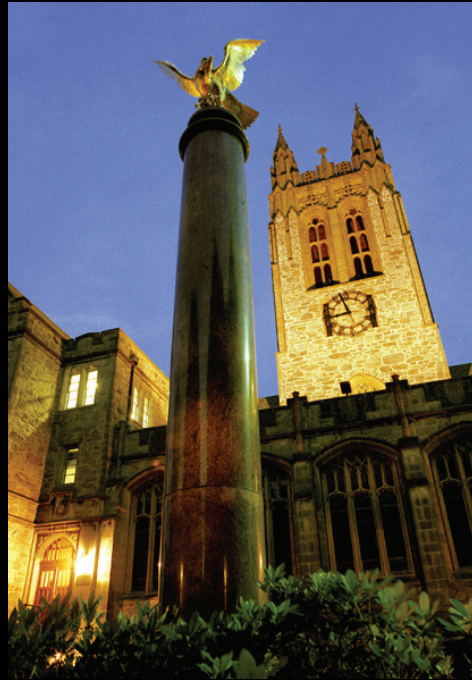


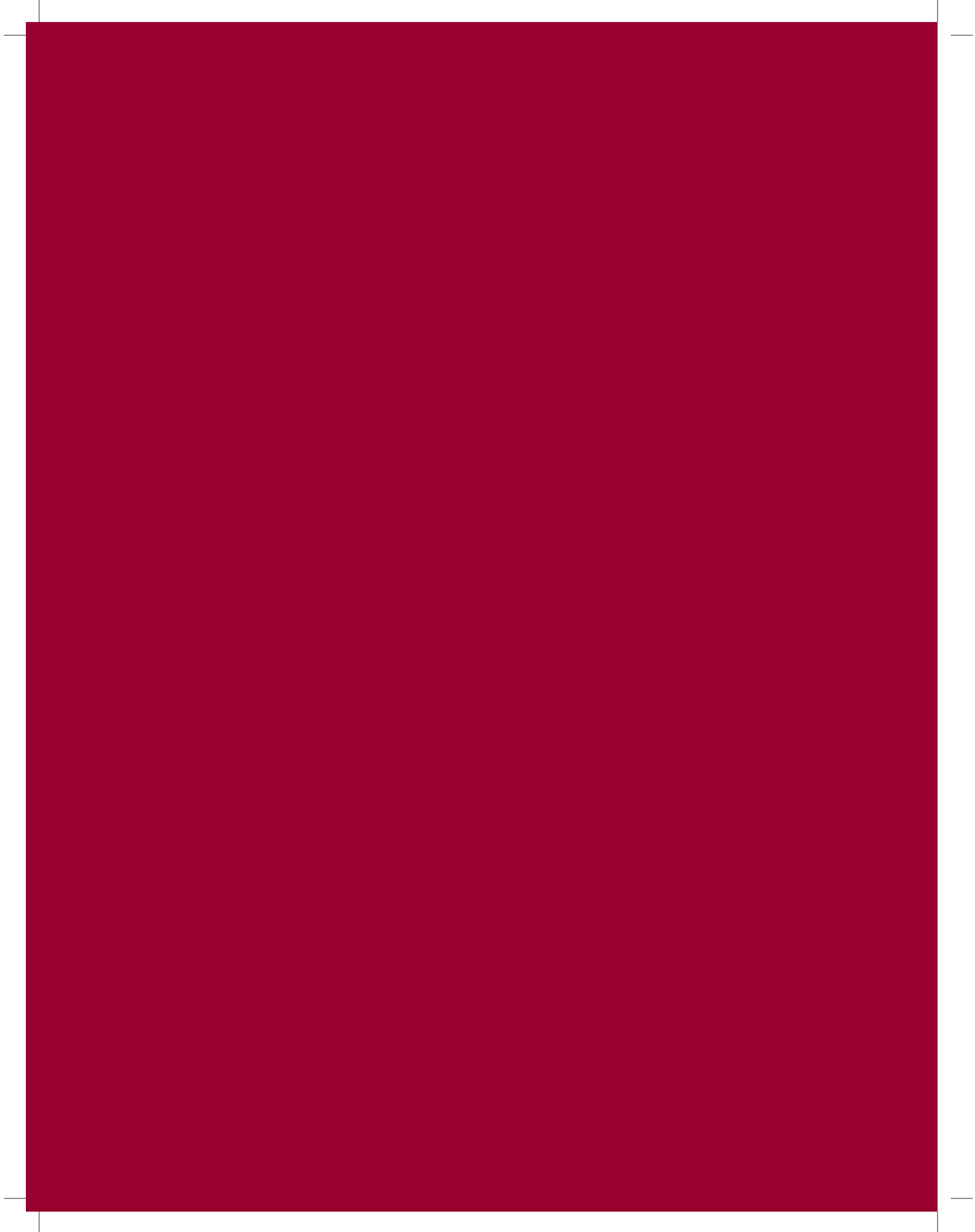
# BOSTON COLLEGE

GRADUATE SCHOOL OF ARTS AND SCIENCES



GRADUATE PROGRAM

# MATHEMATICS



# GRADUATE STUDY IN MATHEMATICS

The Department of Mathematics at Boston College now offers a selective and focused graduate program leading to the Degree of Doctor of Philosophy (Ph.D), specializing in two broad research areas:

- ❖ Geometry/Topology
- ❖ Number Theory/Representation Theory/Algebraic Geometry

and also emphasizing excellence in teaching.

The research areas of our faculty in Geometry/Topology include:

- ❖ 3-dimensional manifolds and their geometry
- ❖ Dynamics
- ❖ Geometry of moduli spaces
- ❖ Heegaard-Floer and Khovanov homology
- ❖ Hyperbolic geometry
- ❖ Kleinian groups
- ❖ Knot theory

The research areas of our faculty in Number Theory/Representation Theory/Algebraic Geometry include:

- ❖ Automorphic forms
- ❖ Algebraic geometry
- ❖ The cohomology of arithmetic groups
- ❖ The geometry of Shimura varieties
- ❖ The local Langlands correspondence
- ❖ Multiple Dirichlet series
- ❖ Representation theory
- ❖ Spectral geometry

Our graduate students are part of a close-knit departmental community, and benefit not only from individual collaboration with their research advisors, but also from the experience of the entire faculty and fellow students.

Boston College is one of the Boston area's premier institutions, which includes over 50 area universities and colleges. Boston is a world-renowned center for Mathematics and provides a vibrant intellectual climate in which graduate students thrive, with many outdoor and cultural opportunities in the beautiful New England area.

# INFORMATION

## Financial Aid

All applicants will be considered for teaching assistantships, which provide full tuition remission, health insurance coverage, and a stipend (currently \$19,500 for the academic year; there is the possibility of summer support).

