Matt L. Wiemann

previously published as Sampson

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ACADEMIC EMPLOYMENT

Eric and Wendy Schmidt AI in Science Postdoctoral Fellow *Jan 2027 – Sept 2029*
Institution: UC San Diego, Department of Computer Science and Engineering
Hosts: Prof. Rose Yu and Prof. Tara Javidi

RESEARCH INTERESTS

- **Representation learning and compression:** Designing ways to encourage highly structured, highly compressed representation of data in scientific domains.
- **Latent dynamics for world models:** Building generative models of dynamical systems that support inference, simulation, and discovery in reduced dimensional spaces.
- **AI for scientific discovery:** Building autonomous and semi-autonomous systems that combine learned dynamics, physical priors, and language-model reasoning to improve scientific discovery.

EDUCATION

Doctor of Philosophy, *Princeton University* **2022– Expected Dec 2026**
· **Thesis:** *Physics-informed latent dynamics for scientific machine learning*
· **Advisor** Prof. Peter Melchior

Master of Arts, *Princeton University* **2023**

Honours (First class), *Australian National University* **2021**
· **Thesis:** *Cosmic ray transport in compressible ionised MHD turbulence*
· **Advisor** Prof. Mark Krumholz

Bachelor of Mathematics , *Queensland University of Technology* **2017-2020**
· **Major:** *Applied and Computational Mathematics*

Bachelor of Science , *Queensland University of Technology* **2017-2020**
· **Major:** *Physics*

PROFESSIONAL EXPERIENCE

NYU/Polymathic AI *2026*
Research Intern | Advisors: Carol Cuesta-Lazaro, Pavel Izmailov
AI for Scientific Experimentation and Discovery: Developing novel physics benchmarks, and RL pipelines to train LLM-based science agents to perform scientific discovery. Webpage

AWARDS AND HONORS

- 2026 Eric and Wendy Schmidt AI in Science Postdoctoral Fellowship
- 2026 Nomination: Schmidt Science Fellows (selected as Princeton nominee)
- 2022 Princeton Graduate Program First Year Fellowship in Natural Sciences
- 2021 Bok Honours Scholarship in Astrophysics at the RSAA

SOFTWARE AND TECHNICAL SKILLS

Contributed, and led development of numerous open source scientific projects.

- Path-minimized latent ODEs, JAX based software for path minimized latent ODE models.
- Major contributor to Scarlet2, python based software for galactic source deblending. Contributed a score-based diffusion model to act as neural priors for galaxy morphology.
- Co-developer of CRIPTIC, C++ software for simulation of cosmic ray transport

Technical skills

Languages: Python (JAX, PyTorch, diffrax, equinox), C++, R, MATLAB, FORTRAN (*ordered by proficiency*)
Mathematical: advanced calculus and linear algebra, ODEs/PDEs, statistics and probability, Bayesian inference, computational statistics
Dev/Databases/Other: Git, bash, remote/cluster computing, high-performance computing, SQL

SUPERVISION/MENTORSHIP

Undergraduate Summer Research Program

- Research supervisor of Gabrielle Florencia
- Co-supervisor with Prof. Charlotte Ward and Prof. Peter Melchior for Sufia Birmingham

SELECTED TALKS

- "Latent ODEs for learning rate scheduling". *Polymathic AI*, Flatiron Institute 2026.
- "Machine Learning for Astrophysics". *Princeton Undergraduate Research School*, Princeton 2025.
- "Latent ODEs for time series modelling and inference". *Ciela Institute's Astromerique student talk series*, (virtual) 2024.
- "Score-based diffusion models with uncertainty quantification". *Data Science X Astro seminar*, 2024.
- "Spotting hallucinations in inverse problems with data-driven priors". *ICML ML4Astro workshop, Hawaii*, 2023.
- "Score-based diffusion models for galaxy separation". *Cosmic Connections Symposium*, Flatiron Institute, NY, 2023.

