

Matthew Dannenberg

CURRICULUM VITAE
ET STUDIORUM

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Research Interests

Dynamical Systems, Renormalization, Statistical Physics

Education

Aug. 2016 – Present **SUNY: Stony Brook University** Stony Brook, NY, USA
Ongoing Doctor of Philosophy in (Pure) Mathematics (Expected 2021-2022)
○ Advisor: [Mikhail Lyubich, Ph.D.](#)

Aug. 2012 – May 2016 **Harvey Mudd College** Claremont, CA, USA
Bachelor of Science with High Distinction in Mathematics and Physics
Undergraduate Thesis:
○ Title: [Pattern Recognition in High-Dimensional Data](#)
○ Advisor: [Weiqing Gu, Ph.D.](#)
○ Description: Developed a manifold machine learning algorithm using the geometry of Grassmann manifolds to perform efficient dimensional reductions, with the goal of robustly detecting objects in hyperspectral images. Analyzed the accuracy of this algorithm on several datasets. Surveyed existing techniques for object classification in hyperspectral images.

Research Experience

Academic Papers

- 2018 (With Berry et al.) [The isoperimetric problem in the plane with the sum of two Gaussian densities](#). *Involve, a Journal of Mathematics* 11.4 (2018): 549-567.
- 2017 (With Berry et al.) [The Convex Body Isoperimetric Conjecture in the Plane](#). *Rose-Hulman Undergraduate Mathematics Journal* 18.2 (2017): 2.
- 2016 [Pattern Recognition in High-Dimensional Data](#). Harvey Mudd College (2016).
- 2016 (With Berry et al.) [Symmetries of Cairo-Prismatic Tilings](#). *Rose-Hulman Undergraduate Mathematics Journal* 17.2 (2016): 3.

Paperless Research Projects

- Summer 2015 - Fall 2015 **2015 Williams College SMALL REU with Frank Morgan, Ph.D.**
Collaboration with John Berry, Jason Liang, and Yingyi Zeng.
[Relaxed Disk Packings](#)
Attempted to produce a proof of the optimal packing of a relaxed disk packing, where disks may overlap but area covered more than once is considered uncovered.
- Fall 2013 - Spring 2015 **High Intensity Laser Physics Group at HMC with Thomas Donnelly, Ph.D.**
Fall 2014 - Spring 2015 [Optical Tweezers Modeling](#)
Analytically and computationally modelled the motion of a distribution of polystyrene spheres held by optical tweezers. Used Fortran for large-scale computation.
- Fall 2013 - Fall 2014 [Multipass Stochastic Heating](#)
Worked with a small team of undergraduates to design and build a functioning laboratory apparatus and experimental procedure to test for the presence of multipass stochastic heating of electrons in polystyrene spheres launched via a laser ejection technique from a silicon slide.

In Summer 2014, travelled with this group to [The UT Austin Center for High Energy Density Science](#) to carry out experimental tests of multipass stochastic heating using petawatt scale lasers.

Presentations & Talks

Conference Talks

- May 2016 *Pattern Recognition in High-Dimensional Data* - 2016 Harvey Mudd College Presentation Days
January 2016 *The Convex Body Isoperimetric Conjecture* - 2016 Joint Mathematics Meeting
August 2015 *The Convex Body Isoperimetric Conjecture* - 2015 MAA MathFest

Poster Presentations

- Spring 2016 *Pattern Recognition in High-Dimensional Data* - Southern California - Nevada MAA Section Spring 2016 Meeting

