

Steven V Sam  
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## EDUCATION

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2008–2012 Massachusetts Institute of Technology Ph.D., Math.  
Advisors: Richard Stanley, Jerzy Weyman  
2004–2008 University of California, Berkeley B.A., Math.

## POSITIONS

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Aug. 2015 – present University of Wisconsin, Madison Assistant professor  
Jul. 2012 – Jul. 2015 University of California, Berkeley Miller research fellow  
Aug. 2014 – Dec. 2014 Simons Institute for Computing Long-term participant  
Aug. 2012 – May 2013 MSRI Postdoctoral fellow

## AWARDS, HONORS, GRANTS

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2017–2019 [Sloan research fellowship](#)  
2017–2022 NSF CAREER grant [DMS-1651327](#), \$561,510  
2015–2018 NSF standard grant [DMS-1500069](#), \$154,866  
Nov. 2014 Séminaire Bourbaki talk by A. Djament, “[La propriété noethérienne pour les foncteurs entre espaces vectoriels](#) [d’après A. Putman, S. Sam, et A. Snowden]”  
2013, 2015 [U.S. Junior Oberwolfach Fellow](#)  
2012–2015 [Miller research fellowship](#)  
May 2012 [Charles W. and Jennifer C. Johnson Prize](#) (MIT)  
2009–2012 [Department of Defense NDSEG fellowship](#)  
2009 [NSF graduate research fellowship](#)  
May 2008 UC Berkeley Mathematics [departmental citation](#)

## PAPERS

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### Research articles:

56. **Hilbert series for twisted commutative algebras**  
Steven V Sam, Andrew Snowden  
[arXiv:1705.10718](#)
55. **Homological vanishing for the Steinberg representation**  
Avner Ash, Andrew Putman, Steven V Sam  
[arXiv:1704.08344](#)
54. **Regularity bounds for twisted commutative algebras**  
Steven V Sam, Andrew Snowden  
[arXiv:1704.01630](#)

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This document was compiled on July 21, 2017.

53. **Regularity of FI-modules and local cohomology**  
 Rohit Nagpal, Steven V Sam, Andrew Snowden  
[arXiv:1703.06832](#)
52. **GL-equivariant modules over polynomial rings in infinitely many variables. II**  
 Steven V Sam, Andrew Snowden  
[arXiv:1703.04516](#)
51. **Invariant theory of  $\wedge^3(9)$  and genus 2 curves**  
 Eric M. Rains, Steven V Sam  
[arXiv:1702.04840](#)
50. **Noetherianity of some degree two twisted skew-commutative algebras**  
 Rohit Nagpal, Steven V Sam, Andrew Snowden  
[arXiv:1610.01078](#)
49. **Towards Boij–Söderberg theory for Grassmannians: the case of square matrices**  
 Nicolas Ford, Jake Levinson, Steven V Sam  
[arXiv:1608.04058](#)
48. **Syzygies of bounded rank symmetric tensors are generated in bounded degree**  
 Steven V Sam  
*Math. Ann.* **368** (2017), no. 3, 1095–1108, [arXiv:1608.01722](#)
47. **Questions about Boij–Söderberg theory**  
 Daniel Erman, Steven V Sam  
*Surveys on recent developments in algebraic geometry*, 285–304, Proc. Sympos. Pure Math. **95**,  
 Amer. Math. Soc., Providence, RI, 2017, [arXiv:1606.01867](#)
46. **Vector bundles on genus 2 curves and trivectors**  
 Eric M. Rains, Steven V Sam  
[arXiv:1605.04459](#)
45. **Infinite rank spinor and oscillator representations**  
 Steven V Sam, Andrew Snowden  
*J. Comb. Algebra* **1** (2017), no. 2, 145–183, [arXiv:1604.06368](#)
44. **Combinatorial constructions of derived equivalences**  
 Daniel Halpern-Leistner, Steven V Sam  
[arXiv:1601.02030](#)
43. **Ideals of bounded rank symmetric tensors are generated in bounded degree**  
 Steven V Sam  
*Invent. Math.* **207** (2017), no. 1, 1–21, [arXiv:1510.04904](#)
42. **Supernatural analogues of Beilinson monads**  
 Daniel Erman, Steven V Sam  
*Compos. Math.* **152** (2016), no. 12, 2545–2562, [arXiv:1506.07558](#)
41. **Equations for the fifth secant variety of Segre products of projective spaces**  
 Luke Oeding, Steven V Sam  
*Exp. Math.* **25** (2016), no. 1, 94–99, [arXiv:1502.00203](#)

