ALEX H WILLIAMS

Asst Prof, NYU & Project Leader, Flatiron Institute | Laboratory for Neural Statistics: http://neurostatslab.org/

EMPLOYMENT

Assistant Professor. New York University, Center for Neural Science. New York, NY   *Jan 2022 – present*
Project Leader & Associate Research Scientist. Flatiron Institute, Center for Computational Neuroscience. New York, NY
Affiliate Faculty. New York University, Center for Data Science. New York, NY
Associate Investigator. NYU Langone Health, Neuroscience Institute

Postdoctoral Scholar. Stanford University, Department of Statistics. Stanford, CA   *June 2019 – Dec 2021*
Advisor: Scott Linderman

EDUCATION

Stanford University. Stanford, CA   *2015-2019*
PhD in Neurosciences. *Advisor: Surya Ganguli*

University of California, San Diego. La Jolla, CA   *2014-2015*
Neurosciences Graduate Program. *Advisor: Terrence Sejnowski*   *(transferred to Stanford after one year)*

Bowdoin College. Brunswick, ME   *2008-2012*
Bachelor of Arts in Neuroscience (*summa cum laude*, Minor: Computer Science)

OTHER PROFESSIONAL APPOINTMENTS

Research Intern. Google Brain. Mountainview, CA   *June 2018 – May 2019*
Host: David Sussillo

Visiting Researcher. Sandia National Laboratories. Livermore, CA   *June – Sept 2016*
Host: Tamara Kolda

Research Technician. Brandeis University, Department of Biology. Waltham, MA   *2012 – 2014*
Advisor: Eve Marder

AWARDS AND FELLOWSHIPS

McKnight Scholar Award	2025 – 2028
Ruth L. Kirschstein NRSA Postdoctoral Fellowship (1F32MH122998-01)	2020 – 2021
Wu Tsai Neurosciences Institute Interdisciplinary Scholar Fellowship	2019 – 2021
Department of Energy Computational Science Graduate Fellowship (DOE CSGF)	2014 – 2019
"Best Performer" – DREAM8 Challenge, Whole-cell Parameter Estimation	2013
Phi Beta Kappa	2011
Barry S. Goldwater Scholarship	2011
Beckman Scholar Award	2011 – 2012

TEACHING

NEURL-GA 3042: Topics In Neuroscience (Neural Statistics)   *Spring 2023+2025*
Center for Neuroscience, New York University.
Teaching Assistant — Methods in Computational Neuroscience   *August 2019*
Marine Biological Laboratory. Woods Hole, MA. Organized by: *Stephen Baccus Xiao-Jing Wang*
Teaching Assistant — Methods in Computational Neuroscience   *August 2017*
Marine Biological Laboratory. Woods Hole, MA. Organized by: *Michale Fee, Mark Goldman*

CONFERENCE AND WORKSHOP TALKS

March 2026. Computational and Systems Neuroscience (COSYNE), Tutorial Session. Lisbon, PT.

September 2025. Dartmouth Center for Cognitive Neuroscience, Workshop on Functional Alignment. Hanover, NH.

August 2025. Computational Cognitive Neuroscience (CCN), Community Event on "Universality and Idiosyncrasy of Perceptual Representations." Amsterdam.

April 2025. Second Workshop on Representational Alignment (Re^2-Align). Held at International Conference on Learning Representations (ICLR) in Singapore.

October 2024. Flatiron Wide Algorithms and Mathematics (FWAM) Workshop. Flatiron Institute. New York, NY.

September 2024. From Neuroscience to Artificially Intelligent Systems (NAISys) Workshop. Held at Cold Spring Harbor Laboratories. Cold Spring Harbor, NY.

August 2024. Computational Cognitive Neuroscience (CCN), Keynotes & Tutorials conference track. Held at Massachusetts Institute of Technology. Cambridge, MA.

June 2024. Simons Institute for the Theory of Computing, Workshop on Understanding Lower-level Intelligence from AI, Psychology, and Neuroscience. Berkeley, CA.

May 2024. Gordon Research Conference, Neural Mechanisms of Acoustic Communication. Sunday River, Maine.

April 2024. International Winter Neuroscience Conference. Sölden, Austria.

February 2024. Labroots Neuroscience Virtual Event Series 2024. Virtual Seminar.

October 2023. Open Data In Neuroscience (ODIN) conference. McGovern Institute, MIT. Cambridge, MA.