## Lecture Series and Seminars

The Boston College Math Department hosts a yearly Distinguished Lecturer series. The Distinguished Lecturer gives three lectures and ample time is incorporated into the schedule to allow for interaction with students. Previous Distinguished Lecturers were John Conway, Ravi Vakil, Benson Farb, and Peter Sarnak.

Boston College runs a Number Theory seminar jointly with MIT, alternating between the two schools, in which outstanding researchers from all over the country present their work in a wide range of areas of Number Theory.

We also have our own active research seminars in Geometry/Topology and Number Theory.

## Graduate Consortium

Boston College has a reciprocity agreement with Boston University, Brandeis, and Tufts that allows graduate students in Mathematics to cross register for one course each semester at one of these institutions. Students may also take courses in cognate departments at Boston College.

## Teaching

Excellence in teaching is an important part of the Boston College tradition, in which we take pride. The Math Department runs a Teaching Seminar each year to mentor and support new Graduate student teachers.

## Our Students

The enrollment at Boston College is roughly 14,500, including more than 4,000 graduate students. The Math Department has a small program: each year's entering class will likely be either five or six students, ensuring individual attention from faculty.

## Socializing

The Math Department looks for opportunities to enhance interaction between faculty and graduate students, through lunch at orientation, cookies and tea after the Teaching Seminar, the yearly TA appreciation luncheon, the beginning-of-term brunch, and other activities.

## Location

Boston College is located in a beautiful residential section of Newton which is about six miles from the heart of Boston. There is easy access to the city by public transportation. The Boston area offers countless outstanding seminars, lectures, colloquia, and concerts throughout the year.

## Housing

The Housing Office at Boston College provides an extensive list of off-campus housing options. Most graduate students rent rooms or apartments near the campus.