Internal Departmental Seminar Talks

- September 11, 2019 *Information Geometry* - SBU Graduate Student Seminar
February 13, 2019 *KAM Theory and the Collapse of Integrable Dynamics* - SBU Graduate Student Seminar
October 31, 2018 *An Introduction to Brownian Motion* - SBU Analysis Student Seminar - SLE
September 19, 2018 *Caratheodory Convergence and Hurwitz's Theorem* - SBU Analysis Student Seminar - SLE
May 1, 2018 *Introduction to Stochastic Calculus* - SBU Analysis Student Seminar - Brownian Motion
April 4, 2018 *Universality of Brownian Motion* - SBU Analysis Student Seminar - Brownian Motion
February 14, 2018 *Elementary Properties of Brownian Motion* - SBU Analysis Student Seminar - Brownian Motion
October 2017 *Bernstein Theorems and Curvature Estimates* - SBU Analysis Student Seminar - Minimal Surfaces
March 2017 *An Introduction to P vs. NP* - SBU Graduate Student Seminar
September 2016 *Sobolev Spaces* - SBU Analysis Student Seminar - Analysis on Metric Spaces

Teaching Experience

Aug. 2016 – Present **SUNY: Stony Brook University**

Teaching Assistant (Recitation Leader and Grader)

- Fall 2019 Teaching Assistant for MAT 598 - Teaching Practicum
◦ Gave short lectures on how to run a recitation.
◦ Attended recitations and gave new TAs individual advice to improve their teaching skills.
Spring 2019 Teaching Assistant for MAT 126 - Calculus B.
◦ Head proctor for the midterms and the final exam.
Fall 2018 Teaching Assistant for MAT 303 - Calculus IV with Applications
Spring 2017 Teaching Assistant for MAT 308 - Differential Equations with Linear Algebra
Fall 2016 Teaching Assistant for MAT 131 - Calculus I

Grader

- Fall 2019 Grader for MAT 532 - (Graduate) Real Analysis I

Jan. 2013 – May 2016 **Harvey Mudd College**

Grader

- Fall 2013 Grader for MATH030B HM - (Advanced) Calculus

Tutor

- Spring 2016 Tutor for MATH115 HM - Fourier Series and Boundary Value Problems
Fall 2015 Tutor for MATH136 HM - Complex Variables and Integral Transforms

Honors & Awards

- Spring 2020 Semester-long Award of NSF RTG Graduate Funding from the SBU Mathematics Department
Fall 2017 - Spring 2018 Yearlong Award of NSF RTG Graduate Funding from the SBU Mathematics Department
Spring 2016 Graduated with High Distinction - at Harvey Mudd College
Spring 2016 Departmental Honors in Mathematics - at Harvey Mudd College
Spring 2016 Departmental Honors in Physics - at Harvey Mudd College

- 2016 Honorable Mention - NSF Graduate Fellowships Program
2016 [Honorable Mention - Mathematical Contest in Modeling](#)
Fall 2015 [The Stavros Busenberg Prize in Applied Mathematics](#) - at Harvey Mudd College
2015 [Finalist Winner - Interdisciplinary Competition in Modeling](#)
Fall 2012 - Spring 2016 Dean's List - at Harvey Mudd College

Community Involvement

- Fall 2019 [The Directed Reading Program in Math at Stony Brook University](#)
Member of the DRP Organizing Committee.
Spring 2019 [The Directed Reading Program in Math at Stony Brook University](#)
Individual tutor - worked with a student on an individual project about Brownian Motion.
April 2018 [Stony Brook Math Day](#)
Assistant - worked to check-in arriving students and assist with the day's activities.

Conference and Workshop Participation

- May 27 - June 7, 2019 Attended in [Analytic Low-Dimensional Dynamics: a celebration of Misha Lyubich's 60th birthday](#) at the **Fields Institute**.
May 16 - 24, 2018 Participated in the [2018 Houston Summer School on Dynamical Systems](#) at the **University of Houston**.
July 11 - 15, 2016 Attended the [2016 SIAM Annual Meeting](#) in Boston, MA.
April 2, 2016 Attended the [Spring 2016 Sectional Meeting of the Southern California - Nevada Section of the MAA](#) at **Loyola Marymount University**.
January 6 - 9, 2016 Attended the [2016 Joint Mathematics Meeting](#) in Seattle, WA.
August 5 - 8, 2015 Attended [2015 MAA MathFest](#) in Washington D.C..

References

Research

- Mikhail Lyubich, Ph.D.
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○ Department of Mathematics
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