Yunlin Zeng, PhD

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Highlights

- Ph.D. level data scientist with 6+ years of research and professional experience in Computational Imaging and Physics.
- Expertise in Generative Artificial Intelligence (AI) and Bayesian Inference.

Education

Georgia Institute of Technology, Ph.D. in Physics — Expected Aug 2025

University of California, Santa Barbara, B.S. in Physics — June 2019

GPA: 3.90/4.00.
Graduation with the highest honors; Highest academic honors for upper division physics courses; Dean's Honors x 6

Professional and Research Experience

Amortized Variational Inference for Seismic Imaging — Sep 2023 – Now
First Author, School of Computational Science and Engineering, Georgia Tech — Atlanta, GA
Published in *International Meeting for Applied Geoscience and Energy*. Conference paper link.

- Used generative AI to reconstruct subsurface images based on observed seismic shot data.
- Developed an amortized variational inference framework using normalizing flows to solve the seismic inverse problem.
- Implemented uncertainty quantification methods to improve stability and accuracy of high-dimensional seismic imaging.
- Applied stochastic resampling and data augmentation techniques to enhance model generalization and performance in predictive analytics, improving the quality of posterior samples by up to 21%.

Orbital Inference and Dynamics — Jan 2020 – Dec 2021
First Author, School of Physics, Georgia Tech — Atlanta, GA
Published in *The Astronomical Journal* (impact factor $= 5.1$). paper link. GitHub.

- Computed how a planet-hosting binary system evolved through the last 9 billion years.
- Applied Bayesian inference and parallel-tempering Markov Chain Monte Carlo (MCMC) algorithms to constrain parameters.
- Reconstructed historical orbital dynamics, and provided insights into planet formation dynamics under extreme conditions.
- Pioneered a benchmark for planet formation theory in truncated stellar disks.

Software Developer in Bayesian Analysis — June 2019 – Dec 2019
Undergraduate Researcher, Physics Department, UC Santa Barbara — Santa Barbara, CA
Published in *The Astronomical Journal* (impact factor $= 5.1$), $90+$ citations. paper link. GitHub.

- Developed "orvara", an open-source Python software for Bayesian analysis of Keplerian orbits.
- Applied MCMC methodologies to robustly sample posterior distributions of stellar and planetary orbits.
- Authored several utility functions and extended the software's capabilities to infer and visualize the results.
- Boosted computational efficiency by 5-10x over traditional methods with low-level memory management to avoid Python overhead.

Software Developer in Computational Chemistry — June 2021 – June 2023
First Author, School of Physics, Georgia Tech — Atlanta, GA
Published in *The Journal of Chemical Physics* (impact factor $= 4.4$). paper link.

- Led the implementation of a graphical user interface of a molecular dynamics simulation package.
- Enabled and streamlined the parameterization of small molecules based on quantum mechanical calculations.
- Enhanced the toolkit's functionality, including new command integrations and expanded input/output options, supporting a wider range of computational tasks and data analysis workflows for all biology/chemistry researchers.

Skills

Languages: Python, SQL, Julia, Cython, TCL, Fortran, Mathematica, MATLAB

Technologies: Scientific Machine Learning, Deep learning (PyTorch, TensorFlow), Signal Processing, ML Deployment