Erik J. Peterson, PhD

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About me

Excellent scientist. Thoughtful software engineer.

Recent Experience

Pastuer Labs - New York, NY
Staff Scientist – Advanced Projects Lead **2023 - Present**
Technical lead overseeing internal and external development of advanced multi-scale and multi-physics models of complex physical systems. Technical lead developing causal discovery methods for Industrial Cyber-Physical Systems (ICPS; Ongoing).

Senior Research Scientist **2022 - 2023**
Lead developer scientific machine learning models (production and research). Technical co-lead scientific machine learning research (Neural Operators, Graph Neural Networks, etc). Technical lead in developing causal analysis methods for ICPS. Theoretical research on causation in complex physical systems."Simulation intelligence" methods for physical computation.

Carnegie Mellon University - Pittsburgh, PA
Research Scientist **2018 - 2022**
Developed a mathematical accounts of play and curiosity for use in Deep Reinforcement Learning (Github) and Multi-Agent systems (Github). Developed new theoretical limits for astrocyte computation.

Kernel, LLC - Los Angeles, CA
Senior Research Scientist **2017 - 2018**
Technical lead building a system for complex spatio-temporal field shaping in deep brain stimulation. This project blended biophysical modeling with artificial neural networks and led to 400,000 fold speed-up – a key requirement for *real-time* use.

U.C. San Diego - San Diego, CA
Postdoctoral Fellow **2014 - 2017**
Theoretical and computational research on the coding properties of neural oscillations. Co-lead development of a python tool (SpecParam) to analyze electrophysiological data which has found *widespread* use in the neuroscience community.

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

I am an experienced scientific programmer (python). I have developed production-ready machine learning models in modern frameworks (jax, torch). 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.
Conflicted Data Science, *Open San Diego*, San Diego, Feb, 2016.
In Theory You're Paying Attention, *Ignite*, San Diego, Nov 2016.

Select publications

Peterson EJ & Lavin A, Physical computing for materials acceleration platforms, Matter 5, 3586-3596 (2022).

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, What can astrocytes compute?, *bioRxiv* 465192 (2021).