## Application Requirements

Applications received by Jan. 16, 2012 will receive full consideration, including consideration for Teaching Assistantships. Applications include application forms, official transcripts, GRE scores (including Math subject test), 3 letters of recommendation, a description of advanced mathematics coursework, and TOEFL (for international students). Information on how to apply can be found at [www.bc.edu/gsas](http://www.bc.edu/gsas).

# DEGREE REQUIREMENTS

## Coursework

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Students take first-year courses in Algebra, Topology, and Real and Complex Analysis, second year courses such as Number Theory, Representation Theory, and Geometry, and topics courses in subsequent years. Very-well-prepared students may be allowed to skip the first-year graduate courses (for example, if they have already taken them elsewhere) and proceed directly to advanced study.

## Exams

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There are three types of exams: Preliminary, Language and Doctoral Comprehensive.

## Preliminary Exams

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After the first year, students take two of the three preliminary exams in Real and Complex Analysis, Algebra, and Topology. Well-prepared students may take these exams earlier, upon consultation with the Graduate Program Director.

## Language Exam

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This exam consists in translating mathematics from French or German into English.

## Doctoral Comprehensive Exam

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During the third year the student chooses a research advisor and forms a doctoral committee, consisting of the research advisor and two other

department members.

The doctoral comprehensive exam consists of a research topic and one secondary topic, chosen by the student in consultation with the doctoral committee. Typically these are based on topics courses or independent study completed by the student in the second and third years.

## Teaching

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In addition to their responsibilities as teaching assistants and teaching fellows, students participate in the Teaching Seminar in the fall semester of their first two years.

## Dissertation

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Upon satisfactory performance in exams, the student is admitted to candidacy for the Ph.D and begins research for the doctoral dissertation. The dissertation must consist of original scholarly work. The doctoral committee will read and evaluate the completed dissertation and conduct an oral examination, at which the dissertation is defended in a public meeting.

# FACULTY AND FIELDS

AVNER ASH

[Ph.D., Harvard University](#)

Number Theory, Algebraic Geometry

JENNY A. BAGLIVO

[Ph.D., Syracuse University](#)

Statistics, Applied Mathematics

JOHN BALDWIN

[Ph.D., Columbia University](#)

Low-dimensional Geometry and Topology

ROBERT J. BOND

[Ph.D., Brown University](#)

Algebra, Number Theory

MARTIN BRIDGEMAN

[Ph.D., Princeton University](#)

Geometry, Topology

DANIEL W. CHAMBERS

[Ph.D., University of Maryland](#)

Probability, Stochastic Processes, Statistics

DAWEI CHEN

[Ph.D., Harvard University](#)

Algebraic Geometry

CHI-KEUNG CHEUNG

[Ph.D., University of California, Berkeley](#)

Complex Differential Geometry, Several Complex Variables

SOLOMON FRIEDBERG

[Ph.D., University of Chicago](#)

Number Theory, Representation Theory

JOSHUA GREENE

[Ph.D., Princeton University](#)

Low-dimensional Topology

ELISENDA GRIGSBY

[Ph.D., University of California, Berkeley](#)

Low-dimensional Topology

ROBERT H. GROSS

[Ph.D., Massachusetts Institute of Technology](#)

Algebra, Number Theory, History of Mathematics

BENJAMIN HOWARD

[Ph.D., Stanford University](#)

Number Theory, Arithmetic Geometry

RICHARD A. JENSON

[Ph.D., University of Illinois](#)

Algebraic Coding Theory, Combinatorics

WILLIAM J. KEANE

[Ph.D., University of Notre Dame](#)

Abelian Group Theory

DUBI KELMER

[Ph.D., Tel Aviv University](#)

Number Theory, Spectral Geometry, Dynamical Systems

MARGARET J. KENNEY

[Ph.D., Boston University](#)

Algebraic Coding Theory, Mathematics Education

TAO LI

[Ph.D., California Institute of Technology](#)

Geometry, Topology, Knot Theory

ROBERT MEYERHOFF

[Ph.D., Princeton University](#)

Geometry, Topology

RENATO MIROLLO

[Ph.D., Harvard University](#)

Dynamical Systems

NANCY E. RALLIS

[Ph.D., University of Indiana](#)

Algebraic Topology, Fixed Point Theory, Probability and Statistics

MARK REEDER

[Ph.D., Ohio State University](#)

Lie Groups, Representation Theory

NED I. ROSEN

[Ph.D., University of Michigan](#)

