

## CURRICULUM VITAE

**Sam Payne**

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### Employment

Professor, Yale University, 2017–  
Associate Professor (with tenure), Yale University, 2013–2017  
Assistant Professor, Yale University, 2010–2013  
Acting Assistant Professor, Stanford University, 2006–2010  
Clay Mathematics Institute Research Fellow, 2006–2010

### Education

Ph.D.: University of Michigan, Ann Arbor, 2006  
Advisor: William Fulton, Thesis: *Toric vector bundles*  
A.B.: Princeton University, 2001, Advisor: János Kollár

### Visiting Positions

Fields Institute, Toronto, Fall 2016  
Von Neumann Fellow, Institute for Advanced Study, Spring 2015  
Max Planck Institute, Bonn, Fall 2011–Spring 2012  
Catholic University, Leuven, Summer 2011  
Free University, Berlin, Summer 2010  
MSRI, Berkeley, Fall 2009  
MSRI, Berkeley, Spring 2009  
Mittag-Leffler Institute, Djursholm, Spring 2007

### Research Awards and Grants

NSF Grant DMS-1702428, 2017–2020, \$240,000  
NSF CAREER Grant DMS-1149054, 2012–2017, \$480,000  
NSF Grant DMS-1068689, 2011–2014, \$262,000  
Clay Research Fellowship, 2006–2010  
Sumner Myers Thesis Prize, University of Michigan, 2006

### PhD Students Supervised

Yoav Len (Yale 2014), Fields-Ontario Postdoctoral Fellow  
Dhruv Ranganathan (Yale 2016), C.L.E. Moore Instructor at MIT  
Shaked Koplewitz, (Yale 2017), Google Software Engineer  
Jifeng (Tif) Shen, (Yale 2017), NSERC Postdoctoral Fellowship at UBC (declined), Data Scientist  
Daniel Corey, PhD expected 2018  
Jeremy Usatine, PhD expected  
Netanel Friedenberg, PhD expected

## Volume Edited

1. Nonarchimedean and Tropical Geometry (with M. Baker). Simons Symposia, Springer 2016.

## Publications

1. *Combinatorial and inductive methods for the tropical maximal rank conjecture* (with D. Jensen). J. Combin. Theory Ser. A. **152** (2017), 138–158.
2. *Tropical independence II: The maximal rank conjecture for quadrics* (with D. Jensen). Algebra Number Theory **10** (2016), no. 8, 1601–1640.
3. *Nonarchimedean geometry, tropicalization, and metrics on curves* (with M. Baker and J. Rabinoff). Algebraic Geometry **3** (2016), no. 1, 63–105.
4. *Cremona symmetry in Gromov-Witten theory* (with A. Gholampour and D. Karp). Pro Mathematica, **29** (2016), no. 57, 129–149.
5. *The tropicalization of the moduli space of curves* (with D. Abramovich and L. Caporaso). Ann. Sci. Éc. Norm. Sup. **48** (2015), no. 4, 765–809.
6. *Topology of nonarchimedean analytic spaces and relations to complex algebraic geometry*. Bull. Amer. Math. Soc. **52** (2015) no. 2, 223–247.
7. *On a Cohen-Lenstra heuristic for Jacobians of random graphs* (with J. Clancy, N. Kaplan, T. Leake, and M. Wood). J. Algebraic Combin. **42** (2015), no. 3, 701–723.
8. *Operational K-theory* (with D. Anderson). Doc. Math. **20** (2015) 357–399.
9. *Lifting divisors on a generic chain of loops* (with D. Carwright and D. Jensen). Canad. Math. Bull. **58** (2015), no. 2, 250–262.
10. *A note on Tutte polynomials, Jacobians, and two variable zeta functions of graphs* (with J. Clancy and T. Leake). Exp. Math. **24** (2015), no. 1, 1–7.
11. *Artificial intelligence for Bidding Hex* (with E. Robeva). Games of No Chance 4, MSRI Publications **63** (2015), 207–214.
12. *Tropical independence I: Shapes of divisors and a proof of the Gieseker-Petri Theorem* (with D. Jensen). Algebra Number Theory **8** (2014), no. 9, 2043–2066.
13. *Limits of tropicalizations* (with T. Foster and P. Gross). Israel J. Math. **201** (2014), no. 2, 835–846.
14. *On the structure of non-archimedean analytic curves* (with M. Baker and J. Rabinoff). Contemp. Math. **605** (2013), 93–125.
15. *Lifting tropical intersections* (with B. Osserman). Doc. Math. **18** (2013), 121–175.
16. *Boundary complexes and weight filtrations*. Mich. Math. J. **62** (2013), no. 2, 293–322.
17. *Connectivity of tropicalizations* (with D. Cartwright). Math. Res. Lett. **19** (2012), no. 5, 1089–1095.
18. *A note on tropical Brill-Noether theory and rank determining sets for metric graphs* (with C. M. Lim and N. Potashnik). Int. Math. Res. Not. (2012), no. 23, 5484–5504.
19. *Cox rings and pseudoeffective cones of projectivized toric vector bundles* (with J. González, M. Hering, and H. Süß). Algebra Number Theory **6** (2012), no. 5, 995–1017.

