

# Matthias Beck

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## Current Position

Assistant Professor, San Francisco State University, since Fall 2004.

## Previous Positions

Robert Riley Assistant Professor, Binghamton University (SUNY), Fall 2000 – Spring 2003.

Postdoctoral Fellow, Mathematical Sciences Research Institute, Berkeley, Fall 2003.

Member, Max-Planck-Institut für Mathematik, Bonn, Spring/Summer 2004.

Member, Mathematical Sciences Research Institute, Berkeley, Spring 2008.

## Education

Ph.D. Mathematics, Temple University, August 2000.

Advisor: S. Robins, dissertation: *The arithmetic of rational polytopes*.

Diplom Mathematics, minor Physics, Universität Würzburg, Germany, July 1997.

Advisor: G. Köhler, Diplomarbeit: *Number theoretical algorithms using elliptic curves*.

Staatsexamen Mathematics and Physics (Secondary Education), Universität Würzburg, Germany, June 1997.

## Research

Discrete and Computational Geometry, Analytic Number Theory.

## Books:

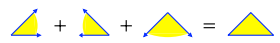

- [1] A. Barvinok, M. Beck, C. Haase, B. Reznick, and V. Welker, eds. Integer points in Polyhedra. Geometry, Number Theory, Algebra, Optimization. Proceedings of the AMS-IMS-SIAM Joint Summer Research Conference in Snowbird, Utah (July 12–18, 2003). *Contemporary Mathematics* **374**, American Mathematical Society, 2005.
- [2] M. Beck and S. Robins, Computing the continuous discretely: Integer-point enumeration in polyhedra. *Springer Undergraduate Texts in Mathematics*, 2007.
- [3] M. Beck, C. Haase, B. Reznick, M. Vergne, V. Welker, and R. Yoshida, eds. Integer points in Polyhedra. Proceedings of the AMS-IMS-SIAM Joint Summer Research Conference in Snowbird, Utah (June 2006). *Contemporary Mathematics* **452**, American Mathematical Society, 2008.

## Papers:

- [1] M. Beck, The reciprocity law for Dedekind sums via the constant Ehrhart coefficient, *American Mathematical Monthly* **106**, no. 5 (1999), 459–462.

- [2] M. Beck, A closer look at lattice points in rational simplices,  
*Electronic Journal of Combinatorics* **6**, no. 1 (1999), R 37 (9 pages).
- [3] M. Beck, Counting lattice points by means of the residue theorem,  
*Ramanujan Journal* **4**, no. 3 (2000), 299–310.
- [4] M. Beck, I. M. Gessel, and T. Komatsu, The polynomial part of a restricted partition function related to the Frobenius problem,  
*Electronic Journal of Combinatorics* **8**, no. 1 (2001), N 7 (5 pages).
- [5] M. Beck, Multidimensional Ehrhart reciprocity,  
*Journal of Combinatorial Theory Series A* **97**, no. 1 (2002), 187–194.
- [6] M. Beck and S. Robins, Explicit and efficient formulas for the lattice point count inside rational polygons, *Discrete & Computational Geometry* **27** (2002), 443–459.
- [7] M. Beck and T. Zaslavsky, A shorter, simpler, stronger proof of the Meshalkin-Hochberg-Hirsch bounds on componentwise antichains,  
*Journal of Combinatorial Theory Series A* **100** (2002), 196–199.
- [8] M. Beck, R. Diaz, and S. Robins, The Frobenius problem, rational polytopes, and Fourier-Dedekind sums, *Journal of Number Theory* **96** (2002), 1–21.
- [9] M. Beck and T. Zaslavsky, A Meshalkin theorem for projective geometries,  
*Journal of Combinatorial Theory Series A* **102** (2003), 433–441.
- [10] M. Beck, Dedekind cotangent sums,  
*Acta Arithmetica* **109**, no. 2 (2003), 109–130.
- [11] M. Beck, M. Cohen, J. Cuomo, and P. Gribelyuk, The number of “magic” squares, cubes, and hypercubes, *American Mathematical Monthly* **110**, no. 8 (2003), 707–717.
- [12] M. Beck, D. Einstein, and S. Zacks, Some experimental results on the Frobenius problem,  
*Experimental Mathematics* **12**, no. 3 (2003), 263–269.
- [13] M. Beck and D. Pixton, The Ehrhart polynomial of the Birkhoff polytope,  
*Discrete & Computational Geometry* **30**, no. 4 (2003), 623–637.
- [14] M. Beck and S. Robins, A formula related to the Frobenius problem in two dimensions,  
*Number Theory. New York Seminar 2003* (D. Chudnovsky, G. Chudnovsky, M. Nathanson, eds.), pp. 17–23. Springer, Berlin, 2004.
- [15] M. Beck and S. Zacks, Refined upper bounds for the linear Diophantine problem of Frobenius,  
*Advances in Applied Mathematics* **32**, no. 3 (2004), 454–467.
- [16] M. Beck and S. Robins, Dedekind sums: a combinatorial-geometric viewpoint,  
*Unusual Applications of Number Theory* (M. Nathanson, ed.), *DIMACS Series in Discrete Mathematics and Theoretical Computer Science* **64** (2004), 25–35.
- [17] M. Beck, The partial-fractions method for counting solutions to integral linear systems,  
*Discrete & Computational Geometry* **32** (2004), 437–446 (special issue in honor of Louis Billera).

