

Benjamin Linowitz

CONTACT INFORMATION:

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EMPLOYMENT:

Oberlin College	
Assistant Professor	Fall 2016 - present
NSF Postdoctoral Research Fellow	2013 - 2016
Institution: University of Michigan	
Sponsoring Scientist: Gopal Prasad	
University of Michigan	2012 - 2016
RTG Postdoctoral Assistant Professor	

EDUCATION:

Ph.D. in Mathematics , Dartmouth College	May 2012
Advisor: Tom Shemanske	
Thesis: <i>Selectivity in central simple algebras and isospectrality</i>	
M.A. in Mathematics , Dartmouth College	May 2009
M.A. in Mathematics , University of Pennsylvania	May 2006
Advisor: Ted Chinburg	
Thesis: <i>An exposition of the AKS polynomial time primality testing algorithm</i>	
B.A. in Mathematics , University of Pennsylvania	May 2006
<i>Summa Cum Laude with Honors in Mathematics</i>	

GRANTS AND FELLOWSHIPS:

NSF DMS - 1905437 (\$176,562)	August 2019 - July 2022
RUI: The Geometry of Arithmetic Locally Symmetric Spaces	
Simons Collaboration Grant (\$42,000)	2017 - 2022
Declined after second year due to NSF support.	
Oberlin Powers Travel Grant (\$2,980)	2019
Project NExT Fellow (Green 16)	2016 - 2017
Oberlin Curriculum Development Grant (\$3,500)	2016
NSF DMS - 1304115 (\$150,000)	2013 - 2016
Postdoctoral Research Fellowship	
NSF DMS - 1500710 (\$19,220)	March 2015
Awarded to support the <i>2015 Automorphic Forms Workshop</i> .	
Co-PIs: M. Agarwal and L. Thompson	
Number Theory Foundation Award (\$4,920)	March 2015
Awarded to support the <i>2015 Automorphic Forms Workshop</i> .	

PUBLICATIONS (ACCEPTED OR PUBLISHED):

- Fake quadrics**, B. Linowitz, M. Stover and J. Voight, *Selecta Math. (N.S.)* 25 (2019), no. 3, Paper No. 48.
- The Fourier coefficients of Eisenstein series newforms**, B. Linowitz and L. Thompson, *Automorphic Forms and Related Topics*, 169-176, *Contemp. Math.*, 732, Amer. Math. Soc., Providence, RI, 2019.
- Brauer equivalent number fields and the geometry of quaternionic Shimura varieties**, B. Linowitz, *Q. J. Math.* 70 (2019), no. 2, 675-687.
- Counting and effective rigidity in algebra and geometry**, B. Linowitz, D. B. McReynolds, P. Pollack and L. Thompson, *Invent. Math.* 213 (2018), no. 2, 697-758.
- Counting isospectral manifolds**, M. Belolipetsky and B. Linowitz, *Adv. Math.* 321 (2017), 69-79.
- Bounded gaps between primes and the length spectra of arithmetic hyperbolic 3-orbifolds**, B. Linowitz, D. B. McReynolds, P. Pollack and L. Thompson, *C. R. Math. Acad. Sci. Paris* 355 (2017), no. 11, 1121-1126.
- Counting problems for geodesics on arithmetic hyperbolic surfaces**, B. Linowitz, *Proc. Amer. Math. Soc.* 146 (2018), no. 3, 1347-1361.
- Systoles of arithmetic hyperbolic surfaces and 3-manifolds**, B. Linowitz, D. B. McReynolds, P. Pollack and L. Thompson, *Math. Res. Lett.* 24 (2017), no. 5, 1497-1522.
- On the isospectral orbifold-manifold problem for nonpositively curved locally symmetric spaces**, B. Linowitz and J. Meyer, *Geom. Dedicata* 188 (2017), 165-169.
- Bounds for arithmetic hyperbolic reflection groups in dimension 2**, B. Linowitz, *Transform. Groups* 23 (2018), no. 3, 743-753.
- Parameterizing Shimura subvarieties of A_1 Shimura varieties and related geometric problems**, B. Linowitz and M. Stover, *Arch. Math. (Basel)* 107 (2016), no. 3, 213-226.
- Local Selectivity of Orders in Central Simple Algebras**, B. Linowitz and T. Shemanske, *Int. J. Number Theory* 13 (2017), no. 4, 853-884.
- Locally equivalent correspondences**, B. Linowitz, D. B. McReynolds and N. Miller, *Ann. Inst. Fourier (Grenoble)* 67 (2017), no. 2, 451-482.
- The length spectra of arithmetic hyperbolic 3-manifolds and their totally geodesic surfaces**, B. Linowitz, J. Meyer and P. Pollack, *New York J. Math.* 21 (2015), 955-972.
- Systolic surfaces in arithmetic hyperbolic 3-manifolds**, B. Linowitz and J. Meyer, In *the Tradition of Ahlfors-Bers, VII*, 215-223, *Contemp. Math.*, 696, Amer. Math. Soc., Providence, RI, 2017.
- Selective orders in central simple algebras and isospectral families of arithmetic manifolds**, B. Linowitz, *Manuscripta Math.* 147 (2015), no. 3, 399 - 413.
- A non-commutative analogue of the Odlyzko bounds and bounds on performance**