20. *A tropical proof of the Brill-Noether Theorem* (with F. Cools, J. Draisma, and E. Robeva). *Adv. Math.* **230** (2012), no. 2, 759–776.
21. *Realization spaces for tropical fans* (with E. Katz). *Combinatorial aspects of commutative algebra and algebraic geometry*, Abel Symp., **6**, Springer 2011, 73–88.
22. *Discrete bidding games* (with M. Develin). *Electronic J. Combin.* **17** (2010), no. 1, RP 85, 40 pp.
23. *Positivity for toric vector bundles* (with M. Hering and M. Mustață). *Ann. Inst. Fourier* **60** (2010), no. 2, 607–640.
24. *Cayley decompositions of lattice polytopes and upper bounds for  $h^*$ -polynomials* (with C. Haase and B. Nill). *J. Reine Angew. Math.* **637** (2009), 207–216.
25. *Analytification is the limit of all tropicalizations*. *Math. Res. Lett.* **19** (2009), no. 3, 543–556.
26. *Lattice polytopes cut out by root systems and the Koszul property*. *Adv. Math.* **220** (2009), no. 3, 926–935.
27. *Frobenius splittings of toric varieties*. *Algebra Number Theory* **3** (2009), no. 1, 107–119.
28. *Fibers of tropicalization*. *Math. Z.* **262** (2009), no. 2, 301–311.
29. *Correction to Fibers of tropicalization*. *Math. Z.* **272** (2012), no. 3–4, 1403–1406.
30. *Toric vector bundles, branched covers of fans, and the resolution property*. *J. Algebraic Geom.* **18** (2009), no. 1, 1–36.
31. *Adelic amoebas disjoint from open halfspaces*. *J. Reine Angew. Math.* **625** (2008), 115–123.
32. *Piecewise polynomials, Minkowski weights, and localization on toric varieties*. (with E. Katz). *Algebra Number Theory* **2** (2008), no. 2, 135–155.
33. *Moduli of toric vector bundles*. *Compositio Math.* **144** (2008), no. 5, 1199–1213.
34. *Ehrhart series and lattice triangulations*. *Discr. Comput. Geom.* **40** (2008), no. 3, 365–376.
35. *Stable base loci, movable curves, and small modifications, for toric varieties*. *Math. Z.* **253** (2006), no. 2, 421–431.
36. *Equivariant Chow cohomology of toric varieties*. *Math. Res. Lett.* **13** (2006), no. 1, 29–41.
37. *Asymptotic cohomological functions of toric divisors* (with M. Hering and A. Küronya). *Adv. Math.* **207** (2006), no. 2, 634–645.
38. *Fujita’s very ampleness conjecture for singular toric varieties*. *Tohoku Math. J.* **58** (2006), no. 3, 447–459.
39. *Ehrhart polynomials and stringy Betti numbers* (with M. Mustață). *Math. Ann.* **333** (2005), no. 4, 787–795.
40. *Smooth complete toric threefolds with no nontrivial nef line bundles* (with O. Fujino). *Proc. Japan Acad. Ser. A. Math. Sci.* **81** (2005), no. 10, 274–279.
41. *Alternating graphs* (with C. Adams, R. Dorman, K. Foley, and J. Kravis). *J. Combin. Theory Ser. B* **77** (1999), no. 1, 96–120.

## Preprints

1. *A tropical motivic Fubini theorem with applications to Donaldson-Thomas theory* (with J. Nicaise)
2. *The tropicalization of the moduli space of curves II: Topology and applications* (with M. Chan and S. Galatius).
3. *Tropical refined curve counting via motivic integration* (with J. Nicaise and F. Schroeter).
4. *Diagonal splittings of toric varieties and unimodularity* (with J. Chou, M. Hering, R. Tramel, and B. Whitney). To appear in Proc. Amer. Math. Soc.

