

JONAH BOTVINICK-GREENHOUSE

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PROFESSIONAL APPOINTMENTS

Yale University, New Haven, CT

July 2026 -

- Postdoctoral Fellow, Institute for Foundations of Data Science

EDUCATION

Cornell University, Ithaca, NY

September 2021 - June 2026

- Ph.D. in Applied Mathematics
- Dissertation: *Measure Transport for Data-Driven Dynamical Systems: Theory Algorithms, and Applications*
- Advisor: Prof. Yunan Yang

Amherst College, Amherst, MA

September 2017 - May 2021

- B.A.s in Mathematics and Physics, *summa cum laude*

RESEARCH INTERESTS

- Dynamical systems, optimal transport, machine learning, numerical analysis, inverse problems

PUBLICATIONS

Preprints

- Yinong Huang, Jonah Botvinick-Greenhouse, and Yunan Yang. "Data-Adaptive Learning of Dynamical Systems by Matching Transfer Operators and Invariant Measures". *arXiv preprint [arXiv:2607.00391](https://arxiv.org/abs/2607.00391)* (2026)
- Jonah Botvinick-Greenhouse and Yunan Yang. "On the Unique Recovery of Transport Maps and Vector Fields from Finite Measure-Valued Data". *arXiv preprint [arXiv:2604.07671](https://arxiv.org/abs/2604.07671)* (2026)
- Jonah Botvinick-Greenhouse. "Invariant Measures for Data-Driven Dynamical System Identification: Analysis and Application". *arXiv preprint [arXiv:2502.05204](https://arxiv.org/abs/2502.05204)* (2025)

Refereed Journal Articles

- Jonah Botvinick-Greenhouse, Wael H Ali, Mouhacine Benosman, and Saviz Mowlavi. "AB-PINNs: adaptive-basis physics-informed neural networks for residual-driven domain decomposition". *Machine Learning: Science and Technology* 7.4 (July 2026), p. 045025. DOI: [10.1088/2632-2153/ae8638](https://doi.org/10.1088/2632-2153/ae8638)
- Jonah Botvinick-Greenhouse, Maria Oprea, Romit Maulik, and Yunan Yang. "Measure-Theoretic Time-Delay Embedding". *Journal of Statistical Physics*. 192.171 (2025). DOI: [10.1007/s10955-025-03555-1](https://doi.org/10.1007/s10955-025-03555-1)
- Jonah Botvinick-Greenhouse, Robert Martin, and Yunan Yang. "Invariant Measures in Time-Delay Coordinates for Unique Dynamical System Identification". *Phys. Rev. Lett.* 135 (16 Oct. 2025), p. 167202. DOI: [10.1103/ppys-1x68](https://doi.org/10.1103/ppys-1x68)
- Jonah Botvinick-Greenhouse, Yunan Yang, and Romit Maulik. "Generative modeling of time-dependent densities via optimal transport and projection pursuit". *Chaos: An Interdisciplinary Journal of Nonlinear Science* 33.10 (2023). DOI: [10.1063/5.0155783](https://doi.org/10.1063/5.0155783)
- Jonah Botvinick-Greenhouse, Robert Martin, and Yunan Yang. "Learning dynamics on invariant measures using PDE-constrained optimization". *Chaos: An Interdisciplinary Journal of Nonlinear Science* 33.6 (2023). DOI: [10.1063/5.0149673](https://doi.org/10.1063/5.0149673)
- Aaron Kirtland, Jonah Botvinick-Greenhouse, Marianne DeBrito, Megan Osborne, Casey Johnson, Robert S Martin, Samuel J Araki, and Daniel Q Eckhardt. "An unstructured mesh approach to nonlinear noise reduction for coupled systems". *SIAM Journal on Applied Dynamical Systems* 22.4 (2023), pp. 2927–2944. DOI: [10.1137/22M152092X](https://doi.org/10.1137/22M152092X)

Conference Proceedings

- Yulong Liu, Jonah Botvinick-Greenhouse, Yunan Yang, and Chloé Arson. “Operator Learning Surrogate Modeling of Hydraulically Fractured Geothermal Injection-Production Systems: A Cornell Case Study”. Vol. 60th U.S. Rock Mechanics/Geomechanics Symposium. U.S. Rock Mechanics/Geomechanics Symposium. June 2026. DOI: [10.56952/ARMA-2026-0354](https://doi.org/10.56952/ARMA-2026-0354)

Science Communication

- Jonah Botvinick-Greenhouse and Troy Shinbrot. “Juggling dynamics”. *Physics Today* 73.2 (2020), pp. 62–63. DOI: [10.1063/PT.3.4417](https://doi.org/10.1063/PT.3.4417)

PATENTS

- Jonah Botvinick-Greenhouse, Saviz Mowlavi, Wael Ali, and Mouhacine Benosman. “Locally and structurally adaptive neural network architecture for statistically heterogenous data”. Filed with the US Patent Office (2025).