for space-time lattice codes, B. Linowitz, M. Satriano and R. Vehkalahti, IEEE Trans. Inf. Theory, vol. 61, no. 4, pp. 1971-1984, April 2015.

Small isospectral and nonisometric orbifolds of dimension 2 and 3, B. Linowitz and J. Voight, Math. Z., vol. 281, no. 1 (2015), pp. 523-569.

Families of mutually isospectral Riemannian orbifolds, B. Linowitz, Bull. London Math. Soc. (2015) 47 (1): 47-54.

The sign changes of Fourier coefficients of Eisenstein series, B. Linowitz and L. Thompson, Ramanujan J., 37 (2015), no. 2, 223-241.

On fields of definition of arithmetic Kleinian reflection groups. II, M. Belolipetsky and B. Linowitz, Int. Math. Res. Not. IMRN (2014), no. 9, 2559-2571.

Characterizing Hilbert modular cusp forms by coefficient size, B. Linowitz, Kyushu J. Math. 68 (2014) no. 1, 105-111.

A newform theory for Hilbert Eisenstein series, T. Atwill and B. Linowitz, Ramanujan J. 30 (2013), no. 2, 257-278.

Isospectral Towers of Riemannian Manifolds, B. Linowitz, New York J. Math. 18 (2012), 451-461.

Decomposition theorems for twists of Hilbert modular newforms, B. Linowitz, Funct. Approx. Comment. Math. 47 (2012), part 2, 157-172.

Embedding orders in central simple algebras, B. Linowitz and T. Shemanske, J. Théor. Nombres Bordeaux, 24 (2012), no. 2, 405-424.

Selectivity in quaternion algebras, B. Linowitz, J. Number Theory 132 (2012), no. 7, 1425-1437.

Modular forms on noncongruence subgroups and Atkin-Swinnerton-Dyer relations, L. Fang, J. Hoffman, B. Linowitz, A. Rupinski and H. Verill, Exp. Math. 19 (2010), no. 1, 1-27.

