensional semi-stable representations with large L-invariant,” joint with J. Bergdall and T. Liu, to appear in *Journal of the Inst. of Mathematics Jussieu* (2022).
3. “Local models for Galois deformation rings and applications,” joint with D. Le, B. V. Le Hung and S. Morra, *Inventiones mathematicae*. 231 (2023), no. 3, pp. 1277-1488.
4. “Reductions of some two-dimensional crystalline representations via Kisin modules,” joint with J. Bergdall, *International Mathematics Research Notices* (2022), no. 4, pp. 3170–3197.
5. “A Harder-Narasimhan theory for Kisin modules,” joint with C. Wang Erickson, *Algebraic Geometry* 7 (2020), no. 6, 645-695.
6. “Serre weights and Breuil’s lattice conjecture in dimension three,” joint with D. Le, B. V. Le Hung and S. Morra, *Forum of Math, Pi*, 8 (2020), e5, 135p.
7. “Weight elimination in Serre-type conjectures,” joint with D. Le and B. V. Le Hung, *Duke Mathematical Journal*. 168 (2019), no. 13, pp. 2433-2506.
8. “Compatible systems of Galois representations associated to the exceptional group  $E_6$ ,” joint with G. Boxer, F. Calegari, M. Emerton, K. Madapusi Pera, and S. Patrikis, *Forum of Math, Sigma*, 7 (2019), e4, 29p.
9. “Potentially crystalline deformation rings and Serre weight conjectures: Shapes and shadows,” joint with D. Le, B. V. Le Hung and S. Morra, *Inventiones mathematicae*. 212 (2018), no. 1, pp. 1-107.
10. “Kisin modules with descent data and parahoric local models,” joint with A. Caraiani, *Annales Scientifiques d’Ecole Normale Supérieure* 51 (2018), no. 1, pp.181-213.
11. “Potentially crystalline deformation rings in the ordinary case,” joint with S. Morra, *Annales de l’Institut Fourier* 66 (2016), no. 5, pp. 1923-1964.
12. “Local models for Weil-restricted groups,” *Compositio Mathematica* 152 (2016), no. 12, pp. 2563–2601.
13. “G-valued crystalline representations with minuscule p-adic Hodge type,” *Algebra & Number Theory* 9 (2015), no. 8, 1741-1792.

## PREPRINTS

14. “Extremal weights and a tameness criterion for mod  $p$  Galois representations,” joint with D. Le, B. V. Le Hung and S. Morra, preprint, arxiv:2206.06442 (2022).
15. “Serre weights for wildly ramified three-dimensional Galois representations,” joint with D. Le, B. V. Le Hung and S. Morra, preprint, arxiv:2202.03303 (2022).

## CONFERENCES ORGANIZED

- |      |   |
|------|---|
| 2024 | Arizona Winter School on Abelian Varieties (lead organizer)   |
| 2023 | Preliminary Arizona Winter School Virtual Program on Elliptic Curves and Abelian Varieties (lead organizer) |
| 2023 | Arizona Winter School on Unlikely Intersections (lead organizer)  |
| 2022 | Preliminary Arizona Winter School Virtual Program on Heights and Model Theory (lead organizer)              |
| 2022 | Arizona Winter School on Modular forms beyond $GL_2$ (scientific organizer)                                 |
| 2020 | Arizona Winter School on Nonabelian Chabauty (scientific organizer)   |
| 2019 | BIRS-Oaxaca Workshop on Modularity and Moduli Spaces (co-organizer)   |

## TEACHING

### Graduate Courses

Topics in Algebraic Number Theory, Rice University, Fall 2022  
Linear Algebra, University of Arizona, Fall 2021  
Special Topics: Introduction to  $p$ -adic Hodge theory, University of Arizona, Spring 2021  
Algebraic Number Theory II, University of Arizona, Spring 2020  
Algebraic Number Theory I, University of Arizona, Fall 2019  
Linear Algebra, University of Arizona, Fall 2018

### Undergraduate Courses

Linear Algebra, University of Arizona, Fall 2020, Spring 2021  
Honors Calculus II, University of Arizona, Spring 2018  
Calculus I, University of Arizona, Fall 2017  
Honors Calculus I-II (Inquiry Based Learning), University of Chicago, 2016-2017  
Honors Calculus I-III (Inquiry Based Learning), University of Chicago, 2015-2016  
Real Analysis I, University of Chicago, 2015  
Linear Algebra, University of Chicago, 2015  
Elementary Number Theory (Inquiry Based Learning), University of Chicago, 2014  
Introduction to Cryptography (T.A., Writing in the Major), Stanford University, 2012  
Linear Algebra and Multivariable Calculus (T.A.), Stanford University, 2010  
Introduction to Group Theory (T.A., Writing in the Major), Stanford University, 2010

