Daniel Halmrast

Lafayette College
Department of Mathematical Sciences
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Academic Interests

Algebraic & Complex Geometry, including Generalized Complex Geometry, Topological String Theory, and Double Field Theory

Education

University of California, Santa Barbara

Ph.D., Mathematics 2024
Thesis: *Supersymmetric Topological Sigma Models and Doubling Spaces* (available here [1])
Advisor: David Morrison.

M.A., Mathematics 2019

Hillsdale College

B.S., Mathematics and Physics, *cum laude* 2017

Senior thesis, Mathematics: *Spectral Decomposition of Quantum-Mechanical Operators*
Advisor: David Gaebler (available here as pdf [2])

Senior thesis, Physics: *Detecting High-Frequency Gravitational Waves With the Pulsar Timing Array*
Advisor: Timothy Dolch (available here as pdf)

Professional Experience

Teaching Assistant, Mathematics, University of California, Santa Barbara 2018-2024

Instructor, Mathematics, University of California, Santa Barbara 2019-2024

Visiting Assistant Professor, Mathematics, Lafayette College 2024-present

Publications and Preprints

1. **The NANOGrav 11-year Data Set: High-precision timing of 45 Millisecond Pulsars** (joint with Z. Arzoumanian et. al.). ApJS **235** 37. arXiv:1801.01837
2. **The NANOGrav 12.5 yr Data Set: Observations and Narrowband Timing of 47 Millisecond Pulsars** (joint with Md F. Alam et al.). 2021 ApJS **252** 4. arXiv:2005.06490
3. **The NANOGrav 12.5-year Data Set: Wideband Timing of 47 Millisecond Pulsars** (joint with Md F. Alam et al.). 2021 ApJS 252 5. arXiv:2005.06495
4. **Supersymmetric Topological Sigma Models and Doubling Spaces**. (Submitted). arXiv:2507.08181
5. **Open String BRST Cohomology in Doubled Abelian Varieties**. (In preparation).

[0] Updated September 29, 2025
[1] Available through eScholarship: https://escholarship.org/uc/item/8tz617wq
[2] PDFs can be found at my personal website danielhalmrast.github.io

Talks and Presentations Given

1. *Upper Limits on High-Frequency Single-Source Gravitational Waves.* International Pulsar Timing Array Annual Science Meeting, Stellenbosch, South Africa, June 20-July 1 2016. (poster available here as pdf [3])
2. *Upper Limits on High-Frequency Single-Source Gravitational Waves.* American Astronomical Society Annual Meeting, Grapevine, TX, January 3-7, 2017. (poster available here as pdf)
3. *Spectral Decomposition of Quantum-Mechanical Operators.* Rose-Hulman Undergraduate Mathematics Conference, Rose-Hulman Institute of Technology, April 22, 2017. (slides available here as pdf)
4. *Schwarzschild Geometry and Black Holes.* Graduate Differential Geometry Seminar, UCSB, November 8, 2018.
5. *Model Categories: Topology for the Algebraist.* Graduate Algebra Seminar, UCSB, February 20, 2020.
6. *Stability Conditions on Topological String Theories.* Ph.D. Advancement to Candidacy, UCSB, August 13, 2020.
7. *D-branes and Derived Categories.* Graduate Mathematical Physics Seminar, UCSB, October 17, 2022.
8. *Multimatrix Algebras.* Graduate Quantum Algebra and Topology Seminar, UCSB, October 12 and 17, 2022.
9. *A Refined Approach to Stability in the Hyperkähler Setting.* Derived Categories, Moduli Spaces, and Counting Invariants, Imperial College, London, July 4, 2023. (poster available here as pdf)
10. *String Theory and Mathematics: an Ongoing Dialogue.* , Lafayette College, April 16, 2024. (slides available here as pdf)
11. *The Circles of Apollonius: A Tour of Enumerative Algebraic Geometry.* , Lafayette College, May 8, 2025. (write-up available here as pdf)
12. *Supersymmetric Topological Sigma Models and Doubling Spaces.* Richmond Geometry Meeting, Virginia Commonwealth University, September 20,2025. (poster available here as pdf)