PUBLICATIONS (SUBMITTED):

Systole inequalities for arithmetic locally symmetric spaces, S. Lapan, B. Linowitz and J. Meyer

Areas of totally geodesic surfaces of hyperbolic 3-orbifolds, B. Linowitz, D. B. McReynolds and N. Miller

UNDERGRADUATE MENTORING:

Honors Students:

Jonathan Ladd, Primes of the form $x^2 + ny^2$ 2019

Nicholas Wilcox, Elliptic Curve Cryptography 2018

Independent Studies:

Hengrui Zhu , Lie Groups	Fall 2019
Yuan (Charles) Cui , Primality Testing	Fall 2017

Research Mentored:

Rainie Heck <i>Project title:</i> Systoles of arithmetic hyperbolic surfaces	Fall 2017
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Joseph Richey and Noah Shutty <i>Project title:</i> Polynomial identities on eigenforms Paper published in the <i>Journal of Number Theory</i> .	2013 - 2014
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Weston Ungemach <i>Project title:</i> A bound on isospectral families and applications	Summer 2013
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TEACHING EXPERIENCE:

Oberlin College

Math 329: Rings and Fields	Fall 2019
Math 350: Differential Geometry	Spring 2019
FYSP 028: Cryptography	Fall 2018, Fall 2016
Math 231: Multivariable Calculus	Fall 2018, Spring 2018
Math 327: Group Theory	Spring 2018, Spring 2017, Fall 2016
Math 134: Calculus II	Fall 2017, Fall 2019
Math 232: Linear Algebra	Spring 2017

University of Michigan

Math 175: Introduction to Cryptology	Fall 2012, 2013, 2014
Math 567: Introduction to Coding Theory	Winter 2013

Dartmouth College

Math 31: Abstract Algebra	Summer 2011
Math 22: Linear Algebra	Spring 2011
Math 2: Calculus with Algebra and Trigonometry	Winter 2010

RESEARCH PRESENTATIONS:

Colloquia

California State University, San Bernardino Title: Can you hear the shape of a drum?	January 2018
Universidad de los Andes (Bogotá, Colombia) Title: You cannot hear the shape of a hyperbolic drum	August 2017
University of Oklahoma Title: You cannot hear the shape of a hyperbolic drum	April 2015
Central Michigan University Title: Embedding orders in central simple algebras	March 2014

Miami University Title: Quaternion orders and isospectral surfaces of small volume	January 2012
Talks at Conferences and Workshops	
Oberwolfach Mini-Workshop: Reflection Groups in Negative Curvature Title: Fields of definition of arithmetic hyperbolic reflection groups	April 2019
The 33rd Automorphic Forms Workshop (Duquesne University) Title: Constructing non-compact isospectral hyperbolic manifolds	March 2019
The Arithmetic Theory of Quadratic Forms (Seoul National University, Korea) Title: Brauer Equivalent Number Fields	January 2019
The 32nd Automorphic Forms Workshop (Tufts University) Title: Brauer Equivalent Number Fields	March 2018
32nd Summer Conference on Topology & its Applications (University of Dayton) Title: Totally geodesic surfaces in arithmetic hyperbolic 3-manifolds	June 2017
Spring Topology and Dynamical System Conference (Jersey City University) Title: Totally geodesic surfaces in arithmetic hyperbolic 3-manifolds	March 2017
Building Bridges: Workshop on Automorphic Forms (University of Sarajevo) Title: Bounds on the arithmetic genus of Hilbert modular varieties	July 2016
Langenhop Lecture and Conference, Southern Illinois University at Carbondale Title: Selective orders in central simple algebras	May 2016
Computational Aspects of Algebraic Geometry, Automorphic Forms, & Number Theory, Tsinghua Sanya International Mathematics Forum Title: The classification of fake quadrics	August 2015
12th Brauer Group Meeting (Pingree Park) Title: Embedding orders in central simple algebras	June 2015
Spring Topology and Dynamics Conference (Bowling Green State University) Title: Can an orbifold be isospectral to a manifold?	May 2015
Ahlfors-Bers Colloquium VI Title: Effective results for the spectra of arithmetic hyperbolic 2- and 3-manifolds	October 2014
ICM 2014 Satellite Conference on Integral Quadratic Forms (Seoul, Korea) Title: The arithmetic of quaternion orders and isospectral hyperbolic surfaces	August 2014
Building Bridges: Workshop on Automorphic Forms (Bristol, UK) Title: The sign changes of Fourier coefficients of Eisenstein series	July 2014
The Algebraic and Arithmetic Theory of Quadratic Forms (Patagonia, Chile) Title: The arithmetic of quaternion orders and isospectral hyperbolic surfaces	December 2013
The 27th Automorphic Forms Workshop (University College Dublin, Ireland) Title: When the product of an arbitrary number of eigenforms is again an eigenform?	March 2013
Quebec-Maine Number Theory Conference Title: Quaternion orders and arithmetic hyperbolic geometry	September 2012
Building Bridges: Workshop on Automorphic Forms (Aachen University) Title: A newform theory for Hilbert Eisenstein series	August 2012
The 26th Automorphic Forms Workshop (University of British Columbia) Title: A newform theory for Hilbert Eisenstein series	April 2012
Maine-Quebec Number Theory Conference Title: A newform theory for Hilbert Eisenstein series	October 2011
The Upstate New York Number Theory Conference (Cornell University) Title: Decomposition theorems for Hilbert modular newforms	May 2011

