Gabriel Dorfsman-Hopkins

Postdoctoral Scholar in Arithmetic Geometry
University of California, Berkeley

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Employment

- **University of California, Berkeley** — Berkeley, California
  NSF RTG Postdoctoral Scholar — *2019-*
- **ICERM at Brown University** — Providence, Rhode Island
  Semester Institute Postdoctoral Scholar — *Fall 2019*

Education

- **University of Washington** — Seattle, Washington
  PhD — *2013-2019*
  - Dissertation: *Projective Geometry for Perfectoid Spaces*. Under the advising of Professor Max Lieblich
- **University of California, San Diego** — San Diego, Califonia
  Visiting Graduate Student — *Spring 2018*
  - Under the advising of Professor Kiran Kedlaya
- **Dartmouth College** — Hanover, New Hampshire
  BA — *2009 - 2013*
  - Cum Laude, Honors Thesis: *The Combinatorics of Inteval Vector Polytopes*. Under the advising of Professor Rosa Orellana

Publications and Preprints

- **Searching for Rigidity in Algebraic Starscapes** *2021*
  - Preprint, in peer review
    - Joint with C. Xu
- **Untilting Line Bundles** *2021*
  - To appear in *International Mathematics Research Notices*
- **On Picard Groups of Perfectoid Covers of Toric Varieties** *2020*
  - Preprint, in peer review
    - Joint with A. Ray and P. Wear
- **The Fabric of Spacetime** *2020*
  - *Illustrating Mathematics*, ed. Diana Davis, American Mathematical Society, p. 16-17
    - Joint With M. Maynard
    - Cover Article

- **Static Animations and Deformation Theory** *2020*
  - *Illustrating Mathematics*, ed. Diana Davis, American Mathematical Society, p. 100-101
- **Projective Geometry for Perfectoid Spaces** *2019*
  - To appear in the *Münster Journal of Mathematics*
- **The Combinatorics of Interval Vector Polytopes** *2013*
  - Electronic Journal of Combinatorics, Vol. 20.3, p.22
    - Joint with M. Beck, J. De Silva, J. Pruitt, and A. Ruiz

Awards, Grants & Honors

- **Excellence in Teaching** *2016*
  - An award given by the UW Math Department each year recognizing outstanding achievements in teaching.
- **Mellon Mays Undergraduate Fellowship** *2010-*
  - A career fellowship awarded to undergraduates who plan to gain doctoral degrees and enter academia with a mission of increasing diversity and representation in higher education.
- **ARCS Foundation Fellowship** *2013-2016*
  - A three year fellowship awarded to outstanding graduate research scientists.
- **MSRI-UP** *2012*
  - Full funding to participate in the undergraduate research program at the Mathematical Science Research Institute in Berkeley, California for the summer of 2012, focused on combinatorial and discrete geometry.

Invited Speaking Engagements

- **JMM Mini Course: 3D Printing in Mathematics** *January 3, 2022*
- **University of California San Diego Number Theory Seminar** *TBA*
- **University of Utah Number Theory Seminar** *October 6, 2021*
- **PCMI Illustrating Mathematics Summer School: Show and Ask** *July 22, 2021*
- **Berkeley MUSA Invited Speaker** *March 29, 2021*
- **Stanford-Berkeley Joint Learning Seminar** *December 1, 2020*
- **Berkeley Undergraduate Number Theory Conference** *November 15, 2020*
- **UC Berkeley RTG Seminar in Arithmetic Geometry** *April 13, 2020*
- **Brown University Algebraic Geometry Seminar** *November 22, 2019*

