

# Benjamin B. Brubaker

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## APPOINTMENTS AND EDUCATION

- **Massachusetts Institute of Technology**, Cambridge, Massachusetts.  
Assistant Professor of Mathematics, 2006 - Present.
- **Stanford University**, Stanford, California.  
Szegö Assistant Professor of Mathematics, 2003 - 2006.
- **Brown University**, Providence, Rhode Island.  
Ph. D. in Mathematics, 2003.  
Sc. M. in Mathematics, 2000.  
Dissertation titled “Analytic Continuation for Cubic Multiple Dirichlet Series,”  
written under the direction of thesis advisor Jeffrey Hoffstein.
- **Amherst College**, Amherst, Massachusetts.  
A.B. *summa cum laude* with highest distinction in Mathematics, 1998.

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## RESEARCH INTERESTS

- Number Theory and Representation Theory; Automorphic Forms
- Eisenstein Series; Metaplectic Forms; Special Values of L-Series

(See the “Publications” section for more detail; recent work at [math.mit.edu/~brubaker](http://math.mit.edu/~brubaker))

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## TEACHING EXPERIENCE

- 9/03–Present     **Assistant Professor**, MIT, Stanford University - Courses taught include head instructor duties in freshman calculus; undergraduate courses in number theory, group theory, measure theory and probability, Fourier analysis; core and special topics graduate courses.
- 9/00–6/03        **Teaching Fellow**, Brown University - Responsible for teaching and planning my own calculus courses of various levels.
- 6/01–9/03        **Instructor**, Brown Summer Studies - Designed and taught number theory and calculus immersion courses for high school students, now both permanent offerings in the summer curriculum.

- 7/07–9/08      **Mentor**, PROMYS - Developed and led projects for gifted high school students participating in a number-theory based curriculum during a six-week summer program at Boston University.
- 9/00–1/02      **Teaching Consultant**, Boston College Case Studies Project - Evaluated materials for use in training of mathematics instructors (with book published by the AMS as Issues in Mathematics Education, vol. 10).
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## GRANT AWARDS AND HONORS

- **NSF CAREER Grant** (2009) - Lone PI on a five-year award (DMS-0844185) to study “Multiple Dirichlet Series, Automorphic Forms, and Combinatorial Representation Theory.”
- **James H. Ferry, Jr. Fund for Innovation in Research Education** (2007) - Lone PI on a grant from MIT to develop and support student interest in number theory titled “Mathematics as a Laboratory Science: Building a Number Theory Community at MIT.”
- **NSF Individual Grant** (2007) - Lone PI on NSF grant (DMS-0702438) to study “Multiple Dirichlet Series with Applications to Automorphic Representation Theory”
- **NSF FRG Grants** (2003, 2006) - Consecutive focused research grants from the NSF (DMS-0354662 and -0652529), the latter titled “Combinatorial representation theory, multiple Dirichlet series, and moments of L-functions” with fellow PIs at Boston College, Brown, Columbia, CUNY, Minnesota and Stanford.
- **Outstanding Teaching Award, Stanford Math Dept.** (2006) - Awarded every few years for distinguished contributions to teaching.
- **President’s Award for Teaching Excellence** (2003) - Brown’s university-wide award given annually to up to four graduate student teachers across all departments.
- **George Irving Hopkins Dissertation Fellowship** (2002) - One-year research grant from Brown University awarded for outstanding progress toward a thesis.
- **Brown Univ. Math Department Outstanding Teaching Award** (2002)
- **Best Overall Score - Critical Review”** (Fall 2000, Spring 2001, Fall 2001) - Received the highest score among all faculty in the math department on a university-wide student survey of teaching for all three semesters while a head instructor at Brown University.  
(available at [students.brown.edu/Critical\\_Review/2002.2003.1/home.shtml](http://students.brown.edu/Critical_Review/2002.2003.1/home.shtml))
- **Phi Beta Kappa** (1998) - membership from Amherst College.

