

Erik J. Peterson, PhD

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IN SUMMARY

Excellent scientist. Thoughtful engineer.

EXPERIENCE

Pasteur Labs - New York, NY

Advanced Projects Lead

2023 - Present

Team lead for advanced projects in scientific machine learning. Focus on multi-physics surrogates and casual discovery methods for industrial deployments.

Senior Scientist

2022 - 2023

Co-lead scientific machine learning research program focused on closing the performance gap between academic results and industrial requirements. Lead development of custom scientific machine learning library and training pipeline (neural operators, graph neural networks, etc; >30 models). Lead development of a major causal analysis software package for the analysis of time-series in physical systems. Established novel “simulation intelligence” methods that use physics to do analog computations (research).

Carnegie Mellon University - Pittsburgh, PA

Research Fellow (Scientist)

2018 - 2022

Developed mathematical accounts of curiosity in reinforcement learning and multi-agent systems which reframed and answered a key open question in decision science. Established a new theoretical upper limit for biological computation (research).

Kernel, LLC - Los Angeles, CA

Senior Scientist

2017 - 2018

Developed a model for complex spatio-temporal electrical field shaping for use in brain computer interfaces and deep brain stimulation. This project blended biophysical models with deep neural networks and led to a 400,000 fold speed-up – a key requirement for real-time (production) use.

U.C. San Diego - San Diego, CA

Postdoctoral Fellow

2014 - 2017

Conducted theoretical and computational research on the optimal coding properties of neural oscillations (research). Co-lead development of a python tool to analyze electrophysiological time-series which has found widespread use in the neuroscience community and been downloaded >275,000 times.

Colorado State University - Fort Collins, CO

Graduate Research Assistant

2006 - 2012

Reinforcement learning, category learning, and fMRI data analysis (research).

Biosearch Technologies - Novato, CA

Research Assistant II

2004 - 2006

Optimization of high-throughput chemistry (production); reporter gene development (research).

EDUCATION

Colorado State University (Fort Collins, CO) – Ph.D, Psychology; Masters, Psychology.

California Polytechnic State University (San Luis Obispo, CA) – B.S., Chemistry; B.S. Biochemistry; Minor, Philosophy.

PROGRAMMING

Developed production-ready machine learning models in modern frameworks (jax, torch). Expert scientific programmer (python). Fluent in standard tools (git, docker, etc).

PRESS & PUBLIC TALKS

Brain’s ‘Background Noise’ May Hold Clues to Persistent Mysteries, *Quanta Magazine*, 2021.

Build Your Own Brainwaves, *Nerd Nite*, Los Angeles, Feb 2018.

In Theory You're Paying Attention, *Ignite*, San Diego, Nov 2016.

SELECT
PUBLICATIONS.

TOTAL CITATIONS: >2,200. H-INDEX: 14

Peterson EJ & Lavin A, Physical Computing for Materials Acceleration Platforms, *Matter* 5, 3586-3596 (2022).

Lavin A, Zenil H, Paige B, Krakauz D, Gottschlich J, Mattson T, Anandkumar A, Choudry S, Rocki K, Baydin A.G, Prunkl C, Paige B, Isayev O, **Peterson EJ**, McMahon PL, Macke J, Cranmer K, Zhang J, Wainwright H, Hanuka A, Veloso M, Assefa S, Zheng S, Pfeffer A, Simulation Intelligence: Towards a New Generation of Scientific Methods, *arXiv* 2112.03235 (2021).

Peterson EJ, What Can Astrocytes Compute?, *bioRxiv* 465192 (2021).

Donoghue T*, Haller M*, **Peterson EJ***, et al, Parameterizing Neural Power Spectra into Periodic and Aperiodic Components, *Nature Neuroscience* 23 1655-1665 (2020). [*]: Co-first.

Peterson EJ & Verstynen T, Curiosity Eliminates the Exploration-Exploitation Dilemma, *bioRxiv* 671362v8 (2020).

Peterson EJ & Voytek B, Homeostatic Mechanisms May Shape the Type and Duration of Oscillatory Modulation, *J Neurophys* 124[1] (2020).

Gao RD, **Peterson EJ**, Voytek B, Inferring Synaptic Excitation/Inhibition Balance from Field Potentials, *Neuroimage* 158 (2017).