- [18] M. Beck, J. A. DeLoera, M. Develin, J. Pfeifle, and R. P. Stanley, Coefficients and roots of Ehrhart polynomials, *Contemporary Mathematics* **374** (2005), 15–36.
- [19] M. Beck, B. Chen, L. Fukshansky, C. Haase, A. Knutson, B. Reznick, S. Robins, and A. Schuermann, Problems from the Cottonwood Room, *Contemporary Mathematics* **374** (2005), 179–191.
- [20] M. Beck, B. C. Berndt, O-Y. Chan, and A. Zaharescu, Determinations of analogues of Gauss sums and other trigonometric sums, *International Journal of Number Theory* **1**, no. 3 (2005), 333–356.
- [21] M. Beck, S. Robins, and S. Zacks, Higher-dimensional Dedekind sums and their bounds arising from the discrete diagonal of the  $n$ -cube, *Advances in Applied Mathematics* **36**, no. 1 (2006), 1–29.
- [22] M. Beck, X. Wang, and T. Zaslavsky, A unifying generalization of Sperner’s theorem, *More Sets, Graphs and Numbers: A Salute to Vera Sos and Andras Hajnal* (E. Gyari, G. O. H. Katona, and L. Lovasz, eds.), *Bolyai Society Mathematical Studies* **15**, pp. 9–24. Springer, Berlin, and Janos Bolyai Mathematical Society, Budapest, 2006.
- [23] M. W. Baldoni, M. Beck, C. Cochet, and M. Vergne, Volume computation for polytopes and partition functions for classical root systems, *Discrete & Computational Geometry* **35** (2006), 551–595.
- [24] M. Beck and S. Hoşten, Cyclotomic polytopes and growth series of cyclotomic lattices, *Mathematical Research Letters* **13**, no. 4 (2006), 607–622.
- [25] M. Beck and T. Zaslavsky, Inside-out polytopes, *Advances in Mathematics* **205**, no. 1 (2006), 134–162.
- [26] M. Beck and T. Zaslavsky, The number of nowhere-zero flows in graphs and signed graphs, *Journal of Combinatorial Theory Series B* **96**, no. 6 (2006), 901–918.
- [27] M. Beck and T. Zaslavsky, An enumerative geometry for magic and magilatin labellings, *Annals of Combinatorics* **10**, no. 4 (2006), 395–413.
- [28] M. Beck, Geometric proofs of polynomial reciprocity laws of Carlitz, Berndt, and Dieter, *Diophantine analysis and related fields 2006*, pp. 11–18, Sem. Math. Sci. 35, Keio University, Yokohama, 2006.
- [29] M. Beck and F. Sottile, Irrational proofs for three theorems of Stanley, *European Journal of Combinatorics* **28**, no. 1 (2007), 403–409.
- [30] M. Beck, S. Sam, and K. Woods, Maximal periods of (Ehrhart) quasi-polynomials, *Journal of Combinatorial Theory Series A* **115**, no. 3 (2008), 517–525.
- [31] M. Beck, B. Nill, B. Reznick, C. Savage, I. Soprunov, and Z. Xu, Let me tell you my favorite lattice-point problem..., *Contemporary Mathematics* **452** (2008), 179–187.

