

Sarah Frei

CONTACT INFORMATION

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US Citizen

EMPLOYMENT

2022 – John Wesley Young Research Instructor, Dartmouth College
2019 – 2022 RTG Lovett Instructor, Rice University

VISITING APPOINTMENTS

Fall 2023 Hausdorff Research Institute for Mathematics, Bonn
Junior Trimester Program on Algebraic geometry: derived categories, Hodge theory,
and Chow groups

EDUCATION

2019 Ph.D. Mathematics, University of Oregon (advisor: Dr. Nicolas Addington)
2014 M.S. Mathematics, Colorado State University (advisor: Dr. Rachel Pries)
2010 B.S. Mathematics and Chemistry, University of Portland, magna cum laude

AWARDS AND GRANTS

2024 – 2027 **NSF Grant** DMS-2401601, \$260,000
2024 – 2025 **NSF Conference Grant** DMS-2333970, \$24,400
2023 – 2025 AMS–Simons Travel Grant, \$7,200 (2024-2025 declined)
2018 Anderson Distinguished Graduate Teaching Award, University of Oregon
2017 Civin Graduate Award, University of Oregon
2015 Heidi J. Arnold Early Teaching Award, University of Oregon
2010 Ron Smit Senior Award in Mathematics, University of Portland
2009 – 2010 William C Wilson Science Scholar, University of Portland
2006 – 2010 President’s Scholar, University of Portland

PUBLICATIONS AND PREPRINTS

RESEARCH:

1. Birational geometry of Fano varieties of lines on cubic fourfolds containing pairs of cubic scrolls. With C. Brooke, L. Marquand, and X. Qin.
arXiv preprint, arXiv:2407.18904. Submitted.

2. Conic bundle threefolds differing by a constant Brauer class and connections to rationality. With L. Ji, S. Sankar, B. Viray, and I. Vogt.
arXiv preprint, arXiv:2406.13510. Submitted.
3. On decompositions for Fano schemes of intersections of two quadrics. With P. Belmans, J. Bose, B. Gould, J. Hotchkiss, A. Lamarche, J. Petok, C. Rodriguez Avila, and S. Shah.
arXiv preprint, arXiv:2403.12517. Submitted.
4. A threefold violating a local-to-global principle for rationality. With L. Ji.
Res. Number Theory, 10(2): 39, 2024.
5. Curve classes on conic bundle threefolds and applications to rationality. With L. Ji, S. Sankar, B. Viray, and I. Vogt.
Algebraic Geometry, 11(3): 421-459, 2024.
6. Rationality of threefolds over non-closed fields. Lecture notes written for the Notre Dame 2023 Thematic Program on Rationality and Hyperbolicity.
Preprint, https://math.dartmouth.edu/~sfrei/Rationality_3folds_survey.pdf.
7. On abelian varieties whose torsion is not self-dual. With K. Honigs, and J. Voight.
arXiv preprint, arXiv:2309.00531.
8. Groups of symplectic involutions on symplectic varieties of Kummer type and their fixed loci. With K. Honigs.
Forum Math. Sigma, 11:e40 1-35, 2023.
9. Reduction of Brauer classes on K3 surfaces, rationality and derived equivalence. With B. Hassett, and A. Várilly-Alvarado.
J. reine angew. Math. (Crelle), 792: 289–305, 2022.
10. Rational points and derived equivalence. With N. Addington, B. Antieau, and K. Honigs.
Compositio Math., 157(5): 1036–1050, 2021.
11. Moduli spaces of sheaves on K3 surfaces and Galois representations.
Selecta Math. (NS), 26(1): 1-16, 2020.
12. The a -number of hyperelliptic curves.
Women in Numbers Europe II, Springer, 107-116, 2018.

GENERAL INTEREST:

13. University of Oregon AWM Chapter: Creation and Evolution. With E. Bellah, L. Merrill, and K. Pohland.
Fifty Years of Women in Mathematics—Reminiscences, History, and Visions for the Future of AWM, 921–927, Assoc. Women Math. Ser., 28, Springer, Cham, 2022.

