

# Dhruv Ranganathan

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*curriculum vitae*

## Education

- 2016 **Ph.D. in Mathematics**, *Yale University*, New Haven, CT, USA.  
Thesis: Skeletons, degenerations, and Gromov–Witten theory.  
Advisor: Sam Payne
- 2012 **B.S. in Mathematics**, *Harvey Mudd College*, Claremont, CA, USA.  
Graduated with highest distinction and honours in mathematics.  
Thesis: Gromov–Witten theory of blowups of toric threefolds.

## Academic Appointments

- 2018– Lecturer, Department of Mathematics and Mathematical Statistics, University of Cambridge, UK.
- 2016–2018 C.L.E. Moore Instructor, Massachusetts Institute of Technology, USA.
- 2017 Member, Institute for Advanced Study in Princeton, USA.

## Research Interests

Algebraic geometry and combinatorics. Specifically, tropical and logarithmic geometry with applications to moduli spaces and Gromov–Witten theory.

## Publications

19 published papers. Available at arXiv at [https://arxiv.org/a/ranganathan\\_d\\_1](https://arxiv.org/a/ranganathan_d_1).

- 2017 **Incidence geometry and universality in the tropical plane**,  
with M. Brandt, M. Jones, and C. Lee. *Journal of Combinatorial Theory, Series A* 159 (2018) 26–53.
- 2017 **Motivic Hilbert zeta functions of curves**,  
with D. Bejleri and R. Vakil. To appear in *Journal of the Institute of Mathematics Jussieu*.
- 2016 **Logarithmic Picard groups, chip firing, and the combinatorial rank**,  
with T. Foster, M. Talpo, and M. Ulirsch. To appear in *Mathematische Zeitschrift*.
- 2016 **Skeletons of stable maps II: superabundant geometries**,  
*Research in the Mathematical Sciences* 2017 4:11.
- 2016 **A graphical interface for the Gromov–Witten theory of curves**,  
with R. Cavalieri, H. Markwig, and P. Johnson. *Algebraic Geometry: Salt Lake City 2015*,  
*Proceedings of Symposia in Pure Mathematics, Part II* pp 139–168.
- 2016 **A note on Brill–Noether existence for graphs of low genus**,  
with S. Atanasov. *Michigan Mathematical Journal* 67 (1) (2018): pp 175–198..
- 2015 **Enumerative geometry of elliptic curves on toric surfaces**,  
with Y. Len. *Israel Journal of Mathematics* (2018) 226(1): pp 351–385.

- 2015 **Skeletons of stable maps I: rational curves in toric varieties.**  
Journal of the London Mathematical Society (2017) 95(3): 804-832.
- 2015 **Degenerations of toric varieties over valuation rings,**  
with *T. Foster*. Bulletin of the London Mathematical Society (2016) 48(5): 835-847.
- 2015 **Superabundant curves and the Artin fan,**  
International Mathematics Research Notices (2017) 2017(4): 1103-1115.
- 2015 **Hahn analytification and the connectivity of higher rank tropical varieties,**  
with *T. Foster*. manuscripta mathematica 151(3) (2016), 353-374
- 2014 **Tropical compactification and the Gromov–Witten theory of  $\mathbb{P}^1$ ,**  
with *R. Cavalieri and H. Markwig*. Selecta Mathematica (2017) 23(2) 1027-1060.
- 2014 **Moduli spaces of rational weighted stable curves and tropical geometry,**  
with *R. Cavalieri, S. Hampe, and H. Markwig*. Forum of Mathematics, Sigma, Vol. 4, 2016.
- 2014 **Tropicalizing the space of admissible covers,**  
with *R. Cavalieri and H. Markwig*. Mathematische Annalen (2016) 364 1275-1313.
- 2014 **Realization of groups with pairing as Jacobians of finite graphs,**  
with *L. Gaudet, D. Jensen, N. Wawrykow, and T. Weisman*. To appear in Annals of Combinatorics.
- 2014 **Toric graph associahedra and compactifications of  $M_{0,n}$ ,**  
with *R.F. da Rosa D. Dave Jensen*. Journal of Algebraic Combinatorics (2016) 43 139-151.
- 2013 **Brill–Noether theory of maximally symmetric graphs,**  
with *T. Leake*. European Journal of Combinatorics (2015) 46 115-125.
- 2011 **Gromov–Witten theory of  $\mathbb{P}^1 \times \mathbb{P}^1 \times \mathbb{P}^1$ ,**  
with *D. Karp*. Journal of Pure and Applied Algebra 220(8), 3000-3009.
- 2011 **Toric Symmetry of  $\mathbb{C}\mathbb{P}^3$ ,**  
with *D. Karp, P. Riggins, and U. Witcher*. Advances in Theoretical and Mathematical Physics (2012) 4 1291-1314.

