William Mau, Ph.D.

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Current position

NIA Postdoctoral Fellow
Advisor: Denise Cai, Ph.D.
Icahn School of Medicine at Mount Sinai
Hess Building, 10th floor
1470 Madison Ave
New York, NY 10029

Education

2014-2019 *Boston University*
Boston, MA 02215
Ph.D. in Neuroscience
Cumulative GPA: 3.97

2010-2014 *Cornell University*
Ithaca, NY 14853
B.A. with distinction in all subjects
Psychology (*Magna cum laude*)
Biological Sciences (Neurobiology & Behavior)
Cumulative GPA: 3.79

Broad Scientific Interests

Spatiotemporal firing patterns as a principle for encoding information in the brain.
Neurobiological correlates of learning and memory over lon timescales.
Neurophysiological signatures of cognitive function in wild-type and disease models.
Data processing, analysis, and visualization of high dimensional data sets.
Development of open-source tools for data analysis.

Research Positions

2019-present *Denise Cai Laboratory*
NIA Postdoctoral Fellow
Flexible memory representations during behavior and sleep.

2014-2019 *Howard Eichenbaum Laboratory of Cognitive Neurobiology*
Graduate Student and Postdoctoral Fellow
Long timescale evolution of neural ensembles during learning.

2012-2014 *David M. Smith Laboratory of Learning & Memory*
Undergraduate Honors Researcher
Representation of cues and space in the retrosplenial cortex during continuous spatial alternation.

2013 *Pfizer, Inc.*
Comparative Medicine INROADS Intern
Impact of environmental enrichment nesting substrates on rodent behavior.

2011-2012 *Hanson Molecular Biology & Genetics Laboratory*
Research Technician
Preparation of media and sanitization of equipment.

2009-2011 *Mount Sinai Hospital*, Neurology department
Clinical Research Assistant
Focus Group on perception of HIV-induced neuropathic pain.

Publications & Talks

Publications

2021 Levy S.J., Kinsky N.R., **Mau W.**, Sullivan D.W., & Hasselmo M.E. (2021). Hippocampal spatial memory representations in mice are heterogeneously stable. *Hippocampus* 31(3):244-260. https://doi.org/10.1002/hipo.23272

2020 **Mau W.**, Hasselmo M.E., & Cai D.J. (2020). The brain in motion: how ensemble fluidity drives memory-updating and flexibility. *eLife* 9:e63550. https://doi.org/10.7554/eLife.63550

Chen L., Cummings K.A., **Mau W.**, Zaki Y., Dong Z., Clem R.L., Shuman T., & Cai D.J. (2020). The role of intrinsic excitability in the evolution of memory: significance in memory allocation, stabilization, and updating. *Neurobiol. Learn. Mem.* 73:107266. https://doi.org/10.1016/j.nlm.2020.107266.

Kinsky N.R., **Mau W.**, Sullivan D.W., Levy S.J., Ruesch E.A., & Hasselmo M.E. (2020). Trajectory-modulated hippocampal neurons persist throughout memory-guided navigation. *Nat. Commun.* 11, 2443. doi.org/10.1038/s41467-020-16226-4.

Alexander A.S., Robinson J.C., Dannenberg H., Kinsky N.R., Levy S.J., **Mau W.**, Chapman G.W., Sullivan D.W., & Hasselmo M.E. (2020). Neurophysiological coding of space and time in cortical circuits. *Brain Neurosci. Adv.* 4:2398212820972871. https://doi.org/10.1177/2398212820972871.

Zaki Y.*, **Mau W.***, Cincotta C.*, Doucette E., Grella S.L., Murawski N.J., Merfeld E., Shpokayte M., & Ramirez S. Hippocampal and amygdalar engrams are necessary for contextual fear reinstatement, *Curr. Biol.*, under revision. *equal contributions.

