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Dynamics of learning	Sparse machine learning
Learning of dynamics	Neuroscience of spatial navigation

BA Physics and BA Mathematics (with high honors)

Sep. 2014 – May 2018

Researcher

April 2021 – *present*

SERVICE

Reviewer: Nature Communications; Nonlinear Dynamics; Communications Physics; IEEE Robotics and Automation Letters (RA-L); IEEE Letters in Control Systems (L-CS); Journal of Fluid Mechanics; Annals of Applied Statistics; Proceedings of Royal Society A; Scientific Reports; ICML (Top 10% of reviewers 2022); NeurIPS (Top reviewers 2022); ICLR (Notable reviewers 2025); AAAI; AISTAT; ICCV; CPAL; IJCAI; NOLTA

HONORS & AWARDS

UCSB Chancellor's Merit Fellowship (2018 – 2023)

Dean's Undergraduate Research Fund (DURF) Grants (2015 – 2018)

NYU Presidential Honor Scholars (2015 – 2018)

Sigma Pi Sigma – National Physics Honor Society (2016)

Union Line Garage Scholarship (2014)

CONTRIBUTOR

- Center for Disease Control and Prevention (CDC) FluSight Forecast Hub Flu Hospitalizations: 2024 – *present*
- University of Guelph AI4CastingHub Respiratory Virus Detection Surveillance System (RVDSS) Data Forecasting: 2024 – *present*
- University of Guelph AI4CastingHub Forecasting Hospital Bed Occupancy Data for Ontario Respiratory Virus Activity Forecasting: 2024 – *present*

PUBLICATIONS

16. **W. T. Redman***, S. Acosta-Mendoza*, X.X. Wei, and M. J. Goard, “Robust Variability of Grid Cell Properties Within Individual Grid Modules Enhances Encoding of Local Space”. *eLife* (2025) (*equal contribution)
15. **W. T. Redman**, Z. Wang, A. Ingrosso, and S. Goldt, “On How Iterative Magnitude Pruning Discovers Local Receptive Fields in Fully Connected Neural Networks”. *Conference on Parsimony and Learning (CPAL 2025)*
14. **W. T. Redman**, D. Huang, M. Fonoberova, and I. Mezić, “Koopman Learning with Episodic Memory”. *Chaos Fast Track* (2025)
13. N. S. Wolcott, **W. T. Redman**, M. Karpinska, E. G. Jacobs, and M. J. Goard, “The estrous cycle modulates hippocampal spine dynamics, dendritic processing, and spatial coding”. *Neuron* (2025)
12. **W. T. Redman**, J. M. Bello-Rivas, M. Fonoberova, R. Mohr, I. G. Kevrekidis, and I. Mezić, “Identifying Equivalent Training Dynamics”. **Spotlight** (Top ~ 5% of accepted papers) *Advances in Neural Information Processing Systems (NeurIPS 2024)*
11. **W. T. Redman**, F. Acosta, S. Acosta-Mendoza, and N. Miolane, “Not so griddy: Internal representations of RNNs path integrating more than one agent”. *Advances in Neural Information Processing Systems (NeurIPS 2024)*
10. F. Acosta, F. Dinc, **W. T. Redman**, M. Madhav, D. Klindt, and N. Miolane, “Global Distortions from Local Rewards: Neural Coding Strategies in Path-Integrating Neural Systems”. *Advances in Neural Information Processing Systems (NeurIPS 2024)*
9. E. R. J. Levy, S. Carrillo-Segura, E. H. Park, **W. T. Redman**, J. Hurtado, S. Y. Chung, A. A. Fenton, “A manifold neural population code for space in hippocampal coactivity dynamics independent of place fields”. *Cell Reports* (2023)
8. **W. T. Redman**, M. Fonoberova, R. Mohr, I.G. Kevrekidis, and I. Mezić, “Algorithmic (Semi-)Conjugacy via Koopman Operator Theory”. *IEEE Conference on Decision and Control (CDC 2022)*
7. **W. T. Redman**, et al., “Long-term Transverse Imaging of the Hippocampus with Glass Microperiscopes”. *eLife* (2022)
6. **W. T. Redman**, T. Chen, Z. Wang, and A. S. Dogra, “Universality of Winning Tickets: A Renormalization Group Perspective”. *International Conference on Machine Learning (ICML 2022)*
 - ▷ **Spotlight** paper at Sparsity in Neural Networks (SNN) Workshop 2022 (< 10% of accepted papers)
5. **W. T. Redman**, M. Fonoberova, R. Mohr, I.G. Kevrekidis, and I. Mezić, “An Operator Theoretic View on Pruning Deep Neural Networks”. *International Conference on Learning Representations (ICLR 2022)*