40. **Noetherianity of some degree two twisted commutative algebras**  
 Rohit Nagpal, Steven V Sam, Andrew Snowden  
*Selecta Math. (N.S.)* **22** (2016), no. 2, 913–937, [arXiv:1501.06925](#)
39. **Proof of Stembridge’s conjecture on stability of Kronecker coefficients**  
 Steven V Sam, Andrew Snowden  
*J. Algebraic Combin.* **43** (2016), no. 1, 1–10, [arXiv:1501.00333](#)
38. **The cone of Betti tables over three non-collinear points in the plane**  
 Iulia Gheorghita, Steven V Sam  
*J. Commut. Algebra* **8** (2016), no. 4, 537–548, [arXiv:1501.00207](#)
37. **Representations of categories of  $G$ -maps**  
 Steven V Sam, Andrew Snowden  
*J. Reine Angew. Math.*, to appear, [arXiv:1410.6054](#)
36. **On Cohen–Macaulayness of  $S_n$ -invariant subspace arrangements**  
 Aaron Brookner, David Corwin, Pavel Etingof, Steven V Sam  
*Int. Math. Res. Not. IMRN* (2016), no. 7, 2104–2126, [arXiv:1410.5096](#)
35. **Gröbner methods for representations of combinatorial categories**  
 Steven V Sam, Andrew Snowden  
*J. Amer. Math. Soc.* **30** (2017), 159–203, [arXiv:1409.1670](#)
34. **Representation stability and finite linear groups**  
 Andrew Putman, Steven V Sam  
*Duke Math. J.*, to appear, [arXiv:1408.3694](#)
33. **Orthosymplectic Lie superalgebras, Koszul duality, and a complete intersection analogue of the Eagon–Northcott complex**  
 Steven V Sam  
*J. Eur. Math. Soc. (JEMS)* **18** (2016), no. 12, 2691–2732, [arXiv:1312.2255](#)
32. **Jacobi–Trudi determinants and characters of minimal affinizations**  
 Steven V Sam  
*Pacific J. Math.* **272** (2014), no. 1, 237–244, [arXiv:1307.6630](#)
31. **Homology of analogues of Heisenberg Lie algebras**  
 Steven V Sam  
*Math. Res. Lett.* **22** (2015), no. 4, 1223–1241, [arXiv:1307.1901](#)
30. **Representations of rational Cherednik algebras of  $G(m, r, n)$  in positive characteristic**  
 Sheela Devadas, Steven V Sam  
*J. Commut. Algebra* **6** (2014), no. 4, 525–559, [arXiv:1304.0856](#)
29. **Jack polynomials as fractional quantum Hall states and the Betti numbers of the  $(k + 1)$ -equals ideal**  
 Christine Berkesch, Stephen Griffeth, Steven V Sam  
*Comm. Math. Phys.* **330** (2014), no. 1, 415–434, [arXiv:1303.4126](#)

28. **Tropicalization of classical moduli spaces**  
 Qingchun Ren, Steven V Sam, Bernd Sturmfels  
*Math. Comput. Sci.* **8** (2014), no. 2, Special issue on computational algebraic geometry, 119–145,  
[arXiv:1303.1132](#)
27. **Littlewood complexes and analogues of determinantal varieties**  
 Steven V Sam, Jerzy Weyman  
*Int. Math. Res. Not. IMRN* (2015), no. 13, 4663–4707, [arXiv:1303.0546](#)
26. **Stability patterns in representation theory**  
 Steven V Sam, Andrew Snowden  
*Forum Math. Sigma* **3** (2015), e11, 108 pp., [arXiv:1302.5859](#)
25. **The cone of Betti tables over a rational normal curve**  
 Manoj Kummini, Steven V Sam  
*Commutative Algebra and Noncommutative Algebraic Geometry*, 251–264, *Math. Sci. Res. Inst. Publ.* **68**, Cambridge Univ. Press, Cambridge, 2015, [arXiv:1301.7005](#)
24. **Alternating trilinear forms on a 9-dimensional space and degenerations of  $(3, 3)$ -polarized Abelian surfaces**  
 Laurent Gruson, Steven V Sam  
*Proc. Lond. Math. Soc. (3)* **110** (2015), no. 3, 755–785, [arXiv:1301.5276](#)
23. **Homology of Littlewood complexes**  
 Steven V Sam, Andrew Snowden, Jerzy Weyman  
*Selecta Math. (N.S.)* **19** (2013), no. 3, 655–698, [arXiv:1209.3509](#)
22. **The universal Kummer threefold**  
 Qingchun Ren, Steven V Sam, Gus Schrader, Bernd Sturmfels  
*Exp. Math.* **22** (2013), no. 3, 327–362, [arXiv:1208.1229](#)
21. **Derived supersymmetries of determinantal varieties**  
 Steven V Sam  
*J. Commut. Algebra* **6** (2014), no. 2, 261–286, [arXiv:1207.3309](#)
20. **GL-equivariant modules over polynomial rings in infinitely many variables**  
 Steven V Sam, Andrew Snowden  
*Trans. Amer. Math. Soc.* **368** (2016), 1097–1158, [arXiv:1206.2233](#)
19. **Combinatorial realizations of crystals via torus actions on quiver varieties**  
 Steven V Sam, Peter Tingley  
*J. Algebraic Combin.* **39** (2014), no. 2, 271–300, [arXiv:1205.5847](#)
18. **Koszul homology of codimension 3 Gorenstein ideals**  
 Steven V Sam, Jerzy Weyman  
*Proc. Amer. Math. Soc.* **142** (2014), 401–408, [arXiv:1203.3168](#)
17. **Moduli of Abelian varieties, Vinberg  $\theta$ -groups, and free resolutions**  
 Laurent Gruson, Steven V Sam, Jerzy Weyman  
*Commutative Algebra* (edited by Irena Peeva), 419–469, Springer, 2013, [arXiv:1203.2575](#)