2019 Miller A.M.P., **Mau W.**, & Smith D.M. (2019). Retrosplenial cortical representations of space and future goal locations develop with learning. *Curr. Biol.* 29, 2083-2090.e4. https://doi.org/10.1016/j.cub.2019.05.034

2018 **Mau W.**, Sullivan D.W., Kinsky N.R., Hasselmo M.E., Howard M.W., & Eichenbaum H. (2018). The same hippocampal CA1 population simultaneously codes temporal information over multiple timescales. *Curr. Biol.* 28, 1499-1508. https://doi.org/10.1016/j.cub.2018.03.051

Kinsky N.R., Sullivan D.W., **Mau W.**, Hasselmo M., & Eichenbaum H. (2018). Hippocampal place field maintain a coherent and flexible map across long time scales. *Curr. Biol.* 28, 1-11. https://doi.org/10.1016/j.cub.2018.09.037

Conference Abstracts

2019 Zaki Y.*, **Mau W.***, Cincotta C.R., McKissick O.P., Shpokayte M., Hamidi A., Doucette E., Grella S.L., Murawski N.J., Merfeld E., & Ramirez S. (2019). Hippocampus and amygdala fear memory engrams re-emerge after contextual fear reinstatement. *Society for Neuroscience Abstracts*, #243.01/X9.

Dong Z., Feng Y., **Mau W.**, Chen L., Pennington Z.T., Zaki Y., Rajan K., Shuman T., Aharoni D., & Cai D.J. (2019). Minian: Open-source miniscope analysis pipeline with interactive visualization tools. *Society for Neuroscience Abstracts*, #612.15/CC61.

Liu Y., Levy S.J., **Mau W.**, & Howard M.W. (2019). Consistent sequences on the scale of tens of minutes in mice hippocampus. *Society for Neuroscience Abstracts*, #164.01/X22.

Liu Y., Levy S., **Mau W.**, & Howard M.W. (2019). Population code for time on the scale of tens of minutes in mouse hippocampus. *Context and Episodic Memory Conference*, University of Pennsylvania.

2018 Zaki Y.*, **Mau W.***, Hamidi A.B., Doucette E., Grella S.L., Murawski N.J., Merfeld E., Shpokayte M., & Ramirez S. (2018). Visualization and modulation of ensembles in the hippocampus and amygdala during fear reinstatement. *Society for Neuroscience Abstracts*, #424.09/III24.

Kinsky N.R., **Mau W.**, Sullivan D.W., Eichenbaum H., & Hasselmo M.E. Tracking the ontogeny of trajectory-dependent neuronal activity in the hippocampus. #508.30/EEE7.

2017 **Mau W.**, Sullivan D.W., Kinsky N.R., Tiganj Z., Wei J., Howard M.W., & Eichenbaum H. (2017). Temporal coding of hippocampal neurons across scales. *Society for Neuroscience Abstracts*, #253.05/SS60.

Zaki Y.*, **Mau W.***, Doucette E., Hamidi A., Grella S.L., Murawski N.J., Merfeld E., Shpokayte M., Eichenbaum H., & Ramirez S. (2017). Inhibiting ensembles in the hippocampus and amygdala to suppress reinstatement-induced fear. *Society for Neuroscience Abstracts*, #425.18/UU5.

Sheehan D.J., **Mau W.**, Mikkelsen C., Rueckemann J.W., & Eichenbaum H. (2017). Learning paradigm influences the organization of memory in the hippocampus *Society for Neuroscience Abstracts*, #253.02/SS57.

Kinsky N.R., Sullivan D.W., **Mau W.**, & Eichenbaum H. (2017). Large-scale hippocampal population representations: Coherent spatial maps that gradually evolve over time. *Society for Neuroscience Abstracts*, #253.04/SS59.

Sullivan D.W., Kinsky N.R., **Mau W.**, & Eichenbaum H. (2017). TENASPIS: A fast, accurate, and improved tool for detecting ROIs and calcium transients from in-vivo single photon fluorescence microscopy. *Society for Neuroscience Abstracts*, #253.08/SS63.

