Hannah K. Larson

University of California, Berkeley
Department of Mathematics
827 Evans Hall
Berkeley, CA 94720, USA

hlarson@berkeley.edu
http://math.berkeley.edu/~hlarson/
Citizenship: USA
Last Updated: April 25, 2024

Employment

2023 – Assistant Professor, University of California, Berkeley
2022 – 2027 Clay Research Fellow
2022 – 2023 Junior Fellow, Harvard Society of Fellows

Education

2017 – 2022 Ph.D. Mathematics, Stanford University. Advisor: Ravi Vakil
2013 – 2017 B.A. Mathematics, Harvard University, summa cum laude

Research Interests

Algebraic geometry: moduli spaces, intersection theory, Brill–Noether theory

Awards and Grants

2024 Maryam Mirzakhani New Frontiers Prize, $50,000
2023 Hertz Thesis Prize, $5,000
2022 – 2027 Clay Research Fellowship
2017 – 2022 Hertz Foundation Graduate Fellowship
2017 – 2022 NSF Graduate Research Fellowship
2017 – 2022 Stanford Graduate Fellowship
2019 – 2020 Maryam Mirzakhani Graduate Fellow
2017 AWM Alice T. Schafer Prize
2017 Mumford Prize, Harvard University
2017 Harvard Friends of Math Thesis Prize
2017 Robert Fletcher Rogers Prize, Harvard Math Table
2015 – 2016 Harvard University Certificate of Distinction in Teaching (2 times)
2015 Barry M. Goldwater Scholarship, $15,000
2013 Davidson Fellow Laureate, $50,000
2013 Intel Science Talent Search, National 4th Place, $40,000

Preprints

29. The Chow ring of the universal Picard stack over the hyperelliptic locus, arXiv:2404.12607

28. Maximal Brill–Noether loci via the gonality stratification (with A. Auel and R. Haburcak), arXiv:2310.09954
27. Extensions of tautological rings and motivic structures in the cohomology of $\overline{\mathcal{M}}_{g,n}$ (with S. Canning and S. Payne), arxiv:2307.08830
26. The embedding theorem in Hurwtiz–Brill–Noether theory (with K. Cook–Powell, D. Jensen, E. Larson, and I. Vogt), arXiv:2303.15189

Accepted for Publication

25. On the Chow and cohomology rings of moduli spaces of stable curves (with S. Canning), to appear in *Journal of the European Math Society* arXiv:2208.02357
24. Global Brill-Noether theory over the Hurwitz space (with E. Larson and I. Vogt), to appear in *Geometry and Topology*, arXiv:2008.10765.
23. The Chow rings of the moduli spaces of curves of genus $7, 8$ and 9 (with S. Canning), to appear in *Journal of Algebraic Geometry*, arXiv:2104.05820.
22. Tautological classes on low-degree Hurwitz spaces (with S. Canning), to appear in *Int. Math. Res. Not.*, arXiv:2103.09902.
21. The rational Chow rings of moduli spaces of hyperelliptic curves with marked points (with S. Canning), to appear in *Annali della Scuola Norm. Sup.*, arXiv:2207.10873.
20. On an equivalence of divisors on $\overline{M}_{0,n}$ from Gromov-Witten theory and conformal blocks (with L. Chen et. al.), to appear in *Transformation Groups*, arXiv:2107.00174.
19. The bielliptic locus in genus 11 (with S. Canning), to appear in *Michigan Math Journal*, arXiv:2209.09715.

Published Papers

18. The eleventh cohomology group of $\overline{\mathcal{M}}_{g,n}$ (with S. Canning and S. Payne), *Forum of Math., Sigma* **11** (2023), Paper No. e62, 18pp, arXiv:2209.03113.
17. The intersection theory of the moduli stack of vector bundles on $\mathbb{P}^1$, *Canadian Math. Bulletin* **66** (2023), no. 2, 359–379 arXiv:2104.14642.
16. The integral Picard groups of low-degree Hurwitz spaces (with S. Canning), *Math. Zeitschrift* **303** (2023), no. 3, Paper No. 61, 22pp. arXiv:2110.14727.
15. Chow rings of low-degree Hurwitz spaces (with S. Canning) *J. Reine Angew. Math.*, **789** (2022), 103-152, arXiv:2110.01059
14. Refined Brill–Noether theory for all trigonal curves, *European Journal of Math.* **7** (2021) 1524–1536, arXiv:2002.00142.
13. A refined Brill-Noether theory over Hurwitz spaces, *Inventiones Mathematicae*, **224** (2021), no. 3, 767-790, arXiv:1907.08597.
12. Universal degeneracy classes for vector bundles on $\mathbb{P}^1$ bundles, *Advances in Mathematics*, **380** (2021), 107563, 20 pages, arXiv:1906.10290.

