Zhenrui Liao

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Citizenship: USA

Education & Training

2019–2023 PhD in Neurobiology and Behavior (expected), Columbia University
Supervised by Attila Losonczy & Liam Paninski
2017–2024 MD (expected), Columbia University College of Physicians and Surgeons
2017 MS in Electrical Engineering (*cum laude*), Columbia University
(concentration in Systems Biology and Neuroengineering)
2017 BS in Electrical Engineering (*cum laude*), Columbia University
2015-2016 MEng Visiting Student, Imperial College London

Publications

2021 S. Terada, T. Geiller*, **Z. Liao** *, J. O'Hare*, B. Vancura*, and A. Losonczy. Adaptive stimulus selection for consolidation in the hippocampus. *Nature*, 2021a

2021 B. Dudok*, M. Szoboszlay*, A. Paul*, P. M. Klein*, **Z. Liao** *, E. Hwaun, G. G. Szabo, T. Geiller, B. Vancura, B.-S. Wang, S. McKenzie, J. Homidan, L. M. Klaver, D. F. English, Z. J. Huang, G. Buzsáki, A. Losonczy, and I. Soltesz. Recruitment and inhibitory action of hippocampal axo-axonic cells during behavior. *Neuron*, 2021

2021 D. Hadjiabadi, M. Lovett-Barron, I. G. Raikov, F. T. Sparks, **Z. Liao**, S. C. Baraban, J. Leskovec, A. Losonczy, K. Deisseroth, and I. Soltesz. Maximally selective single-cell target for circuit control in epilepsy models. *Neuron*, 2021

2020 F. Sparks*, **Z. Liao** *, W. Li, A. Grosmark, I. Soltesz, and A. Losonczy. Hippocampal adult-born granule cells drive network activity in a mouse model of chronic temporal lobe epilepsy. *Nature communications*, 11(1):1–13, 2020

2019 G. F. Turi*, W.-K. Li*, S. Chavlis*, I. Pandi, J. O'Hare, J. B. Priestley, A. D. Grosmark, **Z. Liao**, M. Ladow, J. F. Zhang, et al. Vasoactive intestinal polypeptide-expressing interneurons in the hippocampus support goal-oriented spatial learning. *Neuron*, 101(6):1150–1165, 2019

2017 J. D. Zaremba, A. Diamantopoulou, N. B. Danielson, A. D. Grosmark, P. W. Kaifosh, J. C. Bowler, **Z. Liao**, F. T. Sparks, J. A. Gogos, and A. Losonczy. Impaired hippocampal place cell dynamics in a mouse model of the 22q11. 2 deletion. *Nature neuroscience*, 20(11):1612–1623, 2017

* denotes equal contribution

Talks & Workshops

2022 L. B. Liu, A. Losonczy, and **Z. Liao**. Use the FORCE: A Python package for training chaotic RNNs. In *Northeast Regional Conference on Complex Systems (upcoming)*, Buffalo, NY, 2022

2022 **Z. Liao**. Spiking neural network models in neuroscience (Teaching Assistant). In *COSYNE*, Lisbon, Portugal, 2022

2021 **Z. Liao**. AI & the Brain: Learning about learning. In *Inspirit AI Spotlight Talks*, virtual, 2021b

2021 **Z. Liao**. Dissecting interictal epileptiform discharge diversity: A Bayesian topic modeling approach. In *American Epilepsy Society*, Chicago, IL, 2021a

2021 **Z. Liao**. Replay of world structure by CA3. In *Organization for Computational Neurosciences*, virtual, 2021c

2021 **Z. Liao**. Spectral and machine learning methods for detection of epileptiform electrophysiological events. virtual / Ripple Methods Consortium hosted by NYU, 2021d

Conference presentations

2022 **Z. Liao** *, D. Hadjiabadi*, S. Terada, I. Soltesz, and A. Losonczy. A GABAergic plasticity mechanism for world structure inference by CA3. In *COSYNE*, Lisbon, Portugal, 2022