2016 **Mau W.**, Sullivan D.W., Kinsky N.R., Bidshahri P., & Eichenbaum H. (2016). Long-term stability of hippocampal ensemble sequences. *Society for Neuroscience Abstracts*, #177.19/III9.

2015 Kinsky N.R., Sullivan D.S., **Mau W.**, Polavarapu H., & Eichenbaum H. (2015). Stability and remapping of large cell asssemblies in the hippocampus. *Society for Neuroscience Abstracts*, #534.23/AA48.

Smith D.M., Miller A.M.P., Li H., **Mau W.**, Parauda S., & Yu K. (2015). Retrosplenial cortical neurons differentiate left and right trials on the stem of a T-maze during continuous but not delayed spatial alternation. *Society for Neuroscience Abstracts*, #445.01/CC16.

Miller A.M.P., **Mau W.**, Li H., Yu K., Parauda S., & Smith D.M. (2015). Retrosplenial cortical neural populations simulate future trajectories. *Society for Neuroscience Abstracts*, #727.04/BB54.

2014 Miller A.M.P., **Mau W.**, Parauda S., Yu K., & Smith D.M. (2014). Representations of cues and space in the retrosplenial cortex during continuous spatial alternation. *Society for Neuroscience Abstracts*, #465.11/UU32.

Invited Talks

2020 Miniscope imaging analysis with the Minian package.
Israel Society for Neuroscience Meeting, Eilat, Israel.

Imaging neural activity using miniature head-mounted microscopes.
Techniques and Approaches in Neuroscience course, Mount Sinai Icahn School of Medicine.

2019 Hippocampus and amygdala fear memory engrams re-emerge after contextual fear reinstatement.
Inscopix East Coast User Group Meeting, Boston University.

2018 Tracking temporally structured long-term population dynamics using in vivo calcium imaging.
Cai lab, Friedman Brain Institute, Mount Sinai Icahn School of Medicine.

Tracking temporally structured long-term population dynamics using in vivo calcium imaging.
Graduate Program for Neuroscience progress report, Boston University.

Tracking temporally structured long-term population dynamics using in vivo calcium imaging.
Hope lab, National Institute on Drug Abuse.

Tracking temporally structured long-term population dynamics using in vivo calcium imaging.
Josselyn lab, Hospital for Sick Children.

Temporal information spanning multiple scales is encoded in hippocampal ensembles.
Memory Messabout Meeting, Boston University.

2014 Representation of space and reward in the retrosplenial cortex.
Dept. of Psychology, Cornell University.

Other Posters

2017 **Mau W.**, Sullivan D.W., Kinsky N.R., Tiganj Z., Howard M.W., & Eichenbaum H. (2017). Hippocampal "time cell" sequences fluctuate across minutes to days: evidence for conjunctive coding of temporal context. Presented Winter 2017 at the Neurophotonics Symposium at Boston University, Boston, MA.

2016 **Mau W.**, Kinsky N.R., Bidshahri P., & Eichenbaum H. (2016). Stability of temporal responses in hippocampal neurons during treadmill runs. Presented Spring 2016 at the GPN Recruitment Poster Session at Boston University, Boston, MA.

2014 **Mau W.**, Miller A.M.P., & Smith D.M. (2014). The retrosplenial cortex discriminates space and reward locations during spatial alternation. Presented Spring 2014 at the Psychology Honors Research Symposium at Cornell University, Ithaca, NY.

Honors & Awards

2020 NIA F32 Individual National Research Service Award (NRSA)

2019 Henry I. Russek Day Student Achievement Award, 1st place

2018 F1000Prime featured article, Mau et al. 2018
NSF Neurophotonics Research Traineeship Travel Award
Henry I. Russek Day Student Achievement Award, 3rd place
Frontiers in Neurophotonics Summer School certification

2014 *Magna cum laude* in Psychology
Halpern & Rosevear Undergraduate Research Grant

2011-2014 Dean's List in the College of Arts & Sciences

Funding

2020-2023 NIA Individual F32 1F32AG067640-01: $194,790 over 3 years: 06/01/2020-06/01/2023
Manipulating cellular excitability and CREB expression in CA1 to restore spatial processing in aged mice to young-like levels.

