

IRIS STONE

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www.iris-stone.com

www.github.com/irisstone

RESEARCH INTERESTS

Statistical neuroscience, machine learning, dynamical systems and control theory, latent variable models, Bayesian inference, behavioral quantification, systems neuroscience, neural circuit dynamics

EDUCATION

Princeton University

Aug 2018 - Present

PhD in Neuroscience: Credential in Quantitative and Computational Neuroscience

Graduate Certificate in Statistics and Machine Learning

George Mason University Honors College

Aug 2013 - Dec 2017

BS in Physics, Summa cum Laude

GPA: 3.97 out of 4.0

RESEARCH EXPERIENCE

Princeton University

Aug 2018 - Present

Advisors: Jonathan Pillow and Ilana Witten

Graduate Research Assistant

Developed and applied latent variable models in order to identify the behavioral patterns and associated neural circuitry underlying complex cognitive processes in mice, including decision-making and exploration, and developed mathematical tools for improving the efficiency of associated inference techniques. Gained experience in statistical neuroscience, generative modeling, latent variable modeling, optimization techniques, unsupervised learning, time-series data analysis, and behavior quantification.

Herophilus

Jun 2022 - Sep 2022

Advisors: Pavan Ramkumar, Sean Escola, and Scott Linderman

Computational Neuroscientist Intern

Adapted and applied statistical modeling techniques from physics and neuroscience to neural imaging data collected from human iPSC-derived organoids to identify “computational phenotypes” for use in developing pharmaceutical treatments for complex neurological diseases. Gained experience in statistical neuroscience, dynamical systems, SQL database management, neural data analysis, and neurological drug discovery techniques.

University of California Los Angeles

Jun 2017 - Aug 2017

Advisor: Mayank Mehta

Summer Research Intern

Analyzed the relationship between hippocampal gamma oscillations and running speed from electroencephalography (EEG) data of rats in both real world and virtual reality environments. Gained experience in local field potential (LFP) analysis, artifact reduction, signal processing, and power spectral analysis.

George Mason University

Nov 2014 - Apr 2018

Advisor: Patrick Vora

Undergraduate Research Assistant

Characterized the optoelectronic properties of low-dimensional materials for applications in biomedical devices, neurotransmitter sensors, and next-generation electronics. Gained experience in Raman spectroscopy, cryogenics, microscope design and construction, lasers, optical physics, and atomic force microscopy.

PUBLICATIONS

Stone IR*, Sagiv Y*, Park IM, Pillow JW. *Spectral learning of Bernoulli linear dynamical system models for decision-making.* [Submitted]

Melis S, Hung S, Bagade C, Chung Y, Hughes E, Zhang X, Barbara P, Han P, Li T, McCusker D, Hartsmith R, Bertke J, Dev P, **Stone IR**, Joshi J, Vora PM, Van Keuren E. Charge Transport through Superexchange in Phenothiazine-7, 7, 8, 8-Tetracyanoquinodimethane (PTZ-TCNQ) Cocrystal Microribbon FETs Grown Using Evaporative Alignment. (2022). *ACS Applied Electronic Materials*.

Bolkan SS*, **Stone IR***, Pinto L, Ashwood ZC, Iravedra Garcia JM, Herman AL, Bandi A, Cox J, Zimmerman C, Cho JR, Singh P, Engelhard B, Pillow JW, Witten IB (2022). Opponent control of behavior by dorsomedial striatal pathways depends on task demands and internal state. *Nature Neuroscience*. 25:345-357.

Ashwood ZC, Roy NA, **Stone IR**, The International Brain Laboratory, Churchland AK, Pouget A, Pillow JW (2022). Mice alternate between discrete strategies during perceptual decision-making. *Nature Neuroscience*. 25:201-212.

Oliver S, Beams R, Kryluk S, Kalish I, Singh A, Bruma A, Tavazza F, Joshi J, **Stone IR**, Stranick S, Davydov A, Vora PM (2017). The structural phases and vibrational properties of Mo_{1-x}W_xTe₂ alloys. *2D Materials*. 4(4):045088.

Joshi J, **Stone IR**, Beams R, Krylyuk S, Kalish I, Davydov A, Vora PM (2016). Phonon anharmonicity in bulk Td-MoTe₂. *Applied Physics Letters*. 109(3):031903.

