

## Erik J. Peterson, PhD

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### ABOUT ME

I'm a scientist and engineer with expertise in artificial intelligence, reinforcement learning, neuroscience, and natural computation. In industry and academia I have designed and led high-risk, high-reward research at the intersection of biology, engineering, and computing.

### RECENT EXPERIENCE

**Pastuer Labs** - New York, NY

*Senior Research Scientist*

**2022 - Present**

I am building artificial intelligence models of multiscale physical systems for use in production. Theoretical research on causation in complex physical systems. "Simulation intelligence" methods for physical computation.

**Carnegie Mellon University** - Pittsburgh, PA

*Research Scientist*

**2018 - 2022**

I developed a mathematical accounts of play and curiosity for use in deep reinforcement learning ([Github](#)) and multi-agent systems ([Github](#)). I established new fundamental limits for astrocyte computation.

**Kernel, LLC** - Los Angeles, CA

*Research Scientist*

**2017 - 2018**

I was the technical lead building a system for complex spatio-temporal field shaping in deep brain stimulation. This project blended biophysical modeling with deep 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**

I conducted theoretical research on the coding properties of neural oscillations. I also co-lead development of a python tool to analyze electrophysiological data which has found widespread use in the neuroscience community.

### EDUCATION

**Colorado State University**, Fort Collins, CO

Ph.D, Psychology

**California Polytechnic State University**, San Luis Obispo, CA

B.S., Chemistry and Biochemistry; Minor, Philosophy

### PROGRAMMING

**Python**

Core ML - Linear models to deep neural networks - *{pytorch, jax, sklearn}*

**Expert**

**R**

Core DS - Visualization, analysis, and statistical testing - *{tidyverse}*

**Expert**

### 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

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).

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