Victor Geadah

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Education

2021–*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 **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

2025–2026 Porter Ogden Jacobus Fellowship – Princeton University
→ Princeton University's top honor for graduate students in their later years of study.

2021–2025 Doctoral (B2X) Research Scholarship – FRQNT

2021–2024 Canada Graduate Scholarship - Doctoral (CGS-D) – NSERC

2020 Jean-Maranda Prize – Université de Montréal
→ 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). [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 | link | pdf]. 2024, pp. 8006–8013.
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". [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].

    → 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 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

Dates in *italic* are forthcoming.
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