11. An enriched count of the bitangents to a smooth plane quartic curve (with I. Vogt) *Research in the Mathematical Sciences* **8** (2021), no. 2, Paper No. 26, 21 pages, `arXiv:1909.05945`.
10. Normal bundles of lines on hypersurfaces, *Michigan Math Journal* **70** (2021) no. 1, 115–131, `arXiv:1705.01972`.
9. Hyperbolicity of partition Jensen polynomials (with I. Wagner) *Research in Number Theory* **5** (2019) no. 19, 12 pages, `arXiv:1904.12727`.
8. Shifted distinct-part partition identities in arithmetic progressions (with E. Alwaise et al.) *Annals of Combinatorics*, **21** (2017) no. 4, 479–494, `arXiv:1507.07943`.
7. Coefficients of McKay-Thompson series and distributions of the moonshine module, *Proc. of the Amer. Math. Soc.* **144** (2016), no. 10, 4183–4197, `arXiv:1508.03742`.
6. Modular units from quotients of Rogers-Ramanujan type q-series, *Proc. of the Amer. Math. Soc.*, **144** (2016), no. 10- 4169–4182, `arXiv:1506.08313`.
5. Proof of conjecture regarding the level of Rose's generalized sum-of-divisor functions, *Research in Number Theory*, **1** (2015), no. 16, 8 pages, `arXiv:1507.02671`.
4. Andrews-Gordon style identities, *Research in Number Theory*, **1** (2015) no. 13, `arXiv:1506.05063`.
3. Traces of singular values of Hauptmoduln (with L. Beneish) *Int. J. Number Theory*, **11** (2015), no. 3, 1027–1048, `arXiv:1407.4479`.
2. Congruence properties of Taylor coefficients of modular forms (with G. Smith), *Int. J. Number Theory*, **10** (2014) no. 6, 1501-1518, `arXiv:1406.2999`.
1. Pseudo-unitary non-self-dual fusion categories of rank 4, *Journal of Algebra*, **415** (2014) 184–213, `arXiv:1401.1879`.

Invited Conference Talks

2024 Spec($\overline{\mathbb{Q}}(2\pi i)$), The Fields Institute
Boston Algebraic Geometry Day, Tufts University
Texas Algebraic Geometry Symposium (TAGS)

2023 Oberwolfach Workshop on Recent Trends in Algebraic Geometry
Helvetic Algebraic Geometry Seminar, Les Diablerets, Switzerland
Moduli and Algebraic Cycles, Institut Mittag–Leffler, Sweden
Kentucky–Ohio ALgebra Alliance (KOALA), Ohio State University

2022 Spec($\overline{\mathbb{Q}}$), The Fields Institute
Algebraic Geometry Northeastern Series (AGNES) at Rutgers
AMS–AWM Special Session on Women in Algebraic Geometry

2021 Canadian Math Society Winter Meeting
Boston College Algebraic Geometry Northeaster Series (AGNES) Showcase
Oberwolfach Workshop on Classical Algebraic Geometry
Degeneracy Loci and Applications Workshop at Ohio State

2020 FRG Workshop on Moduli Spaces and Stability

Western Algebraic Geometry Symposium (WAGS)
Bi-annual Algebraic & Tropical Meetings of Brown & Yale (BATMOBYLE)