## Invited Talks

Over 160 invited talks and colloquia since 2006 at universities and institutions including Berkeley, Brown, Caltech, Chicago, Columbia, ETH Zurich, Free University Berlin, Harvard, IAS, ICMS Edinburgh, IMPA Rio de Janeiro, Imperial College London, Institute Mittag-Leffler, Johns Hopkins, Jussieu (Paris VI), Max Planck Institute Bonn, Michigan, MIT, MSRI, Northwestern, NYU, Oberwolfach, Penn, Princeton, RIMS Kyoto, Stanford, Texas, Toronto, UBC, and Utah

## Conferences and Workshops Organized

1. Tropical geometry and moduli spaces, ICM Satellite Conference (with O. Lorscheid, M. Melo, and J. Nicaise), August 2018
2. Nonarchimedean and tropical geometry, Simons Symposium (with M. Baker), May 2017.
3. Chip-firing and tropical curves, Graduate Summer School, MSRI (with M. Baker, M. Chan, and D. Jensen), July 2016
4. Algebraic, tropical, and nonarchimedean analytic geometry of moduli spaces, BIRS-CMO (with M. Baker, M. Chan, and D. Jensen), May 2016
5. Algebraic Geometry NorthEastern Series (AGNES), Yale University (with A. Auel and J. González), April 2016
6. Nonarchimedean and tropical geometry, AMS Summer Institute in Algebraic Geometry (with A. Werner), July 2015
7. Simons Symposium on Tropical and Nonarchimedean Analytic Geometry (with M. Baker), February 2015
8. REU mini-Conference (with A. Folsom), July 2014
9. Workshop on Algebraic Foundations for Tropical Geometry, Yale University, May 2014
10. Specialization of Linear Series for Algebraic and Tropical Curves, BIRS (with M. Baker, L. Caporaso, A. Cueto, and E. Katz), April 2014
11. AMS Mathematical Research Communities Workshop on Tropical and Nonarchimedean Analytic Geometry (with M. Baker), June 2013
12. Algebraic Geometry North-East Series (AGNES) (with M. Kapranov), April 2013
13. Simons Symposium on Tropical and Nonarchimedean Analytic Geometry (with M. Baker), April 2013
14. AIM workshop on Implementing Algorithms in Macaulay 2 (with H. Abo, A. Leykin, and A. Taylor), October 2009
15. Workshop on Moduli Spaces of Curves and Gromov-Witten Theory. U Michigan (with R. Cavalieri), April 2006

### **Postdoctoral Fellows**

Yuchen Liu, Gibbs Assistant Professor, 2017–

Kalina Mincheva, Gibbs Assistant Professor, 2016–

José González, Gibbs Assistant Professor, 2014–2016, (tenure track, UC Riverside)

Dave Jensen, Visiting Instructor, 2013–2014, (tenure track, U Kentucky)

Nathan Kaplan, Gibbs Assistant Professor, 2013–2015, (tenure track, UC Irvine)

Dustin Cartwright, NSF Postdoc and Gibbs Assistant Professor, 2011–2014, (tenure track, UT Knoxville)

### **Undergraduate Research Supervised**

Director of Summer Undergraduate Mathematics Research at Yale (SUMRY), 2014–

Independent research projects with Alec Arana, Julien Clancy, Michael Garn, Timothy Leake, Seung Hyun Lee, Brian Lei, Chang Mou Lim, Natasha Potashnik, and Geoffrey Smith, Yale, 2011–2013

Independent research projects with Jay Bhat, Elina Robeva, and Deyan Simeonov, Stanford, 2008–2010

### **Other Service**

Grant proposal reviewer for French National Research Agency, German Israeli Foundation, Israeli Science Foundation, National Security Agency, National Science Foundation, Simons Foundation, and Swiss National Science Foundation

Referee for *Advances in Mathematics*, *Algebra and Number Theory*, *Annals of Mathematics*, *Duke Mathematical Journal*, *Journal of Algebraic Geometry*, *Journal of the American Mathematical Society*, *Mathematische Annalen*, etc.

Quantitative Reasoning Council (Yale), 2017–

Silliman Lectureship Committee (Yale), 2015–

AMS Mathematical Research Communities Advisory Board, 2013–2017

Yale Splash, faculty sponsor, 2011–

Algebraic Geometry Northeastern Series (AGNES), organizing committee, 2010–

Géométrie Algébrique en Liberté (GAeL), scientific committee, 2010–

Canada/USA Mathcamp, mentor and organizer, 2002–2006