

Jordan M. R. Fox, PhD

Computational Neuroscientist & Research Software Engineer

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Computational Science PhD with 12 years of experience building software tools, simulation pipelines, and machine-learning workflows for computational neuroscience and quantum physics.



SELECTED PUBLIC SOFTWARE PROJECTS

MASCAF

Python, C++

- Pipeline for generating simulation-ready cable models from complex neuronal surface meshes
- Uses mean-curvature flow to achieve topological robustness, extending simulation capabilities to unusual morphologies

spinbox

Python

- Framework for computing imaginary-time Green's functions for quantum many-body simulation
- Uses Restricted Boltzmann Machines to extend capabilities of force models in nuclear Monte Carlo calculations
- Built for reproducible scientific computing workflows connected to large-scale HPC simulations

Computational neuroscience utilities

Python

- [jscip](#) – robust management of simulation parameters, general purpose
- [swctools](#) – neuronal cable model manipulation library
- [neurosignature](#) – analysis of multi-input multi-output dynamical neural systems

EXPERIENCE

Postdoctoral Fellow in neuroscience

Albert Einstein College of Medicine

Sept. 2024 – Present

Computational Models of Sound Localization in the Barn Owl

NY, USA

- Develop Python and C++ software pipelines for high-resolution, morphology-accurate multi-compartmental simulations of auditory neurons using the Arbor simulation framework
- Collaborate with experimental and computational neuroscience researchers to translate modeling needs into reusable software workflows
- Apply statistical modeling and machine learning to neuron models, simulation outputs, and experimental data

Postdoctoral Research Associate in theoretical physics

Argonne National Laboratory

Sept. 2022 – Sept. 2024

Machine Learning Solutions for Nuclear Quantum Monte Carlo

IL, USA

- Integrated machine-learning algorithms into large-scale quantum Monte Carlo research code running on supercomputers
- Worked with domain scientists to convert exploratory numerical methods into maintainable research software

Doctoral research

San Diego State University

Aug. 2016 – Sept. 2022

Data-Driven Methods for Low-Energy Nuclear Physics

CA, USA

- Statistical uncertainty quantification of large-scale nuclear shell model calculations
- Supported in part by the DOE Office of Science Graduate Fellowship with Lawrence Livermore National Lab

Graduate summer internship #3

Lawrence Livermore National Laboratory

Summer 2020

Illuminating Trends in Reaction Evaluations with Deep Generative Machine Learning

CA, USA

- Developed a generative adversarial network for learning complex correlations in nuclear data libraries
- Large scale training of neural networks on world-class heterogeneous HPC

Graduate summer internship #2

Lawrence Livermore National Laboratory

Summer 2019

Exploring Correlations in Nuclear DFT with Deep Generative Machine Learning

CA, USA

- Developed a variational autoencoder for learning distributions of nuclear density functional theory observables

Graduate summer internship #1

Los Alamos National Laboratory

Summer 2018

Quantum Monte Carlo with OpenMP 4.0+ for Performance Portability

NM, USA

- Implemented OpenMP parallelization in a state-of-the-art nuclear Quantum Monte Carlo code

Undergraduate research #2

Seattle University

2014 – 2016

Analysis of $\bar{s}s$ Asymmetry in the Proton Sea with a Combination of Quark Models

WA, USA

- Analyzed strange quark/antiquark asymmetry in the proton sea using a hybrid Meson Cloud and statistical model

Undergraduate R.E.U. program

Texas A&M University

Summer 2017

Momentum Spectra of Bottomonium in Heavy Ion Collisions

TX, USA

- Computed and compared transverse momentum spectra for bottomonium ($b\bar{b}$ mesons) in heavy-ion collisions via two models

Undergraduate research #1

Seattle University

2014 – 2016

*Neural Networks for Auditory Localization in the Barn Owl *Tyto Alba**

WA, USA

- Used multi-compartmental simulation codes to explore auditory localization in the Barn Owl with real neuron geometry

SKILLS

Scientific programming : Python, NumPy/SciPy, TensorFlow, C++, Mathematica, MATLAB, FORTRAN