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## RECENT SYNERGISTIC ACTIVITIES

- Advisor to three MIT Ph.D. students – Peter J. McNamara (graduating May 2010), Sawyer Tabony (September 2010), and Catherine Lennon (May 2011)
- Advisor to Undergraduate Math Majors, including 7 semester-long Undergraduate Research Opportunities at MIT and 2 Stanford research projects
- Co-editor, forthcoming Progress In Mathematics volume based on proceedings of a 2008 ICMS conference (Edinburgh) on multiple Dirichlet series
- Co-organizer of several conferences and workshops, including a BIRS workshop on Whittaker functions and Crystal Bases, Banff, Canada, June 2010
- Member, MIT Graduate Admissions Committee (2007 - present)
- Co-Organizer for Boston Joint Mathematics Colloquium, BC-MIT number theory seminar, MIT number theory seminar
- Organizer, Analytic Number Theory Summer Research at MIT, Summer 2007
- Co-Organizer, Graduate Teacher Training Seminar, Stanford University, 2003 – 2006
- Reviewer for numerous journals

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## PAPERS PUBLISHED OR TO APPEAR

1. *Weyl group multiple Dirichlet series, Eisenstein series, and crystal bases* (with D. Bump and S. Friedberg), To Appear in *Annals of Math.*
2. *Gauss sum combinatorics and metaplectic Eisenstein series* (with D. Bump and S. Friedberg), *Automorphic forms and L-functions I. Global aspects*, *Contemp. Math.* vol. 488, 61–81 (2009)
3. *Twisted Weyl group multiple Dirichlet series: the stable case*, (with D. Bump and S. Friedberg) *Eisenstein Series and Applications* (Gan, Kudla, Tschinkel eds.), *Progress in Math* vol. 258, 2008, 1-26.
4. *Weyl Group Multiple Dirichlet Series III: Connections with Eisenstein series* (with D. Bump, S. Friedberg, and J. Hoffstein) *Annals of Math. (2)*, **166** 293–316 (2007).
5. *Weyl group multiple Dirichlet series II: the stable case*, (with D. Bump and S. Friedberg) *Invent. Math.*, **165** 325-355 (2006).
6. *Weyl group multiple Dirichlet series I*, (with D. Bump, G. Chinta, S. Friedberg, and J. Hoffstein) *Multiple Dirichlet Series, Automorphic Forms, and Analytic Number Theory* (S. Friedberg, D. Bump, D. Goldfeld, and J. Hoffstein, ed.), *Proc. Symp. Pure Math.*, vol. 75, 91-114 (2006).

7. *Residues of Weyl group multiple Dirichlet series associated to  $\widetilde{GL}_{r+1}$* , (with D. Bump) Multiple Dirichlet Series, Automorphic Forms, and Analytic Number Theory (S. Friedberg, D. Bump, D. Goldfeld, and J. Hoffstein, ed.), *Proc. Symp. Pure Math.*, vol. 75, 115–134 (2006).
  8. *On Kubota's Dirichlet series* (with D. Bump) *J. Reine Angew. Math.*, **598** 159-184 (2006).
  9. *Cubic twists of  $GL(2)$  automorphic  $L$ -functions* (with S. Friedberg and J. Hoffstein) *Invent. Math.* **160** no. 1, 31-58 (2005)
  10. *Non-vanishing twists of  $GL(2)$  automorphic  $L$ -functions*, (with A. Bucur, G. Chinta, S. Frechette and J. Hoffstein), *IMRN* **78**, 4211-4239 (2004)
  11. *Analytic continuation for cubic multiple Dirichlet series*, Brown University Ph.D. thesis. (2003)
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## BOOKS

- Co-author – *Weyl group multiple Dirichlet series: Type A combinatorial theory* (with D. Bump and S. Friedberg), 137 pp., To be published by Annals of Math Studies (2010).
  - Co-editor – Conference Proceedings of ICMS Workshop on Multiple Dirichlet Series, Edinburgh, Scotland (2008). To be published in Progress in Math. Series, Birkhauser.
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## PAPERS SUBMITTED FOR PUBLICATION

- *Schur Polynomials and the Yang-Baxter Equation* (with D. Bump and S. Friedberg)
  - *A crystal definition of symplectic multiple Dirichlet series* (with J. Beineke and S. Frechette)
  - *Weyl group multiple Dirichlet series of type C* (with J. Beineke and S. Frechette)
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## PREPRINTS

- *On Hecke relations for coefficients of the  $n$ -fold theta function* (with D. Bump, S. Friedberg, and J. Hoffstein)
- *Whittaker coefficients of metaplectic, parabolic Eisenstein series* (with S. Friedberg)
- *Metaplectic Whittaker functions and solvable lattice models* (with D. Bump, G. Chinta, S. Friedberg, and P. Gunnells)
- *Weyl group multiple Dirichlet series of type B* (with D. Bump, G. Chinta, and P. Gunnells)

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## REFERENCES

- Daniel Bump, Stanford University
- Solomon Friedberg, Boston College
- Dorian Goldfeld, Columbia University
- Jeffrey Hoffstein, Brown University (Thesis Advisor)
- Ken Ono, University of Wisconsin-Madison
- Peter Sarnak, Princeton University/IAS