### **Papers under review**

- 2017 **Moduli of stable maps in genus one & logarithmic geometry II,**  
with *K. Santos-Parker and J. Wise*. Submitted.
- 2017 **Moduli of stable maps in genus one & logarithmic geometry I,**  
with *K. Santos-Parker and J. Wise*. Submitted.
- 2017 **Topology of tropical moduli spaces of weighted stable curves,**  
with *A. Cerbu, S. Marcus, L. Peilen, and A. Salmon*. Submitted.
- 2017 **Counting curves on surfaces: tropical geometry & the Fock space,**  
with *R. Cavalieri, P. Johnson, and H. Markwig*. Submitted.
- 2017 **Brill–Noether theory for curves of a fixed gonality,**  
with *D. Jensen*. Submitted.

### **Awards and Fellowships**

- 2016 Marsden Fellowship, Fields Institute, Declined

- 2015 McDougal Teaching Fellow, Yale Center for Teaching and Learning
- 2014 Oberwolfach “Research-in-Pairs” in Fall 2015, with Cavalieri, Johnson, and Markwig
- 2013 Runner Up, AMS-MAA-SIAM Morgan Prize for Undergraduate Research

## Research Talks

**Over 60 conference and seminar talks since 2013 at institutions that include:** American Institute of Mathematics, Brown University, BIRS Casa Mathematica Oaxaca, University of Cambridge, Chennai Mathematical Institute, Columbia University, Fields Institute, Harvard, Indian Institute of Technology, Indian Institute of Science, IMPA, Imperial College London, Institute for Advanced Study, Institut Mittag-Leffler, MIT, Mathematical Sciences Research Institute, University of Michigan, Princeton University, Rutgers University, Stanford University, University of Warwick, Yale University. **A complete list of talks is available upon request.**

## Supervision

Supervised over 20 undergraduate research students including summer projects, directed research during the term, and senior theses. These have led to six coauthored publications. More information is available at <http://www.dhruvrnathan.net/undergraduate-research>.

## Teaching

- MIT Abstract Algebra II (Spring 2018), Arithmetic Geometry (Fall 2017)
- Lecture Series Tropical Geometry and Curve Counting, IMPA Brazil, March 2018
- Lecture Series Tropical Geometry and Curve Counting, Stockholm University, August 2017

## Mentorship & Outreach

**Highschool Research: PRIMES Program.** During the calendar year 2017-18 I was a faculty mentor for the PRIMES research program run by MIT for high school students, which aims to increase diversity in the mathematical community by supporting students from underrepresented groups.

**Public School Outreach** In 2014 and 2015, I organized a monthly science outreach program for low-income middle and high school students in the New Haven public school district. This was run in conjunction with Yale University’s larger *Pathways to Science* program. I have run a number of discovery-based learning sessions in mathematics for middle and high school students.

## Service

Referee and expert opinions for *Advances in Mathematics*, *Compositio Mathematica*, *Geometry & Topology*, *Journal of Differential Geometry*, *Journal of the European Mathematical Society*, *Mathematische Annalen*, etc.

Ph.D. committee for Ashwin Deopurkar (Columbia), Keli Santos-Parker (University of Colorado).