2021 D. Hadjiabadi*, **Z. Liao** *, Q. A. Nguyen, S. Terada, A. Losonczy, and I. Soltesz. Data-driven biophysical model of genetic epilepsy predicts loss of cue cell suppression during sharp-wave ripple associated memory replay. In *American Epilepsy Society*, Chicago, IL, 2021

2021 **Z. Liao** *, D. Hadjiabadi*, I. Soltesz, and A. Losonczy. Hebbian plasticity of GABAergic synapses sufficient for consolidation of world structure by ca3 replay. In *Society for Neuroscience*, virtual, 2021

2021 S. Terada, **Z. Liao**, D. Hadjiabadi, I. Soltesz, and A. Losonczy. A novel mechanism of adaptive stimulus selection for sharp wave ripple-related memory consolidation in the hippocampus. In *7th Annual BRAIN Initiative Meeting*, virtual, 2021b

2021 **Z. Liao**, A. Losonczy, and C. Papadimitriou. The excitability functionality trade-off: Random graph models of epilepsy. In *COSYNE*, virtual, 2021

2019 F. Sparks*, **Z. Liao** *, I. Soltesz, and A. Losonczy. Circuit level cell-type specific population dynamics within the dentate gyrus during interictal events in the kainic acid mouse model of temporal lobe epilepsy. In *Society for Neuroscience*, Chicago, IL, 2019b

2019 F. Sparks*, **Z. Liao** *, I. Soltesz, and A. Losonczy. Interictal events recruit distinct ensembles of adult-born and mature granule cells in the epileptic dentate gyrus. In *Park City Epilepsy Meeting*, Park City, UT, 2019a

2019 F. Sparks, S. Wiesenberger, **Z. Liao**, W.-K. Li, R. Nyilas, B. Vancura, H. Blockus, A. Vaziri, and A. Losonczy. Large-scale volumetric calcium imaging of hippocampal microcircuits during head-fixed spatial navigation and learning. In *Inhibition in the CNS - Gordon Research Conference*, Newry, ME, 2019

2016 G. Turi, **Z. Liao**, W.-K. Li, J. Zaremba, A. Grosmark, X. Luo, L. Topolnik, and A. Losonczy. Role of hippocampal VIP interneurons in reward-oriented spatial learning. In *Society for Neuroscience*, San Diego, CA, 2016

2016 **Z. Liao** and A. Losonczy. A matched filtering algorithm for sharp-wave ripple detection in hippocampal local field potential recordings. In *38th International Conference of the IEEE Engineering in Medicine and Biology Society*, Orlando, FL, 2016. IEEE

Grants, Honors & Awards

2020-2022	NIH Ruth L. Kirchenstein Fellowship (F31, $171,010 award) – Funded in first year of graduate school
2021	American Epilepsy Society Faculty Stipend 2021
2021	Society for Neuroscience 2021 Professional Development Award
2017-2020	Columbia University Medical Scientist Training Program Training Grant
2017	Bachelor of Science with Latin Honors
2017	Tau Beta Pi (Engineering Phi Beta Kappa, top 7% of class)

Teaching

Instructor

2021, 2022	Mathematics for Theoretical Neuroscience	with Danil Tyukmanov (semester course)
2021	Artificial Intelligence	InspiritAI (winter course)
2018, 2019	Pharmacokinetics & Pharmacodynamics	Columbia Medical School (student-led)

Teaching Assistant

2020, 2021	Computation and the Brain	with Christos Papadimitriou
2020	Advanced Machine Learning	Nakul Verma
2020	Machine Learning	Nakul Verma
2019	Unsupervised Learning	Nakul Verma
2018	Information Theory in Theoretical Computer Science	Omri Weinstein
2018	Machine Learning	Nakul Verma
2017	Machine Learning	Its'ik Pe'er
2016	Machine Learning	Daniel Hsu
2015	Professional Engineering	Esther Perea
2014	Analysis and Optimization	Davesh Maulik