- [32] M. Beck, C. Haase, and F. Sottile,  =   
to appear in *Mathematical Intelligencer*.
- [33] M. Beck, C. Haase, and A. Matthews, Dedekind-Carlitz polynomials as lattice-point enumerators in rational polyhedra,  
to appear in *Mathematische Annalen*.

### Invited Talks:

**Conference Talks:** Joint Mathematics Meetings at San Diego and Washington, D.C., Math-fests in Burlington and Knoxville, AMS Meetings at Murfreesboro, Cincinnati, Storrs, Williams, Toronto, Providence, and Gainesville, Discrete Mathematics Days at University of Massachusetts at Amherst and UC Davis, Integers Combinatorial Number Theory Conference at the University of West Georgia, 16th International Conference Jangjeon Mathematical Society, Antalya, Turkey (invited hour talk), Combinatorial and Additive Number Theory Conference at CUNY, Pacific North West Number Theory Conference at Simon Fraser University (invited hour talk), Illinois Number Theory Conference, Conference on Diophantine Analysis and Related Fields, Keio University, Japan (invited hour talk).

**Colloquia:** Undergraduate Connecticut Valley Colloquium, Sonoma State University, Reed College, Universität Marburg, Universitat de Barcelona, Haverford/Swarthmore Colleges, San Francisco State University, Williams College, University of Delaware, University at Albany (SUNY), Vassar College, University of Rochester, Universität Würzburg, Gettysburg College, Binghamton University (SUNY), Carleton University, SUNY Geneseo, Dickinson College, SUNY Potsdam.

**Seminars:** Stanford University, Technische Universität Berlin, UC Berkeley, Université Pierre et Marie Curie (Paris 6), Max-Planck-Institut für Mathematik, Mathematical Sciences Research Institute, Quebec-Vermont Number Theory Seminar, McGill University, University of Washington, Cornell University, UC Davis, University of Massachusetts, Lafayette College, Bryn Mawr College, William Paterson University, SUNY Albany, University of Scranton, Binghamton University (SUNY), Carleton University, University of Pennsylvania, University of Rochester, City University of New York.

**Outreach:** Math Circles in San Jose, Stanford, San Francisco, Oakland, and Berkeley, Mathematical Sciences Research Institute.

### Grants and Awards

- San Francisco State University  
Presidential Award for Professional Development (pre-tenure sabbatical, 2008).  
Summer research grants (2005 & 2006).
- Institute for Student-Centered Learning, Binghamton University (SUNY)  
Implementation grant for Combinatorics class.
- The Graduate School, Temple University  
University fellowship (2 years).

## Teaching

- Dept. of Mathematics, San Francisco State University *since Fall 2004*  
Assistant Professor. Courses taught: *Concepts of the Number System* (for future K–8 teachers), *Calculus II*, *Proofs and Exploration*, *Number Theory*, *Introduction to Functions of a Complex Variable*, *Modern Algebra I & II*, *Discrete Geometry* (graduate), *Computational Discrete Geometry* (graduate, co-taught with R. Singh, Computer Science Department).
- Dept. of Mathematical Sciences, Binghamton University (SUNY) *Fall 2000 – Spring 2003*  
Visiting Assistant Professor. Courses taught: *Calculus II*, *Number Systems*, *Complex Variables*, *Combinatorics*, *Complex Analysis* (graduate), *Discrete Geometry* (graduate).
- Mathematics Department, Temple University *Fall 1997 – Spring 2000*  
Adjunct faculty for *Discrete Structures of Computer Science*.  
Research assistant for *Calculus On the Web* (funded by the National Science Foundation).
- Mathematics/Physics Departments, Universität Würzburg *Winter 1995 – Summer 1997*  
Teaching assistant for *Number Theory*, *Modern Algebra*, *Topology*.  
Teaching assistant for the Physics (Secondary Education) lab.
- Mathematics Department, SUNY Oneonta *Fall 1994 – Spring 1995*  
Teaching assistant for *Calculus* and *Calculus-based Physics*.
- Karl–Ernst Gymnasium Amorbach, Germany *Spring 1992 / Fall 1993*  
Student teacher for Mathematics and Physics (Secondary Education).