4. **W. T. Redman**, “On Koopman Mode Decomposition and Tensor Component Analysis”. *Chaos Fast Track* (2021)
3. A. S. Dogra* and **W. T. Redman***, “Optimizing Neural Networks via Koopman Operator Theory”. *Advances in Neural Information Processing Systems (NeurIPS 2020)* (*equal contribution)
 ▷ Presented at the Beyond Backpropagation NeurIPS Workshop 2020
2. **W. T. Redman**, “Renormalization group as a Koopman operator”. *Physical Review E Rapid Communication* (2020)
1. **W. Redman**, “An $O(n)$ method of calculating Kendall correlations of spike trains”. *PLOS ONE* (2019)

INVITED TALKS

- “Koopman Learning with Episodic Memory” – **Prague Synapse** 1st Prague Workshop on Neural Networks and Reasoning, July 2025
- “Koopman Learning with Episodic Memory” – **SIAM** Conference on Applications of Dynamical Systems 2025 (DS25), Mini Symposium “Diverse Applications of Koopman Operator Theory”, May 2025
- “Dynamics of learning and learning of dynamics” – Electrical and Computer Engineering Seminar **Johns Hopkins University**, April 2025
- “Identifying Equivalent and Non-Equivalent Training Dynamics” – Fiete Lab **MIT**, April 2024
- “A Koopman Operator Theoretic Approach for Studying Deep Learning” – **SIAM** Conference on Applications of Dynamical Systems 2023 (DS23), Mini Symposium “Koopman Operator Theory: Theory and Applications”, May 2023
- “Microperiscopes and renormalization group theory for probing biological and artificial neural networks” – Physics/AI Journal Club **Harvard University**, January 2023
- “Microperiscopes and renormalization group theory for probing biological and artificial neural networks” – Complex Systems Seminar **Northwestern University**, January 2023
- “Discovering Sparse Subnetworks via Koopman Mode Decomposition” – International Symposium on Nonlinear Theory and Its Applications (**NOLTA**), December 2022
- “Microperiscopes and renormalization group theory for probing biological and artificial neural networks” – Center for Theoretical Neuroscience **Columbia University**, November 2022
- “Biological and artificial neural networks” – **Johns Hopkins Applied Physics Lab**, October 2022
- “Effective theories/mathe-physical perspectives on deep learning”* – Institute of Artificial Intelligence and Fundamental Interactions (**IAIFI**), February 2022 (*with Akshunna S. Dogra)
- “Koopman mode and CP decompositions” – Special Interest Group on Machine Learning and Dynamical Systems hosted by the **Alan Turing Institute**, June 2021
- “On Koopman Mode Decomposition and Tensor Component Analysis”* – **SIAM** Conference on Applications of Dynamical Systems 2021 (DS21), Mini Symposium “Koopman Operator: Computational Methods and Interactions with Machine Learning Part II”, May 2021 (*only graduate student presenting in either part of this mini symposium)
- “Optimizing neural networks via Koopman operator theory”* – The **Fields Institute’s** Second Symposium on Machine Learning and Dynamical Systems, November 2020 (*with Akshunna S. Dogra)
- “Optimizing neural networks via Koopman operator theory”* – Prof. Michael Mahoney’s group meeting **UC Berkeley**, October 2020 (*with Akshunna S. Dogra)

STUDENTS AND MENTEES

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| • Abu-Al Hassan (M.S. ICL → Squarepoint Capital) | 2021 – 2022 |
| • Edward Prideaux-Ghee (M.S. ICL → Thruvision) | 2021 – 2022 |

- Luca Montelisciani (M.S. UCSB → Ph.D. student University of Amsterdam) 2019 – 2020
- Santiago Acosta-Mendoza (B.S. UCSB → Ph.D. student UCSB) 2020 – 2021
- Fiona McBride (B.S. UCSB → Ph.D. student NYU) 2018 – 2022
- William Castagna (B.S. UCSB → Ph.D. student USC) 2019 – 2021

TEACHING

- **Teaching assistant:** Neurobiology 1 (2019, 2021)
- **In-classroom teaching assistant:** Calculus 1 (2016)

WORKSHOPS ATTENDED

Sparsity in Neural Networks (SNN) Workshop, On Practical Limitations and Tradeoffs Between Sustainability and Efficiency - **ICLR** (2023)

Third Symposium on Machine Learning and Dynamical Systems - **Fields Institute**, Toronto *Invited* (2022)

Sparsity in Neural Networks (SNN) Workshop, Advancing Understanding and Practice (2022)

Beyond Life-long Learning via Modular Meta-Learning - **GoodAI**, Prague *Invited* (2021)

Optimization, Differential Equations, and Data Analysis - **Center for Computational Mathematics**, UC San Diego (2020)

Joshua Lederberg-John von Neumann Symposium: Towards Quantitative Biology - **Institute of Advanced Study**, Princeton (2018)