The 25th Automorphic Forms Workshop (Oregon State University) Title: Decomposition theorems for Hilbert modular newforms	March 2011
Arithmetic of quadratic forms and integral lattices (Talca, Chile) Title: Embedding orders into quaternion algebras	December 2010
Canadian Number Theory Association XI meeting Title: Selectivity in quaternion algebras	July 2010
Maine-Quebec Number Theory Conference Title: Selectivity in quaternion algebras	October 2009

Seminars

Number Theory Seminar, Universidad Nacional de Córdoba - Argentina Title: Some recent results on the spectral theory of arithmetic locally symmetric spaces	July 2018
Geometry Seminar, University of Oklahoma Title: Effective results for the spectra of arithmetic hyperbolic 2- and 3-manifolds	April 2015
Number Theory Seminar, Universidad Nacional de Córdoba - Argentina Title: You cannot hear the shape of a drum	October 2015
Geometry Seminar, University of Michigan Title: Effective results for the spectra of arithmetic hyperbolic 2- and 3-manifolds	November 2014
Number Theory Seminar, University of Texas at Austin Title: Counting central simple algebras over number fields	October 2014
Number Theory Seminar, University of Michigan Title: Counting central simple algebras over number fields	September 2014
Number Theory Seminar, Dartmouth College Title: Counting central simple algebras over number fields	May 2014
Geometry Seminar, Purdue University Title: Isospectral surfaces of small volume	April 2013
VIGRE Seminar, University of Georgia Title: You cannot hear the shape of a hyperbolic drum	February 2013
Algebra Seminar, University of Georgia Title: Embedding orders in central simple algebras	February 2013
Algebra Seminar, Wesleyan University Title: Quaternion orders and arithmetic hyperbolic geometry	March 2012
Number Theory Seminar, University of Georgia Title: Quaternion orders and arithmetic hyperbolic geometry	January 2012
Algebra Seminar, Wesleyan University Title: Embedding orders into central simple algebras	September 2010

Special Sessions

Joint Mathematics Meetings AMS Special Session: “A Showcase of Number Theory at Liberal Arts Colleges” Title: Counting problems for geodesics on Shimura curves	January 2018
AMS Special Session on the Geometry of Manifolds, Singular Spaces, and Groups, Michigan State University Title: Can an orbifold be isospectral to a manifold?	April 2015
AMS Special Session on Geometric Topology and Number Theory Title: Quaternion orders and isospectral hyperbolic surfaces	March 2014

JMM Special Session on the Arithmetic of quadratic forms and lattices Title: Lattice-theoretic methods in spectral geometry	January 2013
Special session on the arithmetic of quadratic forms and integral lattices Joint meeting of the AMS and Sociedad de matematica de Chile Title: Embedding orders into central simple algebras	December 2010