- **Dartmouth College Algebra and Number Theory Seminar** *October 8, 2019*
- **University of Washington Algebra and Algebraic Geometry Seminar** *April 16, 2019*
- **Boston University Number Theory Seminar** *December 10, 2018*
- **Columbia University Algebraic Geometry Seminar** *December 7, 2018*
- **Rice University Algebra and Number Theory Seminar** *November 20, 2018*
- **University of Arizona Algebraic Geometry Seminar** *November 14, 2018*
- **Western Algebraic Geometry Symposium: University of Oregon** *October 5-7, 2018*
  - Poster presentation
- **MIT: Arithmetic Geometry, Number Theory, and Computation** *August 2018*
  - Mini talk.
- **ICERM: Birational Geometry and Arithmetic** *May 2018*
  - Poster presentation
- **Arizona Winter School: Project Group** *March 2017*
  - Worked under Jared Weinstein exploring closed subspaces of certain adic and perfectoid spaces, culminating with a talk given to the entire conference.
- **Joint Math Meetings** *January 2013*
  - "The Combinatorics of Interval Vector Polytopes"
- **SACNAS National Conference** *October 2012*
  - Undergraduate research poster session.

Conference and Seminar Organization

Illustrating Mathematics Graduate Summer School at PCMI *July 19-23, 2021*

Berkeley Undegraduate Number Theory Conference *November 14-15, 2020*

UC Berkeley RTG Seminar in Arithmetic Geometry *Spring 2020 - Present*

ICERM Graduate Student and Postdoc Seminar *Fall 2019*

ICERM Workshop on Arduino and Microcontrollers *Fall 2019*

- Organizer and instructor for workshop about integrating electronics into mathematical art.

Graduate Student Number Theory Reading Seminar *Fall 2018*

- Sole organizer of a graduate reading seminar of Cox's *Primes of the form* $x^2 + ny^2$ with 12 active participants

Weekly Update Seminar *Fall 2018*

- Organizer of a weekly meeting among graduate students of Max Lieblich while he was on sabbatical to maintain momentum in our research.

Mentoring and Advising

- **Honors Thesis Supervisor** *Fall 2020, Spring 2021*
  - Supervised 2 undergraduate honors these in the 20-21 academic year. One with a focus on number theory and illustration (which is now submitted for publication), and one with a focus on cryptography.
- **UC LEADS Research Supervisor** *Spring 2021*
  - Supervised an independent research project for an undergraduate in the UC LEADS program which aims to expand the diversity of researchers in STEM.
- **Undergraduate Research Supervisor** *Summer 2021 -*
  - Supervised multiple undergraduate research, including collaborating in a UC Berkeley undergraduate research project along the intersection of algebraic geometry and installation art (see *Climb the 27 Lines* below).
- **Career Transitions Luncheon** *October 1 2018*
  - Co-organizer of a luncheon with Professor Sarah Billey, for University of Washington graduate students, graduating in the 18-19 academic year to discuss progress on job applications, career goals, final steps, and more
- **Undergraduate Research Mentor** *2016-2019*
  - Mentor for the undergraduate research project: *Number Theory and Noise*, where integer sequences are computationally turned into sounds, giving a new and unique insights into their behavior, and allowing students at very early stages to take the lead in creative research, creating sounds and experiencing an exploration based approach to math, often for the first time!

Local Speaking Engagements

- **Condensed Mathematics Learning Seminar** *September 2021*
  - Expository Presentation: Condensed Abelian Groups
- **Berkeley-Stanford Joint Learning Seminar in Perverse Sehaves** *February 2021*
  - Expository Presentation: Gluing t-structures
- **UC Berkeley Student Algebraic Geometry Seminar** *February 2021*
  - Expository Presentation: The Direct Summand Conjecture
- **Prismatic Cohomology Learning Seminar** *April 2020*
  - Expository Presentation: Drinfeld's crystallization and prismatization.
- **UC Berkeley Student Algebraic Geometry Seminar** *April 2020*
  - Expository Presentation: Česnavičius' Purity for the Brauer group.