Research software : Git/GitHub, documentation, packaging, testing, issue tracking, code review, reproducible workflows

Machine learning & data : statistical modeling, simulation pipelines, scientific data visualization, numerical methods

High-performance computing : OpenMP, MPI, CUDA, OpenAcc, Slurm

EDUCATION

San Diego State University & Claremont Graduate University

Doctor of Philosophy in Computational Science

Aug. 2016 – Sept. 2022

San Diego, CA, USA

Seattle University

Bachelor of Science in Physics & Mathematics

Aug. 2013 – Mar. 2016

Seattle, WA, USA

PAPERS

MASCAF: A Cable Model Fitting Pipeline for Topologically Complex Surface Meshes ([biorxiv:2026.05.10.721501](https://doi.org/10.1101/2026.05.10.721501))

Preprint, journal submission in preparation

- Jordan M. R. Fox, Brian Fischer, Will DeBello, Jose Peña

Restricted Boltzmann Machines Propagators for Auxiliary Field Diffusion Monte Carlo ([arxiv:2407.14632](https://arxiv.org/abs/2407.14632))

Preprint

- Jordan M. R. Fox, Alessandro Lovato, Alessandro Roggero, Ermal Rrapaj

Illuminating Systematic Trends in Reaction Cross Section Evaluations using Generative Deep Learning ([arxiv:2403.16389](https://arxiv.org/abs/2403.16389))

Preprint

- Jordan M. R. Fox, Kyle A. Wendt

Uncertainty quantification of transition operators in the nuclear shell model ([Phys. Rev. C 108, 054310](https://arxiv.org/abs/2005.05431))

Published 2023

- Jordan M. R. Fox, Calvin W. Johnson, and Rodrigo Navarro Perez

Uncertainty quantification of an empirical shell-model interaction using principle component analysis ([Phys. Rev. C 101, 054308](https://arxiv.org/abs/2005.05430))

Published 2020

- Jordan M. R. Fox, Calvin W. Johnson, and Rodrigo Navarro Perez

WORKSHOPS

Pynapple + Nemos workshop

Feb. 2025

Center for Computational Neuroscience, Flatiron Institute

New York, NY

Research Software Engineers (RSE) conference

2025

Research software practice and community

Philadelphia, PA

ISNET 8: Information and Statistics in Nuclear Experiment and Theory

2021

Facility for Rare Isotope Beams (FRIB)

Michigan State University

TALENT school: Machine Learning applied to Nuclear Physics

2021

European Center for Theoretical Studies in Nuclear Physics

Trento, Italy

TALENT school: Bayesian Methods and Machine Learning

University of York

2019

York, UK

TALENT school: Fundamental Symmetries and Neutrinos

Institute for Nuclear Theory, University of Washington

2018

Seattle, USA

SELECTED TALKS & POSTERS

Poster

2025

High-resolution Computational Simulation of Auditory Neurons in the Barn Owl

Society for Neuroscience (SfN) & Advances and Perspectives in Auditory Neuroscience (APAN)

Poster

2025

Hoo's There, a Ghost? Coding of Phantom Sounds in Barn Owls

Association for Research in Otolaryngology (ARO)

Invited talk

2021

Uncertainty Quantification and Deep Learning for Nuclear Theory and Data

Facility for Rare Isotope Beams (FRIB), MSU

Invited talk

2021

Learning Trends in Reaction Cross Data with Generative Machine Learning

Brown University, RI

Conference talk

2021

Learning Trends in Reaction Cross Data with Generative Machine Learning

American Physical Society

Talk & student poster session

2020

Uncertainty Quantification of an Empirical Shell-Model Interaction Using Principle Component Analysis

TRIUMF

HONORS & AWARDS

- **2021** Graduate Fellowship (SCGSR), US Department of Energy, Office of Science
- **2021** Los Alamos National Laboratory prize at SDSU ACSESS event, LANL
- **2016** Graduate S-STEM Fellowship, SDSU Computational Science Research Center
- **2016** President's list, Seattle University
- **2016** National Physics Honor Society (SPS), Seattle University
- **2015** Honorable Mention in the COMAP Mathematical Contest in Modeling, Seattle University