Logic, Combinatorics, Dynamical Systems

## SELECTED FACULTY PUBLICATIONS

- ❖ Avner Ash and Robert Gross *Fearless Symmetry: Exposing the Hidden Patterns of Numbers*, Princeton University Press 2006, new paperback edition 2008.
- ❖ Avner Ash, Rigidity of p-adic cohomology classes of congruence subgroups of  $GL(n, \mathbb{Z})$ , with D. Pollack and G. Stevens, *Proc. London Math. Soc.* (3) **96** (2008), pp. 367-388.
- ❖ John Baldwin, Khovanov homology, open books, and tight contact structures, with O. Plamenevskaya, *Adv. Math.*, **224**, (2010), pp. 2544-2582.
- ❖ Martin Bridgeman, An extension of the Weil-Petersson metric to quasi-fuchsian space, with E. Taylor, *Math. Annalen*, **341**, No. 4, (2008), pp. 927-943.
- ❖ Martin Bridgeman, Orthospectra of geodesic laminations and dilogarithm identities on moduli space, *Geometry and Topology*, **15**, No. 2, (2011), pp. 707-733.
- ❖ Dawei Chen, Covers of elliptic curves and the moduli space of stable curves, *J. reine angew. Math.*, **649** (2010), pp 167-205.
- ❖ Solomon Friedberg, Gauss sum combinatorics and metaplectic Eisenstein series, with B. Brubaker, D. Bump, *Contemporary Mathematics* **488**, Amer. Math. Soc., (2009), pp. 61-81.
- ❖ Solomon Friedberg, Weyl group multiple Dirichlet series, Eisenstein series, and crystal bases, with B. Brubaker, D. Bump, *Annals of Mathematics* **173** (2011), pp. 1081-1120.
- ❖ Solomon Friedberg, Teaching mathematics graduate students how to teach, *Notices of the American Mathematical Society* **52** (2005), pp. 842-847.
- ❖ Joshua Greene, The lens space realization problem, (2010), <http://arxiv.org/abs/1010.6257>
- ❖ Elisenda Grigsby, On the colored Jones polynomial, sutured Floer homology, and knot Floer homology, with S. Wehrli, *Advances in Mathematics*, **223**, No. 6 (2010), 2114-2165.
- ❖ Elisenda Grigsby, Knot concordance and Heegaard Floer homology invariants in branched covers, with D. Ruberman and S. Strle, *Geometry and Topology* **12**, (2008), pp. 2249-2275.
- ❖ Robert Gross, Prime Specialization in Genus 0, with B. Conrad and K. Conrad, *Transactions of the American Mathematical Society*, **360**, (2008), pp. 2867-2908.
- ❖ Ben Howard, Intersection theory on Shimura surfaces, *Compos. Math.* **145**, No. 2 (2009), pp. 423-475.
- ❖ Ben Howard, Intersection theory on Shimura surfaces II, *Invent. math.* **183**, No. 1 (2011), pp. 1-77.
- ❖ Dubi Kelmer, Arithmetic Quantum Unique Ergodicity for Symplectic Linear Maps of the Multi-dimensional Torus, *Ann. of Math.* **171**(2)(2010), pp. 815-879.
- ❖ Tao Li, Heegaard surfaces and measured laminations, I: the Waldhausen conjecture, *Invent. math.* **167**, (2007), pp. 135-177.
- ❖ Tao Li, An algorithm to determine the Heegaard genus of a 3-manifold, *Geometry and Topology*, **15**, No. 2, (2011), pp. 1029-1106.
- ❖ Robert Meyerhoff, Geometric invariants for 3-manifolds, *The Mathematical Intelligencer*, **14** (1992), pp. 37-52.
- ❖ Robert Meyerhoff, Minimum volume cusped hyperbolic three-manifolds, with D. Gabai and P. Milley, *J. Amer. Math. Soc.* **22** (2009), pp. 1157-1215.
- ❖ Mark Reeder, From Laplace to Langlands via representations of orthogonal groups, with B. Gross, *Bull. Amer. Math Soc.*, **43** (2006), pp. 163-205.
- ❖ Mark Reeder, Depth-zero supercuspidal L-packets and their stability, with S. DeBacker, *Annals of Mathematics*, **169**, No. 3, (2009), pp. 795-901.



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