

# George Stepaniants

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## EDUCATION

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SEP 2019 - Present	<b>Massachusetts Institute of Technology (PhD)</b>
<b>GPA:</b> 4.9/5.0	Department of Mathematics and Institute for Data, Systems, and Society (IDSS) PhD Advisors: Philippe Rigollet and Jörn Dunkel
SEP 2015 - JUN 2019	<b>University of Washington (BSc)</b>
<b>GPA:</b> 3.87/4.00	Department of Mathematics and Department of Computer Science (double major) Undergraduate Research Advisors: Nathan Kutz and Bing Brunton Research Topic: <i>Inferring causal networks of dynamical systems through transient dynamics and perturbation</i>

## ACADEMIC AWARDS

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NSF Graduate Research Fellowship	JUN 2019 - JUN 2024
MIT Presidential Fellow	SEP 2019 - JUN 2020
Phi Beta Kappa Honors Society Member	JUN 2019
Mary Gates Research Scholarship (merit-based)	JUN 2019
University of Washington Dean's List	JUN 2016 - AUG 2016
Early acceptance to University of Washington at age 16 (UW Academy)	SEP 2015

## TEACHING EXPERIENCE AND MENTORSHIP

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### Massachusetts Institute of Technology - Teaching Assistant

(18.032) Differential Equations (theory focused)	SPRING 2022
(18.600) Introduction to Probability	FALL 2021

### Massachusetts Institute of Technology - Mentorship

(UROP) Time-Dependent Network Inference	SUMMER 2023
(SPUR+) Trade and Tariff Network Dynamics	SUMMER 2023

### University of Washington - Community Service

Teaching assistant at University of Washington Math Circle	2015 - 2018
Math tutoring from K12 to college-level subjects	2015 - 2019

## PUBLICATIONS

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### Manuscripts in Review

- George Stepaniants, Alasdair D. Hastewell, Dominic J. Skinner, Jan F. Totz, and Jörn Dunkel. "Discovering dynamics and parameters of nonlinear oscillatory and chaotic systems from partial observations." *arXiv preprint arXiv:2304.04818* (2023).
- Marie Breeur, George Stepaniants, Pekka Keski-Rahkonen, Philippe Rigollet, and Vivian Viallon. "Optimal transport for automatic alignment of untargeted metabolomic data." *arXiv preprint arXiv:2306.03218* (2023).

### Journal Articles

- George Stepaniants. "Learning partial differential equations in reproducing kernel Hilbert spaces." *Journal of Machine Learning Research* 24.86 (2023): 1-72.
- George Stepaniants, Bingni W. Brunton, and J. Nathan Kutz. "Inferring causal networks of dynamical systems through transient dynamics and perturbation." *Physical Review E* 102.4 (2020): 042309.

## Conference Proceedings

- Enric Boix-Adserà, Hannah Lawrence, George Stepaniants, and Philippe Rigollet. “GULP: a prediction-based metric between representations.” *Advances in Neural Information Processing Systems*.
- Sinho Chewi, Julien Clancy, Thibaut Le Gouic, Philippe Rigollet, George Stepaniants, and Austin Stromme. “Fast and smooth interpolation on Wasserstein space.” *International Conference on Artificial Intelligence and Statistics*. PMLR, 2021.

## TALKS AND PRESENTATIONS

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### Invited Talks

- “Gromov-Wasserstein Theory and Application to Metabolomics”, Statistics and Learning Theory Summer School, Tsaghkadzor, Armenia, July 2023
- “Learning PDEs in a Reproducing Kernel Hilbert Space”, SIAM Conference on Mathematics of Data Science, San Diego, September 2022
- “Learning PDEs in a Reproducing Kernel Hilbert Space”, Meeting on Mathematical Statistics, CIRM, Marseille, France, December 2021

### Contributed Talks

- “Learning and predicting complex systems dynamics from single-variable observations”, APS March Meeting, Chicago, March 2022
- “Learning PDEs in a Reproducing Kernel Hilbert Space”, LIDS Stats & Tea, MIT, December 2021
- “Inferring causal networks of dynamical systems through transient dynamics and perturbation”, Econometrics Lunch, MIT, December 2021
- “Fusion of Genetically Incompatible Fungal Cells”, UCLA Computational and Applied Math REU Presentation, IPAM, August 2018
- “Quantifying Rupture Risk of Brain Aneurysms”, MATDAT18: NSF Materials and Data Science Hackathon, Alexandria, June 2018 (<https://matdat18.wordpress.ncsu.edu/files/2018/06/Team12.pdf>)
- “Hyperparameter Selection”, AI2 Research Internship Final Presentation, Seattle, August 2017
- “Beaker Experimentation Platform”, AI2 Research Internship Midterm Presentation, Seattle, August 2017
- “Image Analysis in Parkinson’s Research”, Pfizer Research Internship Final Presentation, Cambridge, August 2016

### Poster Presentations

- “Inferring causal networks of dynamical systems through transient dynamics and perturbation”, Undergraduate Research Symposium, UW, June 2019

## INTERNSHIP AND RESEARCH EXPERIENCE

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| JUL 2018 - AUG 2018 | <div>Computational and Applied Math <b>Research Experience for Undergrads (REU) at UCLA</b></div> <div><i>Undergraduate Researcher in Mycofluidics Lab</i></div> <div>Worked in Professor Marcus Roper's lab on imaging of fungal cells in <i>Neurospora</i> and <i>Ashbya</i> fungal species. Collected data on nuclear division of these multinucleated cells using 3D imaging algorithms and performed data analysis on nuclear spacing and mixing within the cell. Discovered that genetically incompatible fungal strains fuse together when exposed to environmental stress. We are working on a paper that relies on the research findings and imaging algorithms I developed at UCLA.</div> |
| JUN 2017 - SEP 2017 | <div>Engineering Intern at <b>Allen Institute for Artificial Intelligence (AI2)</b></div> <div><i>Full Stack Development and Data Analysis/Visualization</i></div> <div>Collaborated with researchers and built a system which optimized hyperparameter selection in various neural network experiments ran in the company. I was responsible for experiment design decisions in the company and execution of these experiments on a Google cluster. My platform significantly simplified the experimentation process and reduced the runtime by a factor of two.</div>   |
| AUG 2016 - DEC 2016 | <div>Natural Language Processing Intern at <b>ABBYY</b></div> <div><i>Parser Accuracy Scoring</i></div> <div>Compared ABBYY's parser efficiency and output to that of MaltParser. Created scripts in Java to read parser output from CoNLL-X data files and scored them using an unlabeled and labeled attachment score (UAS and LAS). Used Excel for visual and graphing purposes.</div>   |
| JUN 2016 - AUG 2016 | <div>Image Analysis Intern at <b>Pfizer</b></div> <div><i>Imaging Algorithms for Automated Brain Slice Imaging</i></div> <div>Worked in Neuroscience Pain Research Unit (NPRU) at Pfizer. Studied how various drugs help regenerate healthy cells damaged by neurodegenerative diseases, especially Parkinson's. Used image analysis algorithms, 3D Watershed Segmentation in particular, to quantify the percentage of regenerated healthy cells after treatment. My automated imaging pipeline was used by researchers to quantify <b>hundreds</b> of drug profiles and reduced the runtime of their image analysis code by <b>10 times</b>.</div>  |

## SERVICE AND LEADERSHIP

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1. Founded and led Armenian Student Association at the University of Washington (ASAUW) 2015 - 2019
2. Competition judge at the University of Washington Math Olympiad 2015 - 2019