## SELECT INVITED TALKS

- 2023 University of Munster, Conference on Arithmetic Algebraic Geometry  
Hausdorff Research Institute for Math., Conference on Local Langlands and p-adic methods  
Max Planck Institute for Mathematics, Colloquium  
Universitat Duisburg-Essen, Algebraic Geometry Colloquium
- 2022 Rice Mathematics Department Colloquium
- 2021 University of Arizona Mathematics Department Colloquium
- 2020 Centre de Recherches Math., Workshop on Serre weights and geometry of Shimura varieties
- 2019 Tata Institute, Mumbai, India  
John Hopkins University, Number Theory Seminar  
Mathematical Institute, Univ. of Oxford, Clay Workshop on Modular Representation Theory  
King's College London, Workshop on the p-adic Langlands programme and related topics  
University of Maryland, Number Theory Seminar  
University of California, Berkeley, Number Theory Seminar
- 2018 Bellairs Research Institute, Workshop on Unitary Shimura Varieties and Modular Forms  
California Institute of Technology, Number Theory Seminar  
University of Chicago, Number Theory Seminar
- 2017 Institute for Advanced Study, Workshop on Motives, Galois Representations and Cohomology  
around the Langlands Program  
University of Virginia, Workshop on Elliptic Curves, Torsors, and L-functions
- 2016 Columbia University, Automorphic Forms and Arithmetic Seminar  
Quebec-Vermont, Number Theory Seminar  
Duke University, Number Theory Seminar  
University of Chicago, Number Theory Seminar
- 2015 University of Wisconsin Madison, Number Theory Seminar  
University of Illinois Urbana-Champaign, Number Theory seminar  
Johns Hopkins-Maryland, Algebra and Number Theory Day  
Oberwolfach Workshop on Reductions of Shimura Varieties  
AMS Sectional Meeting, Chicago, Special Session on Langlands Program  
Joint Mathematics Meetings – AMS Special Session on Recent Developments in Algebraic  
Number Theory  
Tata Institute for Fundamental Research Seminar  
University of Toronto, Number Theory Seminar
- 2014 Harvard University, Number Theory Seminar
- 2013 Imperial College, Number Theory Seminar  
Cambridge University, Number Theory Seminar  
Princeton/IAS, Number Theory Seminar  
Harvard University, Number Theory Seminar  
California Institute of Technology, Number Theory Seminar
- 2012 University of California, Los Angeles, Number Theory Seminar  
University of California, Berkeley, Number Theory Seminar

## CAMPUS AND COMMUNITY TALKS

- 2019 “Fermat’s Last Theorem,” University of Arizona, Undergraduate Research Seminar
- 2014 “Modular arithmetic,” University of Chicago Young Scholars Program
- 2011 “Fractional linear transformations,” Stanford Math Circle
- 2009 “What’s the deal with  $-163?$ ,” Stanford University Mathematical Organization

## SERVICE TO UNIVERSITY

### Rice University

- 2022 - Instructor Committee
- Fall 2022 Graduate Committee

### University of Arizona

- 2020 - 2022 Postdoctoral Committee
- 2019 - 2022 Faculty Academic Advisor for Undergraduate Math Majors
- 2019 - 2020 Organizer of University of Arizona Mathematics Department Colloquium

### University of Chicago

- 2015 - 2016 Organizer, University of Chicago Number Theory Seminar

## SERVICE TO PROFESSION

- 2022 - Director of the Southwest Center for Arithmetic Geometry
- 2017 - 2020 Reviewer for American Mathematical Society (AMS)
- 2013 - Referee for journals including ANT, JNT, IMRN, Trans. of AMS, JIMJ, IJM, and Rep. Theory, Compositio, Inventiones

## ADVISING

### Postdocs

Kevin Childers  
Sungyoon Cho

### PhD Students, Advisor

Rachel Knak, University of Arizona, graduated May 2023.  
Anthony Guzman, University of Arizona, expected 2024  
Ben Savoie, University of Arizona, expected 2025

### PhD Students, Dissertation Committee

Anthony Kling, University of Arizona, 2021  
David Taylor, University of Arizona, 2020  
Jun Wang, University of Arizona, 2018

Cody Gunton, University of Arizona, 2018  
Sheng-Chi Shih, University of Arizona, 2018

PhD Comprehensive Exam Committee

Utkarsh Agrawal, University of Arizona, 2019  
Jonathan Taylor, University of Arizona, 2018

Undergraduate Thesis

Victor Zhang, University of Chicago, 2016