INVITED LECTURE SERIES:

Grupos aritméticos Academia Nacional de Ciencias, Córdoba, Argentina This was a weeklong Spanish language course, co-taught with Roberto Miatello and Emilio Lauret, focused on the geometry of arithmetic groups.	July 2018
The geometry of arithmetic hyperbolic 3-manifolds Universidad Nacional de Córdoba - Argentina This was a series of 11 lectures which introduced the audience to the construction of arithmetic hyperbolic 3-manifolds and the techniques used in the study of their topology and geometry. Particular attention was paid to applications in spectral geometry.	September-November 2015
Computing with quaternion algebras in Sage and Magma Dartmouth College These lectures, aimed at advanced undergraduates, introduced the Sage and Magma computer algebra systems with an eye towards the arithmetic of orders in quaternion algebras.	Fall 2011

TALKS ON MATH PEDAGOGY:

Teaching a first year seminar on cryptography using IBL MAA Session on Innovative Teaching Practices in Number Theory, 2018 Joint Mathematics Meetings, San Diego, CA.	January 2018
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TALKS FOR UNDERGRADUATES:

A Brief History of Calculus: The First 3000 Years Oberlin Mathematics Pizza Lunch	May 2019
How I became a mathematician & What the h*ck does number theory have to do with geometry and topology? Wake Forest University REU	August 2017
The ABC Conjecture Butler University Undergraduate Math Colloquium	February 2019
Departmental Spring Banquet, Ohio Wesleyan University	April 2017
Duquesne University Undergraduate Math Colloquium	October 2016
University of Michigan Math Club	September 2014
Central Michigan Univ. SUMMR Conference (keynote speaker)	July 2013
Kalamazoo College	October 2012
A Modular Forms Approach to Quadratic Forms University of Michigan Math Club	November 2013

CONFERENCES ORGANIZED:

Summer Conference on Topology and its Applications	July 2020
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Session on Algebra and Geometry

The Length and Laplace Spectra of Riemannian Manifolds	March 2019
Special session at the AMS meeting at the University of Hawaii	
Mathematical Research Communities	Summer 2018
<i>I am a co-organizer of a 20-person conference at the 2018 Mathematical Research Communities program. The title of our conference is “Number Theoretic Methods in Hyperbolic Geometry”.</i>	
AIM SQuaRE , San Jose, CA	2018, 2019, 2020
Collaborate@ICERM , Providence, RI	2017
29th Automorphic Forms Workshop , University of Michigan	March 2015
Interactions Between Geometry, Group Theory and Number Theory	March 2015
Special session at the AMS meeting at Michigan State University.	
Geometric Structures And Representation Varieties (GEAR)	May 2014
NSF Junior Retreat , University of Michigan (local organizing committee)	

SERVICE TO THE PROFESSION:

Associate Editor for MAA Reviews	2019 - present
MAA Basic Library List Committee	2018 - present
Mathematical Reviews	2011 - present
Reviewer	
Ph.D. defense committee member	
Angelica Babei, Dartmouth College, 2019	
Dianbin Bao, Temple University, 2017	
Refereeing (journals)	
Acta Arithmetica, Algebra & Number Theory, American Mathematical Monthly, Bulletin of the London Mathematical Society, Complex Variables and Elliptic Equations, Integers, International Journal of Number Theory, International Mathematics Research Notices, Journal of Number Theory, Journal of Pure and Applied Algebra, Journal of the London Mathematical Society, Journal of the Ramanujan Mathematical Society, Journal Théorie des Nombres Bordeaux, Manuscripta Mathematica, Mathematics Magazine, The Ramanujan Journal, Transactions of the American Mathematical Society	
Refereeing (publisher)	
Springer	

SERVICE TO OBERLIN:

First Year Seminar Program Committee	2018-2019
Science Advisory Committee	2017-2018
Goldwater Scholarship Nominating Committee	Fall 2017