

# Lindsay M. Smith

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RESEARCH INTEREST: My research focuses on the **science of AI**: I apply techniques and ideas from physics and complex systems to artificial neural networks to understand how they learn. My current research in machine learning/AI includes projects in **mechanistic interpretability, in-context learning, LLM multi-agent interactions, and AI safety**.

## EDUCATION

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**M.A., Ph.D. — Princeton University — Physics** 2022 - PRESENT (EXPECTED 2027)  
NSF GRFP; Research Advisors: Profs. William Bialek (Princeton) and David Schwab (CUNY)

**B.A. — University of Pennsylvania — Physics (Honors)** 2018 - 2022  
Research Advisor: Prof. Dani Bassett  
Cum Laude, Minors in Mathematics and French and Francophone Studies

## PUBLICATIONS

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\* indicates equal contribution.

- Colin Scheibner\*, **Lindsay M. Smith\***, and William Bialek (2025). Large language models and the entropy of English. *Under review*, <https://arxiv.org/abs/2512.249692>.
- Jeff Shen\* & **Lindsay M. Smith\*** (2025). ALICE: An Interpretable Neural Architecture for Generalization in Substitution Ciphers. *Under review*, <https://arxiv.org/abs/2509.07282>.
- Chase Goddard, **Lindsay M. Smith**, Vudtiwat Ngampruetikorn\*, David J. Schwab\* (2025). When can in-context learning generalize out of task distribution? *ICML 2025*, <https://arxiv.org/abs/2506.05574>.
- Lindsay M. Smith**, Chase Goddard, Vudtiwat Ngampruetikorn\*, David J. Schwab\* (2024). Model Recycling: Model component reuse to promote in-context learning. *NeurIPS 2024 Workshop on Scientific Methods for Understanding Deep Learning*, <https://openreview.net/forum?id=vWSu8nEURM>.
- Chase Goddard, **Lindsay M. Smith**, Vudtiwat Ngampruetikorn\*, David J. Schwab\* (2024). Specialization-generalization transition in exemplar-based in-context learning. *NeurIPS 2024 Workshop on Scientific Methods for Understanding Deep Learning*, <https://openreview.net/forum?id=D1ui5QwHqF>.
- Lindsay M. Smith**, Jason Z. Kim, Zhixin Lu, and Dani S. Bassett (2022). Learning continuous chaotic attractors with a reservoir computer, *Chaos* 32, 011101, <https://doi.org/10.1063/5.0075572>. *Selected as an Editor's Pick and publicized with a Scilight summary: <https://doi.org/10.1063/10.0009079>.*

## SELECTED HONORS AND AWARDS

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<b>National Science Foundation (NSF) ACCESS Computing Award</b> – 200,000 credits (~ \$5000)	2025
<i>I applied for and am the Principal Investigator for this award.</i>	
<b>NSF AI Institutes Virtual Organization (AIVO) Travel Grant</b> – \$2000	2025
<b>American Physical Society (APS) GSNP Student Speaker Award Finalist</b> – \$500	2025
<b>NSF Graduate Research Fellowship Program (GRFP)</b> – \$138,000 + \$12,000 bonus from Princeton	2022 - 2027
<b>Charlotte and Morris Tanenbaum *52 Graduate Fellowship in Physical or Life Sciences</b> – \$40,000	2022 - 2023
<b>Joseph Henry Merit Award</b> – \$5,000	2022
<b>University Scholars Program</b> – \$7,000	2020 - 2022
<i>Applied for and awarded summer research funding in 2020 and 2021.</i>	
<b>National French Honor Society – Pi Delta Phi</b>	2020 - Present
<b>Sister Loretta Thome Scholarship</b> – \$10,000	2018 - 2023

## EXPERIENCE

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**MARS (Mentorship for Alignment Research Students) Mentee**, Cambridge, UK July 2025 - Present  
MARS 3.0 participant at the Cambridge AI Safety Hub. Co-first author on project investigating AI control and steering via Chain-of-Thought (CoT) injections.

## SELECTED PRESENTATIONS

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**Princeton Center for Theoretical Science Workshop: The Physics of John Hopfield**, Princeton, NJ 2025  
Poster: "ALICE: An Interpretable Neural Architecture for Generalization in Substitution Ciphers"

**Meta 2025 PhD Forum**, Menlo Park, CA 2025  
Poster: "ALICE: An Interpretable Neural Architecture for Generalization in Substitution Ciphers"

**APS March Meeting**, Anaheim, CA 2025  
Talk: "Multi-Agent Debate: Analyzing Consensus in Networks of LLM Agents" – (*GSNP Student Speaker Award Finalist*)

**APS March Meeting**, Chicago, IL 2022  
Talk: "Learning Continuous Chaotic Attractors with a Reservoir Computer"

**Conference for Undergraduate Women in Physics (CUWiP)**, Virtual 2022  
Poster: "Learning Continuous Chaotic Attractors with a Reservoir Computer"

**Penn Research Expo**, Phila., PA 2020, 2021, 2022  
Posters: "Development of control in brain networks over temporal and spatial scales using graph models",  
"Learning Continuous Chaotic Attractors with a Reservoir Computer"

**CUWiP**, Virtual 2021  
Lightning Talk: "Development of control in brain networks over temporal and spatial scales using graph models"

**University Scholars Lunch Talk**, Phila., PA 2020, 2022  
Talks: "Development of control in brain networks over temporal and spatial scales using graph models",  
"Learning Continuous Chaotic Attractors with a Reservoir Computer"

**APS March Meeting**, Virtual 2020  
Poster: "Development of control in brain networks over temporal and spatial scales using graph models"

## MENTORING, OUTREACH, TEACHING

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PHY 103: General Physics I, **Teaching Assistant** 2025

Princeton Towards an Inclusive Physics cOmmunity in graduaTe Students (TIPOTS), **Mentor** 2024 - Present

Princeton Women in Physics, **Executive Board** 2023 - Present

Princeton Physics EDI, **Events Committee** 2022 - 2024

Princeton Physics Mentorship, **Mentor** 2022 - 2024  
*Mentored one to two undergraduate physics students each semester. Met at least once a semester to give career and academic advice.*

CIS 110, **Tutor** 2021 - 2022  
*Tutored two to three students weekly in CIS 110: Introduction to Computer Programming.*

Side By Side Agency, **Mentor** 2021  
*Mentored a student on her research project exploring astrophysics, advising her how to create a poster and conduct independent research.*

## SKILLS

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Python, PyTorch, Jupyter, Git, MATLAB, Java, C++, ROOT, Mathematica, LaTeX, Linux