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 Pasteur's scientific machine learning library and training pipeline (neural operators, graph neural networks, etc; >30 models). Lead development of Pasteur's causal analysis software for physical systems and time-series. Established "simulation intelligence" methods that use physics to do analog computations.

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.

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 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.

Biosearch Technologies - Novato, CA
Research Assistant II **2004 - 2006**
Optimization of high-throughput chemistry; reporter gene development.

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

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

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, Krakauez 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).