AWARDS

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| • The National Defense Science and Engineering Graduate Fellowship. | <i>September 2022 - August 2025</i> |
| • SIAM Student Travel Award | <i>August 2024</i> |
| • Poster presentation honorable mention, NDSEG Fellows Conference. | <i>July 2024</i> |
| • Third place poster prize, conference on Frontiers in Applied and Computational Mathematics (FACM) at NJIT. | <i>May 2023</i> |
| • The Robert H. Breusch Prize in Mathematics (thesis prize), Amherst College. | <i>May 2021</i> |
| • The Walker Award in Mathematics & Statistics, Amherst College. | <i>May 2021</i> |
| • Poster presentation honorable mention, Joint Mathematics Meetings. | <i>January 2021</i> |

TALKS AND POSTER PRESENTATIONS

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| • MSRNE Generative Modeling & Sampling Workshop, contributed talk. “Unique Recovery of Transport Maps and Vector Fields from Finite Measure-Valued Data.” | <i>August 2026</i> |
| • SIAM UQ, minisymposium on measure flows for inverse problems and machine learning. “Invariant Measures for Data-Driven Dynamical System Identification.” | <i>March 2026</i> |
| • Yale University, FDS seminar (virtual). “Measure Transport for Data-Driven Dynamical Systems.” | <i>February 2026</i> |
| • Sandia National Laboratories, seminar talk. “Measure Transport for Data-Driven Dynamical System Identification and State Reconstruction.” | <i>January 2026</i> |
| • Yale University, Lu Group (virtual). “Measure Transport for Modeling Dynamical Systems: Data-Driven System Identification and State Reconstruction.” | <i>December 2025</i> |
| • Yale University, Krishnaswamy Lab. “Measure Transport for Modeling Dynamical Systems: System Identification and State Reconstruction.” | <i>December 2025</i> |
| • SIAM NNP, minisymposium on modeling and computation of transport problems. “Invariant Measures for Data-Driven Dynamical System Identification.” | <i>November 2025</i> |

- Interdisciplinary Scientific Computing Laboratory Seminar (remote). "Measure Transport Techniques for Modeling Dynamical Systems: Data-Driven System Identification and State Reconstruction" *September 2025*
- UCSD Mathematics of Information, Data, and Signals Seminar. "Measure Transport Techniques for Modeling Dynamical Systems: Data-Driven System Identification and Attractor Reconstruction" *May 2025*
- SIAM Conference on Applications of Dynamical Systems, minisymposium on learning with dynamical systems and their observable statistics. "Invariant Measures for Data-Driven Dynamical System Identification" *May 2025*
- Oberwolfach workshop on Computational Multiscale Methods. "Invariant Measures for Data-Driven Dynamical System Identification" *April 2025*
- SIAM Conference on Computational Science and Engineering, minisymposium on stable prediction of dynamical systems. "Invariant measures in time-delay coordinates for unique dynamical system identification." *April 2025*
- SIAM Conference on the Mathematics of Data Science, minisymposium on fast and scalable Bayesian inference. "Measure-Theoretic Time-Delay Embedding." *October 2024*
- SIAM Conference on the Mathematics of Data Science, poster presentation. "Invariant measures in time-delay coordinates for unique dynamical system identification." *October 2024*
- Cornell University Young Researchers Workshop, poster presentation. "Generative Modeling of Time-Dependent Densities via Optimal Transport and Projection Pursuit." *October 2024*
- NDSEG Fellows Conference, poster presentation. "Learning dynamics on invariant measures using PDE-constrained optimization." *July 2024*
- Cornell University Admission to Candidacy Exam. "Measure Theoretic Modeling of Dynamical Systems." *May 2024*
- IPAM, International Conference on Multiscale Modeling and Simulation based on Physics and Data. "Learning dynamics on invariant measures using PDE-constrained optimization." *April 2024*
- Cornell University Scientific Computing and Numerical Analysis (SCAN) seminar. "Learning dynamics on invariant measures using PDE-constrained optimization." *December 2023*
- SIAM-NNP, contributed talk. "Learning dynamics on invariant measures using PDE-constrained optimization." *October 2023*
- ICIAM, contributed talk (virtual). "Learning dynamical systems from invariant measures." *August 2023*
- ETH-ITS workshop: Emerging topics in applications of optimal transport, poster presentation. "Generative modeling of time-dependent densities via optimal transport and projection pursuit." *June 2023*
- NJIT Frontiers in Applied and Computational Mathematics (FACM) conference, poster presentation. "Generative modeling of time-dependent densities via optimal transport and projection pursuit." *May 2023*
- SIAM conference on applications of dynamical systems, contributed talk. "Generative modeling of time-dependent densities via optimal transport and projection pursuit." *May 2023*