Conferences Attended

Midwest Relativity Meeting, Northwestern University	October 2015
NANOGrav Spring Meeting, Caltech	March 2016
Michigan MAA Annual Meeting, Hillsdale College	April 2016
Green Bank Telescope Student Workshop, Green Bank, WV	May 2016
International Pulsar Timing Array Annual Science Meeting, Stellenbosch University	June 2016
American Astronomical Society Annual Meeting, Grapevine, TX	January 2017
Rose-Hulman Institute of Technology Undergraduate Mathematics Conference, Rose-Hulman institute of Technology	April 2017
Donaldson-Thomas Invariants and Resurgence (Virtual Meeting),	January 2021
Redbud Topology Conference, University of Oklahoma	March 2023
Workshop and School on Complex Lagrangians, Integrable Systems, and Quantization, University of Oxford	June 2023
Derived Categories, Moduli Spaces, and Counting Invariants, Imperial College London	July 2023
Hyperkähler Varieties, Derived Categories, and Moduli Spaces, Columbia University	February 2025
Enumerative Geometry, Representation Theory, and Physics, Kavli IPMU	March 2025
Derived Categories and Mirror Symmetry, University of Wisconsin, Madison	May 2025
Richmond Geometry Meeting, Virginia Commonwealth University	September 2025

[3] PDFs can be found at my personal website danielhalmrast.github.io

Seminars Organized

UCSB Graduate Mathematical Physics Seminar, *with Chris Dare and Danning Lu* 2022

Awards and Grants

Hillsdale College Half-Tuition Merit Scholarship 2013-2017
Hillsdale College LAUREATES Research Grant 2016
UCSB Central Fellowship 2017-2018
Department of Mathematics Outstanding Teaching Assistant Award 2022
UCSB Individualized Professional Skills Grant 2023
UCSB Doctoral Student Travel Grant 2023

Teaching Experience

Hillsdale College

Private Tutor, Mathematics and Physics 2014-2017
Mathematics Department Tutor 2014-2017
Arecibo Remote Command Center Student Team Leader 2015-2017
Teaching Assistant: Physics 101 Fall 2016

University of California, Santa Barbara

Instructor of Record

Math 34A: *Calculus for Social and Life Sciences* Sum. 2019
Math 6B: *Vector Calculus II* Sum. 2020, Sum. 2021
Math 6A: *Vector Calculus I* Sum. 2021
Math 4B: *Differential Equations* Sum. 2022, Sum. 2023

Teaching Assistant

Math 118A: *Introduction to Real Analysis (First Quarter)* F 2018
Math 118B: *Introduction to Real Analysis (Second Quarter)* W 2019
Math 118C: *Introduction to Real Analysis (Third Quarter)* Spr. 2021
Math 113: *Non-Euclidean Geometry* F 2022
Math 111A: *Introduction to Abstract Algebra (First Quarter)* F 2019, F 2021
Math 111C: *Introduction to Abstract Algebra (Third Quarter)* Spr. 2023
Math 108A: *Introduction to Linear Algebra* W 2021
Math 108B: *Advanced Linear Algebra* W 2023
Math 6A: *Vector Calculus I* Spr. 2019
Math 6B: *Vector Calculus II* W 2020, Spr. 2020
Math 4B: *Differential Equations* Spr. 2019, Sum. 2019, F 2020, Spr. 2022, Sum. 2023, F 2023

Course Grader

Math 202C: *Graduate Complex Analysis (Third Quarter)* Spr. 2021
Math 236A: *Graduate Homological Algebra (First Quarter)* W 2023

Directed Reading [4]

"Functional Analysis" with Manish Kumar	2019
"Algebraic Geometry and Elliptic Curves" with Fidel Lopez	2020
"Cyclic Quotient Singularities of 2-Dimensional Affine Toric Varieties" with Jake Garcia	2020
"Quark Configurations and Lie Algebra Representations" with Yuxuan Wang	2021
"Algebraic Geometry and Moduli Spaces" with Michael Yan	2021
"Tangent Vectors as Derivations" with Christian Reynaldo	2022
"Introduction to Mirror Symmetry" with Justin Wu	2022

Lafayette College

Visiting Assistant Professor

Math 141: *Differential Calculus and Economic Modeling*	F 2024, F 2025
Math 161: *Calculus I*	F 2024, F 2025
Math 186: *Applied Statistics*	Spr. 2025
Math 263: *Calculus III*	Spr. 2025

[4] The Directed Reading Program at UCSB pairs graduate student mentors with undergraduate mathematics students to complete a two-quarter directed reading of a mathematical topic of interest. Details can be found at www.ucsbdrp.org