16. **Equations and syzygies of some Kalman varieties**  
Steven V Sam  
*Proc. Amer. Math. Soc.* **140** (2012), 4153–4166, [arXiv:1105.5756](#)
15. **Shapes of free resolutions over a local ring**  
Christine Berkesch, Daniel Erman, Manoj Kummini, Steven V Sam  
*Math. Ann.* **354** (2012), no. 3, 939–954, [arXiv:1105.2244](#)
14. **Tensor complexes: multilinear free resolutions constructed from higher tensors**  
Christine Berkesch, Daniel Erman, Manoj Kummini, Steven V Sam  
*J. Eur. Math. Soc. (JEMS)* **15** (2013), no. 6, 2257–2295, [arXiv:1101.4604](#)
13. **Matrices with restricted entries and  $q$ -analogues of permutations**  
Joel Brewster Lewis, Ricky Ini Liu, Alejandro H. Morales, Greta Panova, Steven V Sam, Yan X Zhang  
*J. Comb.* **2** (2011), no. 3, 355–396, [arXiv:1011.4539](#)
12. **Poset structures in Boij–Söderberg theory**  
Christine Berkesch, Daniel Erman, Manoj Kummini, Steven V Sam  
*Int. Math. Res. Not. IMRN* (2012), no. 22, 5132–5160, [arXiv:1010.2663](#)
11. **Symmetric quivers, invariant theory, and saturation theorems for the classical groups**  
Steven V Sam  
*Adv. Math.* **229** (2012), no. 2, 1104–1135, [arXiv:1009.3040](#)
10. **Schubert complexes and degeneracy loci**  
Steven V Sam  
*J. Algebra* **337** (2011), 103–125, [arXiv:1006.5514](#)
9. **Generalized Ehrhart polynomials**  
Sheng Chen, Nan Li, Steven V Sam  
*Trans. Amer. Math. Soc.* **364** (2012), 551–569, [arXiv:1002.3658](#)
8. **Pieri resolutions for classical groups**  
Steven V Sam, Jerzy Weyman  
*J. Algebra* **329** (2011), Special issue celebrating the 60th birthday of Corrado De Concini, 222–259, [arXiv:0907.4505](#)
7. **Positivity theorems for solid-angle polynomials**  
Matthias Beck, Sinai Robins, Steven V Sam  
*Beiträge Algebra Geom.* **51** (2010), no. 2, 493–507, [arXiv:0906.4031](#)
6. **A finite calculus approach to Ehrhart polynomials**  
Steven V Sam, Kevin M. Woods  
*Electron. J. Combin.* **17** (2010), no. 1, Research Paper 68, 13pp., [arXiv:0904.0679](#)
5. **A bijective proof for a theorem of Ehrhart**  
Steven V Sam  
*Amer. Math. Monthly* **116** (2009), no. 8, 688–701, [arXiv:0801.4432](#)
4. **Grid graphs, Gorenstein polytopes, and domino stackings**  
Matthias Beck, Christian Haase, Steven V Sam  
*Graphs Combin.* **25** (2009), 409–426, [arXiv:0711.4151](#)

### 3. Maximal periods of (Ehrhart) quasi-polynomials

Matthias Beck, Steven V Sam, Kevin M. Woods

*J. Combin. Theory Ser. A* **115** (2008), 517–525, [arXiv:math/0702242](#)

#### Survey articles:

### 2. Noetherian properties in representation theory

Steven V Sam

[arXiv:1707.00770](#)

### 1. Introduction to twisted commutative algebras

Steven V Sam, Andrew Snowden

[arXiv:1209.5122](#)

#### Appendices:

1. Appendix to: Patricia Hersh, Victor Reiner, Representation stability for cohomology of configuration spaces in  $\mathbf{R}^d$

Patricia Hersh, Victor Reiner, Steven V Sam

*Int. Math. Res. Not. IMRN* (2017), no. 5, 1433–1486, [arXiv:1505.04196](#).