- **UC Berkeley Student Arithmetic Geometry Seminar** *March 2020*
  - Expository Presentation: When Galois plays with a variety.
- **UC Berkeley Arithmetic Geometry Learning Seminar** *February 2020*
  - Expository Presentation: An introduction to the perfectoid affine Grassmannian.
- **ICERM Graduate Student and Postdoc Seminar** *November 2019*
  - Expository Presentation: What does geometry over a number field look like?
- **Graduate Student Number Theory Reading Seminar** *October 2018*
  - Expository Presentation: Cox's *Primes of the Form* $x^2 + ny^2$
- **GradSWANTAG: UCSD** *June 2018*
  - Original Research: "The Quillen-Suslin Theorem for the Perfectoid Tate Algebra"
- **Old News in Algebraic Geometry: UCSD** *May 2018*
  - Expository Presentation: "Serre's Example of Non-Homeomorphic but Galois Conjugate Projective Varieties"
- **Graduate Student Analysis Seminar: UW** *Winter 2018*
  - Original Research: "Using Analysis to find Projective Modules"
- **1,2,3 Seminar: UW** *Fall 2016*
  - Original Research: "A (failed) Attempt to Globalize Moret-Bailly Descent"
- **1,2,3 Seminar: UW** *Winter 2016*
  - Expository Presentation: "Singular Cohomology as Sheaf Cohomology"
- **1,2,3 Seminar: UW** *Fall 2015*
  - Expository Presentation: "Serre's GAGA"

Conference Attendance (non presenting participant)

- **WAGON: Zoom** *April 2020*
- **AGONIZE: Zoom** *March 2020*
- **Illustrating Dynamics and Probability: ICERM** *November 2019*
- **Illustrating Number Theory and Algebra: ICERM** *October 2019*
- **Computational Textiles: ICERM** *September 2019*
- **Illustrating Geometry and Topology: ICERM** *September 2019*
- **Derived Algebraic geometry and Applications: MSRI** *March 2019*
- **Joint Mathematics Meetings: Baltimore** *February 2019*

- **Derived Algebraic Geometry Introductory Workshop: MSRI** *February 2019*
- **Southern California Number Theory Day: UCSD** *May 2018*
- **Western Algebraic Geometry Symposium: SFSU** *March 2018*
- **Latinx in the Mathematical Sciences: UCLA** *March 2018*
- **Western Algebraic Geometry Symposium: UCLA** *October 2017*
- **ABC Algebra Workshop: University of Alberta** *October 2016*
- **Western Algebraic Geometry Symposium: Colorado State** *October 2016*
- **Higher Dimensional Algebraic Geometry: University of Utah** *July 2016*
- **FRG Mini Workshop in Derived Categories and Rationality: UU** *February 2016*
- **Western Algebraic Geometry Symposium: University of Washington** *October 2015*
- **Local-Global Principles and their Obstructions: Penn** *October 2015*
- **Arizona Winter School: Rational Points on Varieties** *March 2015*
- **Western Algebraic Geometry Symposium: UC Davis** *March 2015*

Teaching

- **University of California, Berkeley, Lead Instructor** *2020-*
  - Fall 2021: Supervised Undergraduate Research
  - Fall 2021: Introduction to Mathematical Cryptography
  - Summer 2021: Supervised Undergraduate Research
  - Spring 2021: Supervised Undergraduate Research
  - Spring 2021: Senior Honors Thesis
  - Spring 2021: Abstract Algebra
  - Spring 2021: Homological Algebra
  - Fall 2020: Senior Honors Thesis
  - Fall 2020: Introduction to Mathematical Cryptography
  - Spring 2020: Abstract Algebra
- **University of Washington: Lead Instructor** *2015-2019*
  - Spring 2019: Number Theory with Applications to Modern Cryptogaphy
  - Spring 2019:Precalculus
  - Winter 2019: Calculus II: Integration
  - Fall 2018: Calculus I: Differentiation
  - September 2018: Precalculus (3 week intensive)
  - Summer 2018: Precalculus
  - Winter 2018: Calculus II: Integration
  - Fall 2017: Calculus I: Differentiation
  - September 2017: Precalculus (3 week intensive)

- Summer 2017: Precalculus
- Spring 2017: Precalculus
- Winter 2017: Calculus I: Differentiation
- Fall 2016: Precalculus
- Spring 2016: Precalculus
- Summer 2015: Advanced Multivariable Calculus

