Victor Geadah

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Education

2021– exp. 2026	**Princeton University** Ph.D. in Applied and Computational Mathematics • Supervised by Jonathan W. Pillow (Princeton Neuroscience Institute).
2020–2021	**University of Cambridge** MASt in Applied Mathematics (Part III)
2017–2020	**Université de Montréal** B.Sc. in Pure and Applied Mathematics

Research Experience

Summer '25 (upcoming)	**Meta – CTRL-Labs**, New York City, NY *Research Scientist Intern.*
2021–Present	**Princeton Neuroscience Institute**, Princeton, NJ *Graduate Researcher.* Advisor: Jonathan W. Pillow
Summer '24	**Flatiron Institute – Center for Computational Neuroscience**, New York City, NY *Summer Pre-Doctoral Researcher.* Supervisor: Alex H. Williams
2019–2021	**Mila - Quebec Artificial Intelligence Institute**, Montréal, Canada *Undergraduate Researcher.* Advisors: Guillaume Lajoie, Guy Wolf
Summer '18	**Université de Montréal**, Montréal, Canada *Undergraduate Researcher.* Advisor: Iosif Polterovich

Awards & Scholarships

2021–2025	Doctoral (B2X) Research Scholarship – FRQNT
2021–2024	Canada Graduate Scholarship - Doctoral (CGS-D) – NSERC
2020	Jean-Maranda Prize – Université de Montréal $\rightarrow$ Awarded to graduating student with highest GPA in pure and applied mathematics
2020	Undergraduate Introduction to Research Scholarship – IVADO
2020	Honorable Mention – Mathematical Contest in Modeling (MCM)
2019	Undergraduate Summer Scholarship – CRM-ISM
2018	Undergraduate Summer Research Award (USRA), with Supplement – NSERC, FRQNT
2018	Royal Bank of Canada Scholarship Program – RBC

Publications & abstracts

Journal Articles

1. **Geadah**[*], V., Barello[*], G., Greenidge, D., Charles, A. S., and Pillow, J. W. "Sparse-Coding Variational Autoencoders". In: *Neural Computation* 36.12 (2024). [link | code], pp. 2571–2601.

2. **Geadah, V.**, Horoi, S., Kerg, G., Wolf, G., and Lajoie, G. "Neural networks with optimized single-neuron adaptation uncover biologically plausible regularization". In: *PLOS Computational Biology* 20.12 (2024). Ed. by A. Morrison. [link | code], e1012567.

[*]: These authors contributed equally.

Conference Proceedings

3. Nejatbakhsh, A., **Geadah, V.**, Williams, A. H., and Lipshutz, D. "Comparing noisy neural population dynamics using optimal transport distances". In: *The Thirteenth International Conference on Learning Representations (ICLR)*. [**oral** (top 1.8% of submissions) | link]. 2025.

4. **Geadah, V.**, Arbelaiz, J., Ritz, H., Daw, N. D., Cohen, J. D., and Pillow, J. W. "Inferring system and optimal control parameters of closed-loop systems from partial observations". In: *63rd IEEE Conference on Decision and Control (CDC)*. [talk | pdf]. 2024.

5. **Geadah, V.**, Laboratory, I. B., and Pillow, J. W. "Parsing neural dynamics with infinite recurrent switching linear dynamical systems". In: *The Twelfth International Conference on Learning Representations (ICLR)*. [link]. 2024.

6. Horoi, S., **Geadah, V.**, Wolf, G., and Lajoie, G. "Low-Dimensional Dynamics of Encoding and Learning in Recurrent Neural Networks". In: *Advances in Artificial Intelligence*. [link]. Springer International Publishing, 2020.

Preprints & Work Under Review

7. **Geadah, V.**, Nejatbakhsh, A., Lipshutz, D., Pillow, J. W., and Williams, A. H. "Modeling Neural Activity with Conditionally Linear Dynamical Systems". Under review. [arXiv | code].

8. Jha, A., **Geadah, V.**, and Pillow, J. W. "Modeling Complex Animal Behavior with Latent State Inverse Reinforcement Learning". [bioRxiv].