Memberships & Affiliations

2015-present Society for Neuroscience
2017-2019 National Science Foundation Neurophotonics Research Traineeship Program.

Invited Peer Review

Neuropsychopharmacology

Ad-hoc Peer Review

Nature
Nature Neuroscience
Current Biology
Journal of Neuroscience
Neuropsychopharmacology

Service & Mentoring

2020-present *Miniscope workshops*
Instructor
Assist and lecture at workshops aimed at introducing miniscope imaging to new labs around the world.

2020-present *Neuroscience Core Course*
Invited guest lecturer
Lead literature discussions on cognitive neuroscience topics.

2020-present *Techniques and Approaches in Neuroscience Course*
Invited guest lecturer
Lecture on one-photon calcium imaging using miniscopes.

2019-present *Python for Neuroscience Workshops*
Instructor
Design and lead workshops on introductory programming in neuroscience.
Link to exercises: `https://github.com/wmau/PythonForNeuro`

2018-2019 *BU Preprint Journal Club*
Peer reviewer
Constructively post reviews on bioRxiv articles on a monthly basis.

2016-2018 *Museum of Science*
Outreach volunteer
Present neuroscience-related demonstrations to museum visitors of all ages.

2016-2018 *Academic Immersion in Medicine Program at Boston University*
Outreach volunteer
Demonstrate cockroach motor/sensory neuron recordings and stimulations using Spiker Boxes.

2015-2018 *Massachusetts State Science & Engineering Fair*
Judge
Grade high school science fair posters and mentor young minds interested in the life sciences.

2018 *Undergraduate Research Opportunities Program at Boston University*
Mentor for Ellison, L.
Training in surgical techniques and rodent handling.

2015-2016 *Undergraduate Research Opportunities Program at Boston University*
Mentor for Bidshahri, P.
Training in experimental design, execution, and data analysis.

2016 *Boston University Biology Department*
Principles of Neuroscience Teaching Fellow
Organized and led discussion sections for an introductory neuroscience course.

TA Evaluation: 4.5/5.0

2016 *Boston University Neuroscience Department*
Introduction to Computational Neuroscience of Speech, Language, & Hearing Teaching Fellow
Assisted in a computer-based lab section for an advanced computational course.

2014 *Cornell Neurobiology & Behavior Department*
Introduction to Neuroscience Undergraduate Teaching Assistant
Led discussion groups to review lecture content and hold office hours.
TA Evaluation: 4.5/5.0

2011-2013 *Alpha Phi Omega Community Service Fraternity*
Pledge Project Group Leader
Mentored initiates on brotherhood principles and planning of service projects.

2011 *Education Association for China Tomorrow*
English as a Foreign Language Instructor
Taught self-planned English lessons for middle school classes in China.

Skills

One-photon calcium imaging in freely moving mice using miniaturized microscopes.
Rodent care and handling (mice and rats).
Rodent behavior: Continuous spatial alternation, T-maze, open field, contextual fear conditioning.
Experience with tetrode recordings in the hippocampus and related cortical structures.
Experience with two-photon calcium imaging in anesthetized mice.
Brain sectioning (coronal and sagittal) with cryostat.
Proficient in Arduino, MATLAB, and Python (PyCharm IDE).
Proficient with conda virtual environments, pandas, scikit-learn, scipy, matplotlib, and xarray libraries.
Proficient with SQLite.
Proficient in LaTeX, GitHub (Git Bash and GitHub Desktop).
Passable proficiency in Autodesk Fusion 360 (design and manufacturing).
Published experience with creative data visualization methods, dimensionality reduction, and machine learning techniques.
Conversational in Cantonese.

References

Available upon request.