- **University of Washington: Teaching Assistant** *2013-2016*
  - Winter 2016: Abstract Algebra for Teachers
  - Fall 2015: Calculus I: Differentiation (2 Sections)
  - Spring 2015: Calculus for Business and Economics (2 Sections)
  - Winter 2015: Calculus III: Multivariable Calculus (2 Sections)
  - Fall 2014: Calculus III: Multivariable Calculus (2 Sections)
  - Spring 2014: Calculus III: Multivariable Calculus (2 Sections)
  - Winter 2014: Calculus II: Integration (2 Sections)
  - Fall 2013: Calculus I: Differentiation (2 Sections)
- **Dartmouth College: Teaching Assistant** *2009-2013*
  - 2012-2013: Algorithms (Computer Science Department)
  - 2009-2011: Spanish 1-5 (1 section per quarter)

Art

- **Climb the 27 Lines** *In Progress*
  - A joint project with a Berkeley undergraduate math major, illustrating the fact that every smooth cubic contains exactly 27 lines by building a climbable smooth cubic from fabric, held up by a metal frame consisting of the 27 lines.
- **DXARTS: Machines of Survival** *March 2019*
  - An Exhibition at the DXARTS Gallery Space in Seattle presenting interactive and mechatronic art. I installed *The Fabric of Spacetime* and *Electroluminescence*.
- **The Fabric of Spacetime** *March 2019*
  - Collaboration with Meghan Maynard. An interactive model of a young universe (much less than one second old), created from a large hand crocheted hyperbolic manifold embedded with 264 individually programmable neopixel LED, controlled by 6 motors, a motion sensor, and an Arduino MEGA microcontroller. Performances at the DXARTS Gallery Space in Ballard, Seattle.
- **Electroluminescence** *December 2018*
  - A handmade synthesizer, created from hand crocheted mushrooms embedded with conductive stuffing and controlled by arduino. Performances at the DXARTS Gallery space in the Ballard neighborhood in Seattle.
- **Hello? The Interdimensional Communication Device** *October 2018*

- Collaboration with Aarohi Bhaway. A homemade telegraph machine connected to a programmed infinity mirror attatched to the end of a salvaged bomb siren. Use it to send messages into the eternal void.

- **Seattle Center on Contemporary Art: Art ∩ Math Exhibition** *March-April 2018*
  - Collaboration with Jayadev Athreya. Produced 2d and 3d representations of a triply periodic singular Riemann surface with a holomorphic 1 form, featured on display for 6 weeks at the CoCA gallery in Seattle.

Outreach

- **Washington Experimental Math Lab: Graduate Student Mentor** *2016-2019*
- **Washington Experimental Math Lab: Fabrication Lab Manager** *2017-2019*
  - The WXML has a fabrication lab with 3d printers, laser cutters, and other fabrication technology which is useful for math visualization, both for the lab, and the entire math department. Beginning in fall 2017 I have been in charge of the lab, facilitating visualization projects for WXML project groups, as well as for undergraduate classes and projects for the faculty. I also teach people how to use this technology and integrate it with their teaching and research.
- **Association for Women in Mathematics** *2018-*
- **SACNAS** *2012-*
  - SACNAS (the Society for the Advancement of Chicano/Histpanic and Native American Scientists) is an inclusive organization dedicated to fostering the success of Chicanos/Hispanics and Native Americans, from college students to professionals, in attaining advanced degrees, careers, and positions of leadership in STEM.

Interests and Extra Qualifications

- **Fluency in Spanish and French.**
  - Native/heritage Spanish speaker. Proficiency in conversation and reading in French. Can teach classes in Spanish and/or French.
- **Programming and Computer Algebra**
  - Experience in programming, web design, computer graphics, and computer algebra, with proficiency in Python, Java, Javascript, WebGL, HTML, C/C++, Sage and Pari.
- **Art**
  - Experience in mechatronic and digital art, including sculpture, 3d modeling, programmable and electronic art (e.g, Arduino, Raspberry Pi, etc.).