Asa Barth-Maron

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Education

Harvard University Boston, MA

Ph.D. in Neuroscience, Distinction in Computational Neuroscience February, 2022

- **F31 Ruth L. Kirschstein Predoctoral Individual National Research Service Award (NRSA)**
  National Institutes of Health. 2017 - 2020
- **Relevant Courses:** Linear Algebra & Differential Equations, Intro. to Probability Theory, Machine Learning, Statistical Machine Learning, Teaching Fellow for Intro. to Computational Neuroscience.

Lehigh University Bethlehem, PA

BS, Behavioral Neuroscience, *magna cum laude* 2013

- **Relevant Coursework:** Fundamentals of Programming.

Research Experience

Harvard Medical School, Department of Neurobiology Boston, MA
Graduate Researcher. Advisor: Dr. Rachel I. Wilson 2015 – 2022

- Research focuses on how network architecture supports distinct computations during sensory encoding.
- Discovered subpopulations of inhibitory neurons that enable different forms of normalization depending on input statistics.
- Combined circuit mapping (connectomics), *in vivo* physiology/optogenetics, and dynamical systems modeling.
- Hired, trained, mentored over 20 research assistants, and coordinated work for teams of 3-5.

Harvard Medical School, Department of Neurobiology Boston, MA
Graduate Researcher. Advisor: Dr. Till S. Hartmann Summer 2015

- Developed data-driven, biologically realistic, CNNs to model mid-size visual feature detection in primate cortex area V4.

Harvard Medical School, Department of Neurobiology Boston, MA
Research Assistant. Advisor: Dr. Michael E. Greenberg 2012 - 2014

- Investigated the role of a intracellular signaling molecule (Ephexin5) in hippocampal synapse development.

Lehigh University, Department of Biology Bethlehem, PA
Undergraduate Research Assistant. Advisor: Dr. Jennifer Swann 2010 – 2012

- Investigated the role of an intercellular signaling molecule in a mammalian mating behavior circuit.

Technical Skills & Experience

Programming Languages: Python (e.g., PyTorch, Scikit-learn, SciPy, Pandas), MATLAB, and R.

- GitHub: https://github.com/AsaBarthMaron

Distributed high-performance computing 2014 - Present

- Ran large-scale models and analyses on LSF and SLURM managed clusters at Harvard.

EEG Motor Imagery, personal project

- Implemented Filter Bank Common Spatial Pattern (FBCSP) algorithm to classify imagined movements. Current work is in progress to compare these results to transformers and CNNs.

Teaching Fellow, Intro. to Computational Neuroscience Fall 2021

- Topics included deep learning, reinforcement learning, recurrent neural networks, neural encoding and decoding, generalized linear models, and dynamical systems analysis.

Teaching Fellow, Boot Camp in Quantitative Methods Summer 2015 & 2019

- Taught programming fundamentals and data analysis methods in MATLAB.

Large-Scale Connectomics Project Management 2015 - 2018

- Managed DVID backend server and NeuTu clients for large-scale reconstruction effort.

Publications & Presentations

Papers

- **Barth-Maron A.,** Horne J.A., Katz W.T., Plaza S.M., Scheffer L.K., D'Alessandro I., Meinertzhagen I.A., Lee W.A., Wilson R.I. *Interneuron diversity in the Drosophila antennal lobe promotes computational flexibility and adapative coding properties.* In preparation.
- Schlegel, P., Bates, A.S., Stürner, T., Jagannathan, S.R., Drummond, N., Hsu, J., Serratosa Capdevila, L., Javier, A., Marin, E.C., **Barth-Maron, A.,** et al. (2021). *Information flow, cell types and stereotypy in a full olfactory connectome.* **eLife** 10, e66018.
- Guo W., Clause A.R., **Barth-Maron A.,** Polley D.B. (2018) *A Corticothalamic Circuit for Dynamic Switching between Feature Detection and Discrimination.* **Neuron** , Volume 95, Issue 1, 180-194.e5
- Veeramah K.R., Johnstone L, Karafet T.M., Wolfe D., Sprissler R., Salogiannis J., **Barth-Maron A.,** Greenberg M.E., Pazzi M., Restifo L.L., Talwar D., Erickson R.P., Hammer M.F. (2013) *Exome sequencing reveals new causal mutations in children with epileptic encephalopathies.* **Epilepsia** 54(7): 1270-1281.

Conferences & Seminars

- **Barth-Maron A.,** Horne J.A., Katz W.T., Plaza S.M., Scheffer L.K., D'Alessandro I., Meinertzhagen I.A., Lee W.A., Wilson R.I. (2019) *What is the role of interneuron diversity in the Drosophila antennal lobe?* Neurobiology of Drosophila, Cold Spring Harbor. (poster)
- **Barth-Maron A.,** Horne J.A., Katz W.T., Plaza S.M., Scheffer L.K., D'Alessandro I., Meinertzhagen I.A., Lee W.A., Wilson R.I. (2018) *What is the role of interneuron diversity in the Drosophila antennal lobe?* Harvard Medical School, Department of Neurobiology Friday Seminar Series. (talk)
- Guo W., Clause A.R., **Barth-Maron A.,** Shinn-Cunningham B.G., Polley D.B. (2015) *Layer 6 corticothalamic neurons modulate the Gain and Selectivity of columnar sound processing.* Society for Neuroscience, Annual Meeting Abstract 596.13/J26. (poster)