Conference Abstracts

9. **Geadah, V.** and Pillow, J. W. "Inferring single-animal learning objectives in mice decision-making". In: *Computational and Systems Neuroscience (COSYNE)*. [poster]. 2025.

10. **Geadah, V.**, Nejatbakhsh, A., Lipshutz, D., Pillow, J. W., and Williams, A. H. "Capturing condition dependence in neural dynamics with Gaussian process linear dynamical systems". In: *Computational and Systems Neuroscience (COSYNE)*. [poster]. 2025.

11. Nejatbakhsh, A., **Geadah, V.**, Williams, A. H., and Lipshutz, D. "Comparing noisy neural population dynamics using optimal transport distances". In: *Computational and Systems Neuroscience (COSYNE)*. [poster]. 2025.

12. **Geadah, V.** and Pillow, J. W. "Parsing neural dynamics with infinite recurrent switching linear dynamical systems". In: *Computational and Systems Neuroscience (COSYNE)*. [poster]. 2023.

13. **Geadah, V.** and Pillow, J. W. "Non-exchangeability in Infinite Switching Linear Dynamical Systems". In: *NeurIPS Workshop on Gaussian Processes, Spatiotemporal Modeling, and Decision-making Systems*. [poster | pdf]. 2022.

14. **Geadah, V.**, Horoi, S., Kerg, G., Wolf, G., and Lajoie, G. "Top-down optimization recovers biological coding principles of single-neuron adaptation in RNNs". In: *Computational and Systems Neuroscience (COSYNE)*. [poster]. 2022.

15. **Geadah, V.**, Horoi, S., Kerg, G., Wolf, G., and Lajoie, G. "Network-level computational advantages of single-neuron adaptation". In: *Computational and Systems Neuroscience (COSYNE)*. [poster]. 2021.

16. **Geadah, V.**, Wolf, G., and Lajoie, G. "Single neuron nonlinearities and their impact on learning dynamics of recurrent networks". In: *From Neuroscience to Artificially Intelligent Systems (NAISys)*. [**talk**]. 2020.

17. **Geadah, V.** and Polterovich, I. "Asymptotics of Steklov Eigenvalues for Regular Polygons". In: *Annual Symposium in Mathematics for a Future in Research and Industry*. [poster].

    $\rightarrow$ Awarded the **Poster Public Prize** by the *Faculty of Graduate Studies and Post-Doctoral Research*. 2019.

Teaching

Spring '24	**Princeton University**, Princeton, NJ
	Assistant in Instruction, Statistical Modeling and Analysis of Neural Data (NEU 560)
	• Guest lecture on Monte Carlo Integration and Importance Sampling
Fall '19	**Université de Montréal**, Montréal, CA
	Teaching Assistant, Real Analysis I (MAT1000)

Academic Service

	Princeton University, Princeton, NJ
2022–Present	*Mentor*, PACM Undergraduate Certificate
2023–2024	*Mentor*, COSYNE Undergraduate Travel Grant Program
	Université de Montréal, Montréal, CA
2018–2020	*Co-founder*, Mathematical Modeling Club
2018–2020	*Organizer*, Club Mathématique
2018–2020	*Mentor*, Sensibilisation aux Études, à l'Université et à la Recherche (SEUR)

Reviewer: ICLR 2025

Invited Talks

2025 (upcoming)	COSYNE "Dynamics of brain computations through the lens of control theory" workshop
2025	Princeton Neuroscience Institute Seminar, Princeton University
2024	PACM Graduate Student Seminar, Princeton University
2024	NeuroStatsLab Meeting, Flatiron Institute – Center for Computational Neuroscience
2024	Cohen Lab Meeting, Princeton University
2023	SAMARI Symposium, Université de Montréal
2022	P6 Seminar (invited by Jonathan Cohen), Princeton University
2022	SAMARI Symposium, Université de Montréal
2020	Séminaire d'été du Département de Mathématique et Statistique, Université de Montréal
2019	Waterloo Mathematics Undergraduate Research Conference, University of Waterloo
2019	Séminaire d'été du Département de Mathématique et Statistique, Université de Montréal
2019	Canadian Undergraduate Mathematics Conference (CUMC), Queen's University
2018	Séminaire d'été du Département de Mathématique et Statistique, Université de Montréal

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