LECTURE SERIES

- 2023 Thematic Program on Rationality and Hyperbolicity, University of Notre Dame
(gave five lectures for graduate students and postdocs on rationality of threefolds over non-closed fields)
- 2021 Pacific Rim Mathematical Association (PRIMA) Summer school on Rational curves and moduli spaces in arithmetic geometry
(gave one of three lectures for graduate students on Brauer classes in moduli problems and arithmetic, with N. Addington and K. Honigs)

INVITED CONFERENCE TALKS

- 2024 Joint Mathematics Meetings, San Francisco CA
 AMS Special Session on Derived Categories, Arithmetic, and Geometry
 Joint Mathematics Meetings, San Francisco CA
 AMS Special Session on Arithmetic Geometry with a View toward Computation
- 2023 Algebraic geometry and cohomology in mixed characteristic, Northwestern University
 AMS Spring Central Sectional Meeting, University of Cincinnati
 Special Session on Arithmetic Statistics
- 2022 Algebraic Geometry Northeastern Series, UMass Amherst
 Spec($\overline{\mathbb{Q}}$), The Fields Institute
 Banff International Research Station
 Derived Categories, Arithmetic, and Reconstruction Theorems in Algebraic Geometry
 Workshop
 AWM Research Symposium, University of Minnesota
 Session on Women in Algebraic Geometry
 Western Algebraic Geometry Symposium, Colorado State University
 Joint Mathematics Meetings, Seattle WA
 AMS-AWM Special Session on Women in Algebraic Geometry
- 2021 Simons Collaboration on Arithmetic Geometry, Number Theory, and Computation Meeting, MIT
 Algebraic Geometry Northeastern Series Showcase, Boston College
 Texas Algebraic Geometry Symposium, Texas A&M University
 (postponed due to covid-19)
 Algebra and Geometry of Homogeneous Spaces, Online mini-workshop
 Joint Mathematics Meetings
 AMS Special Session on Galois Cohomology in Arithmetic Geometry
- 2020 AMS Fall Southeastern Sectional Meeting, University of Tennessee at Chattanooga
 Special Session on Geometry and Arithmetic of Hyperkahler Manifolds
 Canadian Mathematical Society Summer Meeting, Ottawa, ON
 (cancelled due to covid-19)
 Scientific session on Algebraic and Geometric Theory of Homogeneous Spaces
 Joint Mathematics Meetings, Denver CO
 AMS Special Session on Algebraic Cycles in Arithmetic and Geometry
 Joint Mathematics Meetings, Denver CO
 AMS Special Session on Rational Points on Algebraic Varieties
- 2019 Banff International Research Station
 Interactions between Brauer Groups, Derived Categories and Birational Geometry of
 Projective Varieties Workshop
 Texas Algebraic Geometry Symposium Fall Program, Texas A&M University
- 2018 FRG Workshop on Moduli spaces of sheaves and Bridgeland stability, UIC
 AMS Fall Western Sectional Meeting, San Francisco State University
 Special Session on Algebraic Geometry

AMS Spring Western Sectional Meeting, Portland State University
 Special Session on Moduli Spaces

INVITED SEMINAR & COLLOQUIA TALKS

- 2024 Courant Institute at New York University, Algebraic Geometry Seminar (upcoming)
- University of Massachusetts, Amherst, Valley Geometry Seminar (upcoming)
- University of Utah, Algebraic Geometry Seminar (upcoming)
- University of Virginia, Number Theory Seminar
- Dartmouth College, Colloquium
- 2023 University of Hannover, Arithmetic Geometry Seminar
- University of Edinburgh, Geometry Seminar
- The Ohio State University, Number Theory Seminar Series
- University of Washington, Algebra and Algebraic Geometry Seminar
- Zoom Birational Geometry Seminar
- 2022 Columbia University, Joint Columbia-CUNY-NYU Number Theory Seminar
- University of Michigan, Algebraic Geometry Seminar
- Dartmouth College, Algebra and Number Theory Seminar
- Columbia University, Algebraic Geometry Seminar
- University of Maryland, Algebra-Number Theory Seminar
- University of California, Santa Barbara, Seminar on Geometry and Arithmetic
- 2021 Rice University, Undergraduate Colloquium
- University of Utah, Algebraic Geometry Seminar
- Michigan State University, Algebra Seminar
- 2020 University of Washington, Algebraic Geometry Seminar
 (cancelled due to covid-19)
- Brown University, Algebraic Geometry Seminar
- Stanford University, Algebraic Geometry Seminar
- 2019 Duke University, Algebraic Geometry Seminar
- Texas Christian University, Colloquium
- Rice University, Algebraic Geometry and Number Theory Seminar
- 2018 University of Utah, Algebraic Geometry Seminar
- University of Oregon, Number Theory Seminar

TEACHING

DARTMOUTH COLLEGE, Instructor of Record¹

- 2024 Math 71: Algebra (currently)
- Math 3: Calculus
- Math 22: Linear Algebra with Applications

