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 multi-scale and multi-physics models of complex physical systems. Technical lead developing causal discovery methods for Industrial Cyber-Physical Systems (ICPS; Ongoing). Theoretical research on causation in complex physical systems.

Senior Research Scientist **2022 - 2023**
Lead developer scientific machine learning models (production and research). Technical co-lead scientific machine learning research. Technical lead in developing causal analysis methods for ICPS. "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).