Erik J. Peterson, PhD

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In summary

Excellent scientist. Thoughtful engineer.

Experience

Pastuer Labs - New York, NY
Staff Scientist – Advanced Projects Lead **2023 - Present**
Project lead overseeing internal and external development of all data-driven multi-physics models for advanced applications in Industrial Cyber-Physical Systems (ICPS). Project lead causal discovery methods for ICPS applications (production and research).

Senior Research Scientist **2022 - 2023**
Co-lead scientific machine learning research (Neural Operators, Graph Neural Networks, etc). Lead developer scientific machine learning models (production and research). Lead developer causal analysis methods for physical systems. Established "simulation intelligence" methods that exploit physics to do distributed analog computations.

Carnegie Mellon University - Pittsburgh, PA
Research fellow (Scientist) **2018 - 2022**
Developed mathematical accounts of play and curiosity for use in deep reinforcement learning (Github) and multi-agent systems (Github). This work answered a fundamental question in decision science (the explore-exploit dilemma). Established new theoretical upper limit for biological computation.

Kernel, LLC - Los Angeles, CA
Senior Research Scientist **2017 - 2018**
Developed a system for complex spatio-temporal field shaping in deep brain stimulation. This project blended *biophysical models* with artificial neural networks that 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**
Theoretical and computational research on the coding properties of neural oscillations. Co-lead development of a python tool to analyze electrophysiological data which has found *widespread* use in the neuroscience community (SpecParam).

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

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).