¹See <https://math.dartmouth.edu/~sfrei/teaching.html> for course websites

- 2023 Math 31: Topics in Algebra
Math 125: Topics in Number Theory *
- 2022 Math 22: Linear Algebra with Applications
Math 31: Topics in Algebra
RICE UNIVERSITY, Instructor of Record
- 2022 Math 567: Topics in Algebraic Geometry *
- 2021 Math 356: Abstract Algebra I
Math 101: Calculus I
Math 238: Rice Connect
- 2020 Math 355: Linear Algebra
Math 464/564: Abstract Algebra III *
- 2019 Math 101: Calculus I
UNIVERSITY OF OREGON, Instructor of Record
- 2019 Math 251: Calculus I
Math 252: Calculus II
- 2018 Math 342: Linear Algebra II
Math 253: Calculus III
- 2017 Math 252: Calculus II
- 2016 Math 112: Elementary Functions
Math 243: Intro to Probability and Statistics
Math 251: Calculus I
Math 112: Elementary Functions
- 2015 Math 243: Intro to Probability and Statistics
Math 111: College Algebra
Math 111: College Algebra
- 2014 Math 111: College Algebra
UNIVERSITY OF OREGON, Teaching Assistant
- 2017 Math 242: Calculus for Business and Social Sciences II
- 2016 Math 241: Calculus for Business and Social Sciences I
COLORADO STATE UNIVERSITY, Instructor of Record
- 2014 Math 141: Calculus in Management Sciences
Math 160: Calculus for Physical Scientists I
COLORADO STATE UNIVERSITY, Teaching Assistant
- 2012 Math 161: Calculus for Physical Scientists II

* indicates a graduate course or a course cross-listed for graduate and undergraduate students.

OUTREACH AND MENTORING

DARTMOUTH COLLEGE

- 2023 Co-supervisor, Reading course for graduate students

- 2023 Mentor, Dartmouth Math Directed Reading Program
RICE UNIVERSITY
- 2020 – 2022 Co-organizer, Anti-Racist Teaching Seminar
- 2019 – 2021 Co-organizer, Horizons Seminar
- 2021 Mentor, Rice Math Directed Reading Program
- 2020 Reading course supervisor for mathematics graduate student
UNIVERSITY OF OREGON
- 2018 – 2019 Co-organizer, Women in Mathematics Reading Room
- 2018 – 2019 Mentor, UO Math Directed Reading Program
- 2017 – 2019 Mentor, first-year graduate student mentoring program
- 2017 – 2018 Mentor, AWM Undergraduate Reading Program
- 2017 – 2018 Mathematics Instructor, Oregon Young Scholars Program
- 2017 – 2018 Committee Chair, UO AWM Distinguished Speaker Series
- 2016 – 2017 President, UO AWM Student Chapter
- 2015 – 2016 Committee Chair, UO AWM Distinguished Speaker Series

PROFESSIONAL SERVICE

- 2024 Co-organizer, AGNES @ Dartmouth College (upcoming)
- 2024 Co-organizer, WIAG 2: a collaborative workshop in Algebraic Geometry, Institute for Advanced Study
- 2023 Group leader and seminar co-organizer, Junior Trimester Program on Algebraic geometry
- 2023 Co-organizer, Spectra LGBTQ+ in Mathematics Conference
- 2023 Co-organizer, School on K3 surfaces, hyperkähler manifolds, and cubic fourfolds, Hausdorff Research Institute for Mathematics
- 2023 Co-organizer, AMS Special Session on Brauer Groups in Algebraic Geometry and Arithmetic, AMS Spring Central Sectional Meeting, University of Cincinnati
- 2022 Co-organizer, Special Session on Women in Algebraic Geometry, AWM Research Symposium, University of Minnesota
- 2020 Co-organizer, Texas Algebraic Geometry Symposium
 (canceled due to covid-19)

DEPARTMENTAL SERVICE

DARTMOUTH COLLEGE

- 2023 – Co-organizer, Dartmouth Algebra and Number Theory Seminar
- 2024 Panelist for a departmental panel on “What to Expect When You’re Expecting...to Teach”, for new graduate student and postdoctoral instructors
- 2023 Math 117 instructor (taught one week of a summer course for graduate students to introduce them to different research areas)

RICE UNIVERSITY

- 2021 – 2022 Colloquium committee
- 2020 – 2022 Diversity committee
- 2019 – 2022 Co-organizer, Algebraic Geometry and Number Theory Seminar
- 2020 – 2021 Undergraduate Colloquium committee
- 2020 – 2021 Advanced Exam committees

UNIVERSITY OF OREGON

- 2017 – 2019 Organizer, Graduate Notions Seminar
- 2017 – 2019 Co-organizer, Ring-op Seminar
- 2015 Volunteer, Oregon Invitational Mathematics Tournament

COLORADO STATE UNIVERSITY

- 2013 Volunteer, SIAM Conference on Applied Algebraic Geometry
- 2012 Volunteer, Math Day