- BIRS workshop: New ideas in computational inverse problems. "Learning dynamical systems from invariant measures." *October 2022*
- SIAM annual meeting, minisymposium on machine learning for inverse problems and dynamical systems (virtual). "Learning dynamical systems with invariant measures." *August 2022*
- UBC physics & astronomy colloquium (virtual). "Juggling dynamics." *November 2021*
- Physics Today webinar, editor series (virtual). "Juggling dynamics." *August 2021*
- Amherst College thesis defense. "An introduction to the theory of the ergodic partition." *May 2021*
- Joint Mathematics Meetings (JMM), poster presentation. "An unstructured mesh approach to nonlinear noise reduction." *January 2021*
- Southern California REU conference (virtual). "An unstructured mesh approach to nonlinear noise reduction." *July 2020*
- UMass Amherst REU conference. "On a nonlinear random walk on graphs." *July 2019*

ACADEMIC SERVICES

- Judge for Cornell Mathematical Contest in Modeling *November 2025*
- AMS Mathematical Moment: "Counting Juggles, Swapping Sites" *May 2025*
- Co-organizer of the minisymposium "Data-driven Modeling of Dynamical Systems Via the Transfer Operator" at the SIAM Conference on Applications of Dynamical Systems. *May 2025*
- Cornell Math Explorers Club - The Math of Juggling *January 2024*
- Cornell Math REU mentor - An unstructured mesh approach to learning dynamics on invariant measures. *June 2023 - August 2023*
- Cornell Directed Reading Program mentor - Diffusion limited aggregation *January 2023 - May 2023*
- Cornell Directed Reading Program mentor - Topics in ergodic theory *September 2022 - December 2023*

REVIEWING ACTIVITIES

- Mathematical Reviews, International Journal of Data Science and Analytics, Scientific Reports, Journal of Computational Physics, Computer Methods in Applied Mechanics and Engineering, Nonlinear Dynamics, SIAM Journal on Scientific Computing

TEACHING EXPERIENCE

Cornell University

- TA for Math 2130 - Calculus III *January 2022 - May 2022*
- TA for Math 1910 - Calculus for Engineers *August 2021 - December 2021*

Amherst College

- Math Fellow (TA) for Math/Phys 102 - Geometry and Relativity *February 2021 - May 2021*
- Math Fellow (TA) for Math 255 - Geometry *August 2020 - December 2020*
- Math Fellow (TA) for Math 220 - Mathematical Reasoning *January 2020 - May 2020*
- Peer Tutor for Math 106 - Calculus with Elementary Functions *January 2020 - May 2020*

- Math Fellow (TA) for Math 105 - Calculus with Algebra *September 2019 - December 2019*
- Discussion TA for Physics 117 - Electricity and Magnetism *January 2019 - May 2019*
- Homework grader for Math 211 - Multivariable Calculus *September 2018 - May 2019*
- Lab TA for Physics 116 - Introductory Mechanics *September 2018 - December 2018*

RESEARCH INTERNSHIPS

Mitsubishi Electric Research Laboratories (MERL): Internship *May 2024 - August 2024*

- 2024 MERL intern, mentored by Dr. Saviz Mowlavi and Dr. Mouhacine Benosman
- Developed an adaptive domain decomposition framework for training physics-informed neural networks to achieve fast convergence when solving multiscale PDEs.
- The framework was filed for a patent and published in Machine Learning: Science and Technology.

Argonne National Laboratory: NSF MSGI *June 2022 - April 2023*

- 2022 NSF MSGI intern and Argonne Visiting Graduate Student, mentored by Prof. Romit Maulik.
- Developed a projection-based optimal-transport approach for modeling stochastic dynamics of high-dimensional systems that is competitive with state-of-the-art normalizing flows conditioned on time.
- Published results in Chaos: An Interdisciplinary Journal of Nonlinear Science, and presented findings at the FACM (2023) and SIAM ADS (2023) conferences, as well as an ETH-ITS workshop (2023).

UCLA Institute for Pure and Applied Mathematics: RIPS *June 2020 - August 2020*

- Participated in the Research in Industrial Projects for Students (RIPS) program, mentored by AFRL researchers Dr. Robert Martin and Dr. Daniel Eckhardt.
- Developed an unstructured mesh approach to nonlinear noise reduction for Hall-effect thrusters alongside a team of three other undergraduates.
- Published results in the SIAM Journal on Applied Dynamical Systems, and presented work at the JMM poster session (2021) and Southern California REU conference (2020).

University of Connecticut: REU *June 2019 - July 2019*

- Participated in the Markov Chains REU, mentored by Prof. Iddo Ben-Ari.
- Classified bifurcations and regions of multistability for a nonlinear random walk on graphs alongside two other undergraduate students.
- Presented findings at the UMass-Amherst REU Conference (2019).

Rutgers University *June 2018 - August 2018*

- Investigated the relative sensitivities of various juggling patterns with Prof. Troy Shinbrot using open loop simulations of juggling patterns with Gaussian perturbations applied to throw angle and throw speed.
- Published work in a Physics Today quick study and presented results in a Physics Today webinar (2021) and at a UBC physics & astronomy colloquium.

ADDITIONAL INTERESTS

Juggling *January 2010 - present*

- Trained independently for the last sixteen years, won several international competitions, and holds various world records.

Cello *November 2009 - present*

- Practiced cello for the last sixteen years, participating in chamber ensembles, orchestras, and master classes.