## Service and Related Experience

- **Committee service:** San Francisco State University  
Hiring Committee (Mathematics), Graduate Committee (Mathematics) Website Committee (Mathematics), Professional Development Council, Honorary Degree Committee, Liberal Studies Council.
- **Seminar coorganizer**  
Coorganizer (with L. Anderson and T. Zaslavsky) of weekly Combinatorics and Number Theory Seminar at Binghamton University (SUNY).  
Coorganizer (with F. Ardila, J. Gubeladze and S. Hosten) of weekly Algebra-Geometry-Combinatorics Seminar at San Francisco State University.
- **Conference coorganizer**  
Coorganizer (with A. Barvinok, C. Haase, B. Reznick, M. Vergne, and V. Welker) of the 2003 AMS-IMS-SIAM Summer Research Conference *Integer Points in Polyhedra. Geometry, Number Theory, Algebra, Optimization*.  
Coorganizer (with R. Datta, J. Gubeladze, S. Hosten, T. Hsu, N. Thieme, A. Schilling, M. Vazirani, and A. Yong) of the *Bay Area Discrete Math Day*, 2004–2006.  
Coorganizer (with S. Robins) of the 2005 MSRI/PIMS/Banff summer school *Integer-point enumeration in polyhedra*.  
Coorganizer (with F. Ardila) of the special session *Enumerative Aspects of Polytopes* at the

Spring 2006 AMS Western Section Meeting.

Coorganizer (with C. Haase, B. Reznick, M. Vergne, V. Welker, and R. Yoshida) of the 2006 AMS-IMS-SIAM Summer Research Conference *Integer Points in Polyhedra. Geometry, Number Theory, Representation Theory, Algebra, Optimization, Statistics*.

Coorganizer (with S. Wagon and K. Woods) of the special session *The Linear Diophantine Problem of Frobenius*, 2008 Joint Mathematics Meetings.

Coorganizer (with L. Fukshansky) of the special session *Diophantine Problems and Discrete Geometry* at the Spring 2008 AMS Western Section Meeting.

- **Faculty adviser**

Adviser to the Undergraduate Math Club and the MAA Student Chapter at Binghamton University (SUNY) (2000–2003).

Graduate Adviser for the San Francisco State University Mathematics Department (2006/2007).

Member of several M.A. and Ph.D. committees at Binghamton University (SUNY), San Francisco State University, UC Berkeley, and Universität Magdeburg.

Principal thesis adviser for Eric Etu (SFSU MA'07), Mary Halloran (SFSU MA'07), Asia Matthews (SFSU MA'07), Dorothy Moorefield (SFSU MA'06), Kim Seashore (SFSU MA'07), and Andrew Van Herick (SFSU MA'07).

- **Editor** for the *Journal of Number Theory* (since 2004).

- **Reviewer** for *Mathematical Reviews* and *Zentralblatt MATH*.

- **Referee** for *Advances in Applied Mathematics*, *Advances in Mathematics*, *American Mathematical Monthly*, *AMS Electronic Research Announcements*, *Annales de l'Institut Fourier*, *College Math Journal*, *Discrete & Computational Geometry*, *Discrete Applied Mathematics*, *Discrete Mathematics*, *L'Enseignement Mathématique*, *Electronic Journal of Combinatorics*, *European Journal of Combinatorics*, *Experimental Mathematics*, *Graphs and Combinatorics*, *Integers (Electronic Journal of Combinatorial Number Theory)*, *Journal für die reine und angewandte Mathematik*, *Journal of Algebraic Combinatorics*, *Journal of Combinatorial Theory*, *Journal of Integer Sequences*, *Journal of Mathematical Analysis and Applications*, *Journal of Number Theory*, *Mathematics of Computation*, *Mathematics of Operations Research*, *Mathematische Annalen*, *Monatshefte für Mathematik*, *Moscow Mathematical Journal*, *Proceedings of the Royal Society A*, *Ramanujan Journal*, *Transactions of the AMS*.

- **Organizer/Instructor**: San Francisco Math Circle (since 2005)

An integrated weekly program for teachers and students in 6–11 grade, centering around intriguing and challenging problems.

- **Team member**: [www.mathnerds.com](http://www.mathnerds.com) (1999–2005)

Assisted and gave hints to mathematical questions asked over the internet.