Daniel Halmrast

Lafayette College
Department of Mathematical Sciences
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Academic Interests

Complex Algebraic & Differential Geometry and Mathematical Physics

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

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)

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

[0] Updated December 30, 2025
[1] Available through eScholarship: https://escholarship.org/uc/item/8tz617wq
[2] PDFs can be found at my personal website danielhalmrast.github.io

5. **T-duality, Mirror Symmetry, and Fourier-Mukai Transforms on Elliptic Abelian Surfaces**. (In preparation).

6. **Topological Open Strings and Rank-One D-branes in Doubled Abelian Varieties**. (In preparation).

Talks and Presentations Given

Conferences

1. *Upper Limits on High-Frequency Single-Source Gravitational Waves.* — June 20-July 1 2016
International Pulsar Timing Array Annual Science Meeting — Stellenbosch, South Africa
(poster available here as pdf [3])

2. *Upper Limits on High-Frequency Single-Source Gravitational Waves.* — January 3-7, 2017
American Astronomical Society Annual Meeting — Grapevine, TX
(poster available here as pdf)

3. *Spectral Decomposition of Quantum-Mechanical Operators.* — April 22, 2017
Rose-Hulman Undergraduate Mathematics Conference — Rose-Hulman Institute of Technology
(slides available here as pdf)

4. *A Refined Approach to Stability in the Hyperkähler Setting.* — July 4, 2023
Derived Categories, Moduli Spaces, and Counting Invariants — Imperial College, London
(poster available here as pdf)

5. *Supersymmetric Topological Sigma Models and Doubling Spaces.* — September 20,2025
Richmond Geometry Meeting — Virginia Commonwealth University
(poster available here as pdf)

6. *Supersymmetric Topological Sigma Models and Doubling Spaces.* — January 04, 2026
Joint Mathematics Meetings Contributed Papers Session (Upcoming) — Washington, D.C.

Seminars and Colloquia

1. *Schwarzschild Geometry and Black Holes.* — November 8, 2018
Graduate Differential Geometry Seminar — UC Santa Barbara

2. *Model Categories: Topology for the Algebraist.* — February 20, 2020
Graduate Algebra Seminar — UC Santa Barbara

3. *Stability Conditions on Topological String Theories.* — August 13, 2020
Ph.D. Advancement to Candidacy — UC Santa Barbara

4. *D-branes and Derived Categories.* — October 17, 2022
Graduate Mathematical Physics Seminar — UC Santa Barbara

5. *Multimatrix Algebras.* — October 12 and 17, 2022
Graduate Quantum Algebra and Topology Seminar — UC Santa Barbara

6. *String Theory and Mathematics: an Ongoing Dialogue.* — April 16, 2024
Department Colloquium — Lafayette College
(slides available here as pdf)

7. *The Circles of Apollonius: A Tour of Enumerative Algebraic Geometry.* — May 8, 2025
Department Colloquium — Lafayette College
(write-up available here as pdf)

Seminars Organized

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

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

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

Student Mentorship Experience

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

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

[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

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

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Visiting Assistant Professor

Math 141: *Differential Calculus and Economic Modeling*	F 2024, F 2025
Math 161: *Calculus I*	F 2024, F 2025
Math 162: *Calculus II*	Spr. 2026
Math 186: *Applied Statistics*	Spr. 2025
Math 263: *Calculus III*	Spr. 2025
Math 310: *Ordinary Differential Equations*	Spr. 2026

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 — February 2025
Columbia University

Enumerative Geometry, Representation Theory, and Physics — March 2025
Kavli IPMU

Derived Categories and Mirror Symmetry — May 2025
University of Wisconsin, Madison

Richmond Geometry Meeting — September 2025
Virginia Commonwealth University

Joint Mathematics Meetings (upcoming) — January 2026
Washington, D.C.

KMI-Math School:Bridges Between Physics and Mathematics (upcoming) — February 2026
KMI, Nagoya University