October 2023. Bernstein Network Computational Neuroscience Conference, 2nd Workshop on Symmetry, Invariance and Neural Representations. Berlin, Germany.

July 2023. Sampling Theory and Applications Conference (SAMPTA). Yale University. New Haven, CT.

May 2023. New York University, Workshop on Dogmas of Memory. New York, New York.

March 2023. Computational & Systems Neuroscience (Cosyne) Workshop on Taming Complexity & Discovering Interpretable Latent Spaces. Montreal, CA.

March 2022. Computational & Systems Neuroscience (Cosyne) Workshops. Cascais, Portugal.

January 2022. CUNY Graduate Center. Symposium on Dimensionality and Neural Dynamics. New York, New York.

SEMINAR AND COLLOQUIUM TALKS

October 2025. University of Chicago, Committee on Computational Neuroscience. Chicago, IL.

October 2025. UC San Diego Neurosciences Graduate Program (NGP) Seminar Series. San Diego, CA.

October 2025. Rockefeller University. Center for Studies in Physics and Biology. New York, NY.

May 2025. University College London. Gatsby Computational Neuroscience Unit. London, UK.

May 2025. Cambridge University. Department of Engineering. Cambridge, UK.

April 2025. Zuckerman Institute, Columbia University. Center for Theoretical Neuroscience. New York, NY.

April 2025. State University of New York at Albany (SUNY Albany). Department of Psychology. Albany, NY.

April 2024. Cold Spring Harbor Laboratories. CSHL NeuroAI Seminar Series. Cold Spring Harbor, NY.

November 2023. SUNY Downstate Medical Center. Neuroscience Program. Brooklyn, NY.

April 2023. Boston University. Mathematics & Statistics Department. Boston, MA.

February 2023. University of Washington. Neuroscience Graduate Program Seminar Series. Seattle, WA.

November 2022. New York University. Swartz Seminar Series on Theoretical Neuroscience. New York, New York.

PREPRINTS AND MANUSCRIPTS UNDER REVIEW

Barbosa J, Nejatbakhsh A, Duong L, Harvey SE, Brincat SL, Siegel M, Miller EK, **Williams AH** (2025). Quantifying Differences in Neural Population Activity With Shape Metrics. *bioRxiv* 2025.01.10.632411.

PUBLISHED JOURNAL ARTICLES & CONFERENCE PROCEEDINGS
[https://scholar.google.com/citations?user=7_GzzXMAAAAJ : 2543 citations, h-index 22]
*denotes equal contribution

Khosla M, **Williams AH** , McDermott J, Kanwisher N (*In Press*). Privileged representational axes in biological and artificial neural networks. *Nature Human Behavior*.

Hong F, Bouhassira R, Chow J, Sanders C, Shvartsman M, Guan P, **Williams AH**, Brainard DH (2025). Comprehensive characterization of human color discrimination thresholds. *eLife.* 14:RP108943.

Geadah V, Nejatbakhsh A, Lipshutz D, Pillow JW, **Williams AH** (2025). Modeling Neural Activity with Conditionally Linear Dynamical Systems. *Advances in Neural Information Processing Systems.*

Medvedeva A, Balzani E, **Williams AH**, Keeley SL (2025). Scalable inference of functional neural connectivity at submillisecond timescales. *Advances in Neural Information Processing Systems.*

Feather J, Lipshutz D, Harvey SE, **Williams AH**, Simoncelli EP (2025). Discriminating image representations with principal distortions. *International Conference on Learning Representations.*

Nejatbakhsh A, Geadah V, **Williams AH**, Lipshutz D (2025). Comparing noisy neural population dynamics using optimal transport distances. *International Conference on Learning Representations.*
[Selected for oral presentation. Top ~1.8% of submissions.]

Wu JH, Koneru H, Ravenel JR, Sabath A, Roach JM, Lim SS, Tadross MR, **Williams AH**, Dunn TW (2025). Disentangling 3D Animal Pose Dynamics with Scrubbed Conditional Latent Variables. *International Conference on Learning Representations.*

Zutshi I, Apostolelli A, Yang W, Zheng Z, Dohi T, Balzani E, **Williams AH**, Savin C, Buzsáki G (2025) Hippocampal neuronal activity is aligned with action plans. *Nature*, doi:10.1038/s41586-024-08397-7

Harvey SE, Lipshutz D, **Williams AH** (2024). What Representational Similarity Measures Imply about Decodable Information. *Proceedings of Machine Learning Research (Unifying Representations in Neural Models)*. PMLR 285:140-151, 2024.