#### Software:

1. Computing inclusions of Schur modules

Steven V Sam

*J. Softw. Algebra Geom.* **1** (2009), 5–10, [arXiv:0810.4666](#).

## INVITED TALKS

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#### Conference presentations:

26. “A view towards algebraic geometry” conference (David Eisenbud’s 70th birthday), Martha’s Vineyard, May 2017
25. KUMUNU commutative algebra conference, University of Kansas, Oct. 2016
24. Kronecker coefficients conference, City University London (England), Sep. 2016
23. International conference on representations of algebras (plenary), Syracuse, Aug. 2016
22. Algebraic combinatorics and group actions, Herstmonceux (England), July 2016
21. Free resolutions, representations, and asymptotic algebra workshop, BIRS (Canada), April 2016
20. Algorithms and complexity in algebraic geometry reunion workshop, Simons Institute, Berkeley, Dec. 2015
19. Syzygies of algebraic varieties workshop, U. Illinois, Chicago, Nov. 2015
18. Midwest commutative algebra conference, Purdue University, Aug. 2015
17. Midwest combinatorics conference (plenary speaker, 2 lectures), U. Minnesota, May 2015
16. Cohomology of finite groups workshop, Oberwolfach (Germany), May 2015
15. International conference on representation theory and commutative algebra (Jerzy Weyman’s 60th birthday), U. Connecticut, April 2015
14. IMPANGA15, Bedlewo (Poland), April 2015
13. Representation theory network SPP 1388 conference, Bad Honnef (Germany), March 2015
12. Algebraic topology and applications, Université Blaise Pascal, Clermont-Ferrand (France), Oct. 2014
11. Algebraic groups and representations workshop, Université de Lyon (France), July 2014

10. “Stanley@70” (Richard Stanley’s 70th birthday), MIT, June 2014
9. Macaulay2 research meeting, University of Illinois, Urbana-Champaign, June 2014
8. Algebra geometry and combinatorics day 9, Loyola University, November 2013
7. Lie Groups, Lie Algebras and their Representations workshop, UC Berkeley, October 2013
6. Algebraic groups workshop, Oberwolfach (Germany), April 2013
5. Combinatorial Commutative Algebra and Applications workshop, MSRI, December 2012
4. Algebraic geometry and complex geometry, CIRM, Marseille (France), March 2012
3. Geometric/categorical aspects of representation theory workshop (3 lectures), Hokkaido University (Japan), February 2012
2. Combinatorial algebra meets algebraic combinatorics, Lakehead University, January 2011
1. Maurice Auslander Distinguished Lectures and International Conference, Woods Hole, Massachusetts, April 2010

**Seminars and colloquia:**

45. Princeton University, Algebraic geometry seminar, April 2017
44. University of Notre Dame, Algebra seminar, April 2017
43. University of Connecticut, Colloquium, March 2017
42. Stanford University, Algebraic geometry seminar, February 2017
41. Columbia University, Algebraic geometry seminar, October 2016
40. University of Maryland, Algebra and number theory seminar, March 2016
39. University of Utah, Commutative algebra seminar, September 2015
38. University of Utah, Colloquium, September 2015
37. Universität Bielefeld, Representation theory of algebras seminar, March 2015
36. Caltech, Algebraic geometry seminar, February 2015
35. Rice University, Colloquium, January 2015
34. UCLA, Combinatorics seminar, January 2015
33. UC Berkeley, Colloquium, November 2014
32. Institut Henri Poincaré, Mini-course on twisted commutative algebras (4 lectures), Oct. 2014
31. Université de Nice, Algebra, topology, and geometry seminar, July 2014
30. University of Michigan, Combinatorics seminar, April 2014
29. UC Berkeley, Commutative Algebra & Algebraic Geometry seminar, March 2014
28. UC Davis, Algebra and discrete math seminar, March 2014
27. University of Illinois, Urbana-Champaign, Colloquium, January 2014
26. University of Oregon, Colloquium, January 2014
25. University of Wisconsin, Colloquium, December 2013
24. University of Virginia, Algebra seminar, November 2013
23. Loyola University, Algebra and combinatorics seminar, November 2013
22. Stony Brook University, Algebraic geometry seminar, October 2013
21. San Francisco State University, Algebra-geometry-combinatorics seminar, September 2013
20. Rice University, Algebraic geometry seminar, September 2013
19. U. North Carolina, Chapel Hill, Geometric methods in representation theory, March 2013
18. UC Berkeley, Commutative Algebra & Algebraic Geometry seminar, February 2013
17. Northeastern University, Quivers and invariant theory seminar, November 2012
16. Yale University, Algebraic and tropical geometry seminar, November 2012
15. MSRI, “Boij–Söderberg theory” focus period seminar, October 2012