**Indicates authors contributed equally to the work*

INVITED TALKS AND CONFERENCE PRESENTATIONS

Latent Variable Models for Identifying and Interpreting Natural Behaviors

- COSYNE Workshop: What I cannot create I do not understand: analyzing neural and behavioral data with generative models (scheduled talk) 2023

Spectral Learning of Bernoulli Linear Dynamical Systems for Decision-Making

- COSYNE Conference (scheduled poster) 2023

GLM-HMMs for Discovering Internal States in Decision-Making in Dorsomedial Striatal Pathways

- Linderman Lab Meeting (talk) 2022
- Joint Carnegie Mellon University & University of Pittsburgh Journal Club (talk) 2022
- BRAINCoGS U19 Grant Site Visit (talk) 2021
- BRAINCoGS U19 Grant Site Visit (talk) 2020
- Brody Lab Meeting (talk) 2020
- COSYNE Conference (poster) 2020

Modulation of Gamma Rhythms on Running Speed in Real World and Virtual Environments

- UCLA Summer REU Symposium (talk) 2017

Optoelectronic Characterization of Charge Transfer Crystals for Applications in Biomedicine

- OSCAR Summer Celebration of Student Scholarship (poster) 2016
- American Physical Society March Meeting (talk) 2016
- Department of Physics and Astronomy Undergraduate Research Colloquium (talk) 2015
- OSCAR Summer Celebration of Student Scholarship (poster) 2015

AWARDS AND HONORS

National Institute of Health F31 National Research Service Award (NRSA) Fellowship	2022
COSYNE Travel Grant	2020
G. Wallace Ruckert '30 Fellowship Fund Recipient	2018
Physics Department Outstanding Graduating Senior Award	2018
National Science Foundation Graduate Research Fellowship Program (GRFP) Honorable Mention	2018
Physics Department Outstanding Rising Senior Award	2017
Induction into Sigma Xi: The Scientific Research Honors Society	2017
Goldwater Scholarship	2017
Induction into The Honors Society of Phi Kappa Phi	2017

Physics Department Outstanding Undergraduate Research Award	2016
OSCAR Student Excellence Award for Research	2016
OSCAR Undergraduate Research Scholars Program Intensive Research Grant	2016
Honors College Schwartzstein Summer Research Award	2016
American Physical Society Ken Haas Outstanding Student Paper Runner-Up	2016
OSCAR Undergraduate Research Scholars Program Traditional Research Grant	2015

TEACHING EXPERIENCE

Princeton Neuroscience Institute

Co-organizer and Biophysics Lecturer: First Year Neuro Bootcamp	May 2021 - Aug 2021
Assistant in Instruction: NEU 437/537 Computational Neuroscience	Feb 2020 - May 2020
Assistant in Instruction: NEU 201 Foundations of Neuroscience	Sep 2019 - Jan 2020

George Mason University

Learning Assistant: MATH 105 Pre-calculus	Aug 2015 - Dec 2015
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LEADERSHIP AND OUTREACH

Computational Neuroscience Journal Club, <i>Co-organizer</i>	Jan 2021 - Present
BrainWAVES (Women Advocating for Visibility and Equity in Science), <i>Co-organizer</i>	Aug 2020 - Present
Inclusive Teaching Committee, <i>Committee Member</i>	Sep 2020 - May 2021
Princeton Citizen Scientists, <i>Member</i>	Aug 2018 - Oct 2021
Graduate Student Government, <i>Neuroscience representative</i>	May 2019 - Nov 2021
Letters to a Pre-scientist, <i>Penpal</i>	Aug 2019 - May 2020
AAAS Science in the Classroom, <i>Contributor</i>	Jun 2018 - Sep 2018
Office of Scholarship, Creative Activities, and Research, <i>Research Fellow</i>	Aug 2016 - May 2017

TRAINING AND WORKSHOPS

MIT Center for Brains, Minds, and Machines Summer Course <i>Marine Biology Laboratory (MBL) Woods Hole, MA</i>	Aug 2019
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PROFESSIONAL EXPERIENCE

Bloomrock Writing <i>Founder, CEO, Senior Writer and Editor</i>	Apr 2014 - Jun 2018
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Managed all marketing, administrative, and financial activities; directly completed projects while also overseeing a staff of up to 12 independent contractors; and worked with clients across four continents on projects that involved conducting research, writing custom data mining/web scraping pipelines, and producing and editing written content, bringing in up to six figures in profits year after year.

SOFTWARE PACKAGES

glmhmm	A latent variable model for discovering discrete states during decision-making
bestLDS	A spectral algorithm for estimating parameters of Bernoulli linear dynamical systems (in prep)

PROGRAMMING EXPERIENCE

python, <i>proficient</i>	scientific computing incl. experience w/ scikit-learn, autograd, JAX, PyTorch, pandas
MATLAB, <i>proficient</i>	experience w/ statistics & machine learning, curve fitting, signal processing toolboxes
LabVIEW, <i>proficient</i>	experience w/ instrumentation and automation, custom package development
Other programming knowledge: Git/Github, Vim, Jupyter, SQL, Amazon Web Services (AWS), HTML/CSS	