Williams AH (2024). Equivalence between representational similarity analysis, centered kernel alignment, and canonical correlations analysis. *Proceedings of Machine Learning Research (Unifying Representations in Neural Models)*. PMLR 285:10-23, 2024.

Peterson RE*, Tanelus A*, Ick CA, Mimica B, Francis MJN, Ivan VJ, Choudhri A, Falkner A, Murthy M, Schneider DM, Sanes DH, **Williams AH** (2024). Vocal Call Locator Benchmark (VCL'24) for localizing rodent vocalizations from multi-channel audio. *Neural Information Processing Systems: Datasets & Benchmark.*

Zheng Z, Huszár R, Hainmueller T, Bartos M, **Williams AH***, Buzsáki G* (2024). Perpetual step-like restructuring of hippocampal circuit dynamics. *Cell Reports. 43(9): 114702.*

Harvey S, Larsen B, **Williams AH** (2024). Duality of Bures and Shape Distances with Implications for Comparing Neural Representations. *Proceedings of Machine Learning Research (Unifying Representations in Neural Models)*

Khosla M, **Williams AH** (2024). Soft Matching Distance: A metric on neural representations that captures single-neuron tuning. *Proceedings of Machine Learning Research (Unifying Representations in Neural Models)*

Pospisil DA, Larsen BW, Harvey SE, **Williams AH** (2024). Estimating Shape Distances on Neural Representations with Limited Samples. *International Conference on Learning Representations (ICLR)*.

Peterson RE, Choudhri A, Mitelut C, Tanelus A, Capo-Battaglia A, **Williams AH**, Schneider DM, Sanes DH (2023). Unsupervised discovery of family specific vocal usage in the Mongolian gerbil. *eLife 12:RP89892*

Nejatbakhsh A, Garon I, **Williams AH** (2023). Estimating noise correlations in neural populations with Wishart processes. *Advances in Neural Information Processing Systems*, 36, 54032-54045.

Wang Y, Degleris A, **Williams AH**, Linderman SW (2023). Spatiotemporal clustering with neyman-scott processes via connections to bayesian nonparametric mixture models. *Journal of the American Statistical Association*, 1-14.

Low IIC, Giocomo LM, **Williams AH** (2023). Remapping in a recurrent neural network model of navigation and context inference. *eLife 12:RP86943.*

Duong LR, Zhou J, Nassar J, Berman J, Olieslagers J, **Williams AH** (2023). Representational dissimilarity metric spaces for stochastic neural networks. *International Conference on Learning Representations*. Kigali, Rwanda.

Costacurta JC, Duncker L, Sheffer B, Gillis W, Weinreb C, Markowitz JE, Datta SR, **Williams AH**, Linderman SW (2022). Distinguishing discrete and continuous behavioral variability using warped autoregressive HMMs. *Advances in Neural Information Processing Systems*, 35, 23838-23850.

Williams AH, Kunz E, Kornblith S, Linderman SW (2021). Generalized Shape Metrics on Neural Representations. *Advances in Neural Information Processing Systems*, 34, 4738-4750.

Williams AH, Linderman SW (2021). Statistical Neuroscience in the Single Trial Limit. *Current Opinions in Neurobiology*. 70: 193-205.

Low IIC, **Williams AH**, Campbell MG, Linderman SW, Giocomo LM (2021). Dynamic and reversible remapping of network representations in an unchanging environment. *Neuron*. 109(18):2967-2980.e11

Williams AH, Degleris A, Wang Y, Linderman SW (2020). Point process models for sequence detection in high-dimensional neural spike trains. *Advances in Neural Information Processing Systems*, 33, 14350-14361. **[Selected for oral presentation. Top 105 of 9454 submissions.]**

Williams AH, Poole B, Maheswaranathan N, Dhawale AK, Fisher T, Wilson CD, Brann DH, Trautmann E, Ryu S, Shusterman R, Rinberg D, Ölveczky BP, Shenoy KV, Ganguli S (2020). Discovering precise temporal patterns in large-scale neural recordings through robust and interpretable time warping. *Neuron.* 105(2):246-259.e8

Mackevicius EL*, Bahle AH*, **Williams AH**, Gu S, Denissenko NI, Goldman MS, Fee MS (2019). Unsupervised discovery of temporal sequences in high-dimensional datasets, with applications to neuroscience. *eLife*. 8:e38471

Maheswaranathan N*, **Williams AH***, Golub MD, Ganguli S, Sussillo D (2019). Universality and individuality in neural dynamics across large populations of recurrent networks. *Advances in Neural Information Processing Systems*, 32. **[Selected for spotlight talk. Top 200 of 6743 submissions.]**

Maheswaranathan N*, **Williams AH***, Golub MD, Ganguli S, Sussillo D (2019). Reverse engineering recurrent networks for sentiment classification reveals line attractor dynamics. *Neural Information Processing Systems*, 32.