Invited Seminar Talks

2024 Brown Algebraic Geometry Seminar
Harvard/MIT Algebraic Geometry Seminar
University of North Texas, Department Colloquium
Michigan State University, Algebra Seminar
University of Illinois, Chicago, Algebraic Geometry Seminar
University of Chicago, Department Colloquium
2023 University of Washington, Department Colloquium
San Francisco State University Algebra Seminar
Berkeley Commutative Algebra and Algebraic Geometry Seminar
ETH Zürich Algebraic Geometry Seminar
Stanford Algebraic Geometry Seminar
Northeastern University Geometry, Physics, and Representation Theory Seminar
2022 University of Colorado, Boulder Algebraic Geometry Seminar
Dartmouth Algebra and Number Theory Seminar
Webinar on Brill–Noether theory
University of Texas, Austin Geometry Seminar
Mexico National Algebraic Geometry Seminar
Princeton Algebraic Geometry Seminar
Zoom Algebraic Geometry (ZAG) Seminar
2021 Berkeley Commutative Algebra and Algebraic Geometry Seminar
Brown University Algebraic Geometry Seminar
Harvard/MIT Algebraic Geometry Seminar
Stony Brook Algebraic Geometry Seminar
ETH Zürich Algebraic Geometry and Moduli Seminar
Berlin Algebraic Geometry Seminar
University of Illinois–Chicago Algebraic Geometry Seminar
University of Wisconsin Algebra and Algebraic Geometry Seminar
Derived Seminar
2020 University of Georgia Algebraic Geometry Seminar
University of Washington Algebraic Geometry Seminar
Michigan – Arithmetic Geometry Initiative – Columbia (MAGIC)
Moduli Across the Pandemic (MAP)
Stanford Algebraic Geometry Seminar
Goethe University Frankfurt Algebraic Geometry Seminar
2019 University of California–Davis Algebraic Geometry Seminar
Emory University Algebraic Geometry Seminar
Virginia Tech Algebraic Geometry Seminar

San Francisco State University Algebraic Geometry Seminar
University of Kentucky Algebraic Geometry Seminar
University of Illinois–Chicago Algebraic Geometry Seminar
Berkeley Commutative Algebra and Algebraic Geometry Seminar
University of Wisconsin Algebra and Algebraic Geometry Seminar
2018 Indiana University Algebra Seminar
2017 Stanford Algebraic Geometry Seminar

Teaching

University of California, Berkeley, Professor
Fall 2023 Math 143: Undergraduate Algebraic Geometry (Overall evaluation: 6.85/7)

Stanford University, Teaching Assistant
Wint. 2017 Math 51: Linear Algebra and Multivariable Calculus (Overall evaluation: 4.62/5)

Harvard University, Course Assistant
Spr. 2016 Math 137: Algebraic Geometry (Overall evaluation: 4.91/5)
Spr. 2015 Math 129: Algebraic Number Theory (Overall evaluation: 4.88/5)

Advising

2023 Reading Course Advisor to Feiyang Lin (PhD Candidate, UC Berkeley)
Topics: Limit linear series, admissible covers, Hurwitz–Brill–Noether theory
2023 Undergraduate Research Advisor to Dhruv Goel (B.A. Candidate, Harvard)
Project: *Varieties of Secant and Tangent Lines*
2017 Instructor, Emory Number Theory Research Experience for Undergraduates

Conference Organization and Leadership

2024 Organizer and Lecturer, *Introduction to the Theory of Algebraic Curves*
SLMath Summer School at UC Berkeley, Berkeley, CA
Co-organizers: Izzet Coskun, Eric Larson, and Isabel Vogt
2024 Project Co-leader (with Emily Clader), *Women in Algebraic Geometry II*
Institute for Advanced Study, Princeton, NJ
2024 Organizer, *Combinatorial Perspectives on Algebraic Curves and Their Moduli*
AMS Special Session, Joint Math Meetings, San Francisco, CA
Co-organizers: Melody Chan, Siddarth Kannan, and Sam Payne
2023 Lecturer and Project Co-leader (with Juliette Bruce), *AGNES Summer School on Intersection Theory on Moduli Spaces*, Brown University, Providence, RI
2023 – Co-organizer, *Berkeley Commutative Algebra and Algebraic Geometry Seminar*
2022 – 2023 Co-organizer, *Harvard/MIT Algebraic Geometry Seminar*
2019 Organizer, *Modular Forms, Arithmetic, and Women in Mathematics*
Emory University, Decatur, GA
Co-organizers: Lea Beneish and David Zureick–Brown

Service and Outreach

2024 Keynote Speaker, Expanding Your Horizons (workshop for middle school girls)
2023 Member, Berkeley Department Committee on Equity and Inclusion
2023 Panelist, Berkeley Connect "Meet the Faculty"
2023 Speaker, Berkeley Math Undergraduate Student Association, "Math Mondays"
2018 – 2019 Board Member, Stanford Women in Math Mentoring Program
2017 – 2020 Mentor, Stanford Women in Math Mentoring Program
2018 – 2019 Instructor, Stanford Elementary Math Circle
2014 – 2017 Mentor, Girl's Angle: a Math Club for Girls, Cambridge, MA