TEACHING EXPERIENCE

- Princeton TA (1 course)
- QUT TA (6 courses over 5 semesters)

PROFESSIONAL SERVICE

Referee contributions

- NeurIPS 2023, 2024, 2025
- ICML 2023, 2025, 2026 (Gold reviewer)
- ICLR 2026
- The Astrophysical Journal
- MNRAS

OUTREACH AND COMMUNITY SERVICE

Mercer County Community College Machine Learning club

- I am passionate about the importance of education, especially those from disadvantaged backgrounds

- I lead yearly workshops teaching local community college students programming and machine learning skills
- Students from this have gone on to participate in both internship opportunities and transfer offers at 4-year institutions such as Princeton University and others

PUBLICATIONS

(**8 first-author, 14 total** Scholar) (†led by my student, * *joint first author*)

Note: **prior to 2026 published under Matt L. Sampson (as on google scholar)**

Machine learning

[1] **Wiemann*, M. L.**, Smith*, L. M., Cuesta-Lazaro, C., Izmailov, P., Melchior, P., Mishra-Sharma, S., Wilson, AG., (2026), DiscoverPhysics: Benchmarking LLMs for out-of-the-box scientific thinking
Code: DiscoverPhysics, Website/Leaderboard
In review at *NeurIPS*

[2] **Wiemann, M. L.**, Melchior, P., Saydjari, A., (2026), Interleaved Noise Curricula for Improved Clean, Corrupt and OOD Performance
In submission (*TMLR*)

[3] **Wiemann, M. L.**, Melchior, P., (2026), Optimization as a Dynamical System: Generative Schedules from Latent ODEs
In review at *Transactions on Machine Learning Research*

[4] Yan, A.†, **Sampson, M. L.**, Melchior, P., (2025), A novel approach to classification of ECG arrhythmia types with latent ODEs
NeurIPS Time Series for Health Workshop

[5] **Sampson, M. L.**, Melchior, P., (2025), Path-minimised latent ODEs as inference models
Machine Learning: Science and Technology, 6, 025047

[6] **Sampson, M. L.**, Melchior, P. (2023), Spotting Hallucinations in Inverse Problems with Data-Driven Priors
ICML ML4 Astro Spotlight talk

Computational Physics & Domain Applications

[1] **Sampson, M. L.**, et al., (2026), Two-moment cosmic ray fluid - plasma coupling in isothermal, supersonic, magnetized turbulence relevant to the interstellar medium
The Astrophysical Journal

[2] Melchior P., Ward, C., Remy B., **Sampson, M. L.,** Siegel, J,. (2026), Scarlet2 Astronomical scene modelling in JAX.
Journal of open source software

[3] **Sampson, M. L.**, Melchior, P., Ward, C., & Birmingham, S. (2024), Score-matching neural networks for improved multi-band source separation
Astronomy and Computing, 49, 100875

[4] Ward, C., Melchior, P., **Sampson, M.L.**, et al., (2025), Disentangling transients and their host galaxies with scarlet2: A framework to forward model multi-epoch imaging.
Astronomy and Computing, 100930

[5] **Sampson, M. L.**, Beattie, J. R., Krumholz, M. R., et al. (2023), The turbulent diffusion of streaming cosmic rays through compressible, partially ionised plasma.
Monthly Notices of the Royal Astronomical Society 519 (1), 1503-1525

[6] Krumholz, M. R., Crocker, R. M., **Sampson, M. L.,** (2022), Cosmic Ray Interstellar Propagation Tool using Itô Calculus (CRIPTIC): software for simultaneous calculation of cosmic ray transport and observational signatures.
Monthly Notices of the Royal Astronomical Society 517 (1), 1355-1380

[7] Beattie, J. R., Krumholz, M. R., Federrath, C., **Sampson, M. L.,** Crocker, R. M. (2022), Ion Alfvén velocity fluctuations and implications for the diffusion of streaming cosmic rays
Frontiers in Astronomy and Space Sciences

[8] Stevenson, S., **Sampson, M. L.**, Powell, J., et al. (2019), The impact of pair-instability mass loss on the binary black hole mass distribution.
The Astrophysical Journal, 882(2), 121.