Williams AH, Kim TH, Wang F, Vyas S, Ryu SI, Shenoy KV, Schnitzer M, Kolda TG, Ganguli S (2018). Unsupervised discovery of demixed, low-dimensional neural dynamics across multiple timescales through tensor components analysis. *Neuron.* 98(6):1099–1115.e8.

Williams AH, O'Donnell C, Sejnowski T, O'Leary T (2016). Dendritic trafficking faces physiologically critical speed-precision tradeoffs. *eLife*. 5:e20556

Dickinson PS, Kurland SC, Qu X, Parker BO, Sreekrishnan A, Kwiatkowski MA, **Williams AH**, Ysasi AB, Christie AE (2015). Distinct or shared actions of peptide family isoforms: II. Multiple pyrokinins exert similar effects in the lobster stomatogastric nervous system. *J Exp Biol*. 218(18): 2905-17.

Karr JR, **Williams AH**, Zucker JD, Raue A, Steiert B, Timmer J, Kreutz C, DREAM8 Parameter Estimation Challenge Consortium, Wilkinson S, Allgood BA, Bot BM, Hoff BR, Kellen MR, Covert MW, Stolovitzky GA, Meyer P (2015). Summary of the DREAM8 parameter estimation challenge: Toward parameter identification for whole-cell models. *PLoS Computational Biology.* 11(5): e1004096.

O'Leary T, **Williams AH**, Franci A, Marder E (2014). Cell types, network homeostasis and pathological compensation from a biologically plausible ion channel expression model. *Neuron*. 82(4):809-21.

Caplan JS, **Williams AH**, Marder E (2014). Many parameter sets in a multicompartment model oscillator are robust to temperature perturbations. *J Neurosci*. 34(14):4963-75.

Williams AH, Calkins A, O'Leary T, Symonds R, Marder E, Dickinson PS (2013). The neuromuscular transform of the lobster cardiac system explains the opposing effects of a neuromodulator on muscle output. *J Neurosci*. 33(42):16565-75.

O'Leary T, **Williams AH**, Caplan J, Marder E (2013). Correlations in ion channel expression emerge from homeostatic tuning rules. *Proc Natl Acad Sci.* 110(28):E2645-54

Williams AH, Kwiatkowski MA, Mortimer AL, Marder E, Zeeman ML, Dickinson PS (2013). Animal-to-animal variability in the phasing of the crustacean cardiac motor pattern: an experimental and computational analysis. *J Neurophysiol.* 109: 2451-65.

ACADEMIC DUTIES & COMMUNITY INVOLVEMENT

Department Service: Colloquium Committee (2023-2025), Neuroscience Lab Night Organizer (2024-2026), Community Building and Outreach Committee (2024-2026).

Conference Program Committees: Computational and Systems Neuroscience (COSYNE; 2024-2026), Statistical Analysis of Neural Data (SAND; 2025)

Conference Reviews: Neural Information Processing Systems (NeurIPS; 2018-2025), International Conference on Machine Learning (ICML; 2020-2021,2023-2025), International Conference on Learning Representations (ICLR; 2021, 2023), Computational and Systems Neuroscience (COSYNE; 2021, 2023).

Journal Reviews: Nature, PNAS, Neuron, Nature Methods, Nature Neuroscience, Transactions on Machine Learning Research, Journal of Neuroscience Methods, SIAM Journal on Applied Dynamical Systems, eLife, Neural Computation, PLoS Comput Biol, Data Mining and Knowledge Discovery, NBDT (Neurons, Behavior, Data analysis, and Theory), Journal of Open-Source Software.

PhD Students supervised: Sam Zheng (2022-), Elliott Capek (2022-), Isabel Garon (2023-), Argha Bandyopadhyay (2024-), Alisha Ahmed (2024-), Shujun Xiong (2025-), Kushal Kolar (2025-)