14. University of South Carolina, Colloquium, October 2012
13. UC Berkeley, Representation theory, geometry, combinatorics seminar, September 2012
12. Stanford University, Algebraic geometry seminar, February 2012
11. UC Berkeley, Combinatorics seminar, February 2012
10. University of Michigan, Commutative algebra seminar, January 2012
9. University of Michigan, Algebraic geometry seminar, January 2012
8. Princeton University, Arithmetic invariant theory seminar, November 2011
7. University of Minnesota, Combinatorics seminar, September 2011
6. MIT, Combinatorics seminar, September 2011
5. City University of New York, Representation theory seminar, April 2011
4. U. Illinois, Urbana-Champaign, Algebra-Geometry-Combinatorics Seminar, February 2011
3. UC Berkeley, Commutative Algebra & Algebraic Geometry Seminar, January 2011
2. Dartmouth College, Combinatorics seminar, October 2010
1. MIT, Combinatorics seminar, October 2009

## ADVISING

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### PhD students:

2. Robert Laudone (2016 – present)
1. Hang (Amy) Huang (2016 – present)

### Undergraduates:

6. James Boudouris, Sho Kawakami, Jacob Kettinger (June – July 2017, UW-Madison undergrads), through NSF RTG
5. Pallav Goyal (May – Jul. 2016, IIT Kanpur undergrad), through SN Bose Scholars.  
“Invariant theory of finite general linear groups modulo Frobenius powers”, [arXiv:1701.06329](https://arxiv.org/abs/1701.06329).
4. Iulia Gheorghita (Jul. – Sep. 2014, Caltech undergraduate), through Caltech SURF.  
“The cone of Betti tables over three non-collinear points in the plane”, [arXiv:1501.00207](https://arxiv.org/abs/1501.00207).
3. Kiho Park (Feb. – Dec. 2014, Berkeley undergraduate), Berkeley senior thesis.  
“Schubert calculus on the Grassmannian and the flag manifold”
2. Sheela Devadas (Jan. 2011 – Dec. 2012, high school / MIT undergrad), through MIT PRIMES.  
“Representations of rational Cherednik algebras of  $G(m, r, n)$  in positive characteristic”, [arXiv:1304.0856](https://arxiv.org/abs/1304.0856).
1. Carl Lian (Jan. – Dec. 2011, high school / MIT undergraduate), through MIT PRIMES.  
“Representations of Cherednik algebras associated to symmetric and dihedral groups in positive characteristic”, [arXiv:1207.0182](https://arxiv.org/abs/1207.0182).

## TEACHING (UNIVERSITY OF WISCONSIN)

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### Undergraduate:

- Math 222: Calculus II (Fall 2016)
- Math 475: Introduction to combinatorics (Fall 2015)
- Math 490: Collaborative Undergraduate Research Lab (Spring 2017)

### Graduate:

- Math 740: Symmetric functions (Spring 2017)
- Math 742: Abstract algebra II (Spring 2016)

- Math 746: Topics in ring theory (Spring 2016)

## ORGANIZING

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### Conferences:

Nov. 4 – 5, 2016	<a href="#">Commutative algebra+ (CA+)</a>	UW Madison
Jun. 27 – Jul. 1, 2016	<a href="#">Representation stability workshop</a>	American Institute of Math.
Nov. 13 – 14, 2015	<a href="#">Upper midwest commutative algebra colloquium</a>	UW Madison

### Seminars and reading groups:

Spring 2017	Examples in algebraic geometry	UW Madison
Fall 2016	Positivity in algebraic geometry	UW Madison
Fall 2014 – Spring 2015	Combinatorics seminar	UC Berkeley
Spring 2013	Macdonald polynomials	UC Berkeley
Fall 2011	Cluster algebras	Northeastern/MIT
Spring 2011	Quantum groups	MIT
Spring 2008	Toric varieties	UC Berkeley