Stanford



Subhaneil Lahiri

Physical Sci Res Scientist, Ginzton, E.L. Laboratory

Curriculum Vitae available Online

Bio

BIO

I am currently a post-doc in the Ganguli Lab (Department of Applied Physics, Stanford University) where I study theoretical neurobiology, in particular the effects of synaptic plasticity mechanisms on learning and memory.

Before this, I was a post-doc in the Samuel Lab (Department of Physics and Center for Brain Science, Harvard University) where I studied brain and behavior in the Drosophila larva and C. elegans.

Prior to that, I was a graduate student in the High Energy Theory Group (Department of Physics, Harvard University) where I studied string theory, using the AdS/CFT correspondence to investigate black hole thermodynamics, especially in the fluid mechanics regime.

ACADEMIC APPOINTMENTS

- Physical Sci Res Scientist, Ginzton, E.L. Laboratory

HONORS AND AWARDS

- Scott Prize for best performance in M.Phys. examination, Oxford University (2003)
- Certificate of distinction in teaching, Harvard University (Spring 2008)
- Outstanding Paper Award, Neural Information Processing Systems (December 2013)

PROFESSIONAL EDUCATION

- Doctor of Philosophy, Harvard University , Physics (2009)
- Master of Physics, University of Oxford , Physics (2003)

LINKS

- My website: https://subhylahiri.github.io/
- Lab site: http://ganguli-gang.stanford.edu/
- Google Scholar profile: http://scholar.google.com/citations?user=2nEwLGcAAAAJ
- arXiv profile: http://arxiv.org/a/lahiri_s_1
- INSPIRE profile: http://inspirehep.net/author/profile/S.Lahiri.1

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

I am interested in most aspects of theoretical neurobiology. I am currently studying the role of complex synapses in learning and memory.

Our brains store long term memories by adjusting the strengths of the synapses that connect neurons. The tendency for new memories to overwrite old ones leads to a trade-off between learning and remembering: if synapses are too plastic older memories will be wiped out too easily, if they are too rigid it becomes difficult to learn new memories in the first place. I am studying theoretical models of synapses to understand how their internal structure can be used to balance these effects and maximize their memory storage.

Publications

PUBLICATIONS

- **Universal energy-accuracy tradeoffs in nonequilibrium cellular sensing.** *Physical review. E*
  Harvey, S. E., Lahiri, S., Ganguli, S.
  2023; 108 (1-1): 014403
- **Accurate Estimation of Neural Population Dynamics without Spike Sorting.** *Neuron*
  Trautmann, E. M., Stavisky, S. D., Lahiri, S. n., Ames, K. C., Kaufman, M. T., O'Shea, D. J., Vyas, S. n., Sun, X. n., Ryu, S. I., Ganguli, S. n., Shenoy, K. V.
  2019
- **A saturation hypothesis to explain both enhanced and impaired learning with enhanced plasticity** *ELIFE*
  Nguyen-Vu, T., Zhao, G. Q., Lahiri, S., Kimpo, R. R., Lee, H., Ganguli, S., Shatz, C. J., Raymond, J. L.
  2017; 6
- **Exponential expressivity in deep neural networks through transient chaos** *Neural Information Processing Systems (NIPS)*
  Poole, B., Subhaneil, L., Raghu, M., Sohl-Dickstein, J., Ganguli, S.
  2016: 3360–3368
- **Statistical mechanics of complex neural systems and high dimensional data** *JOURNAL OF STATISTICAL MECHANICS-THEORY AND EXPERIMENT*
  Advani, M., Lahiri, S., Ganguli, S.
  2013
- **A memory frontier for complex synapses** *Neural Information Processing Systems*
  Lahiri, S., Ganguli, S.
  2013: 1034–1042
- **Two Alternating Motor Programs Drive Navigation in Drosophila Larva** *PLOS ONE*
  Lahiri, S., Shen, K., Klein, M., Tang, A., Kane, E., Gershow, M., Garrity, P., Samuel, A. D.
  2011; 6 (8)
- **Lumps of plasma in arbitrary dimensions** *JOURNAL OF HIGH ENERGY PHYSICS*
  Bhattacharya, J., Lahiri, S.
  2010
- **Large rotating AdS black holes from fluid mechanics** *JOURNAL OF HIGH ENERGY PHYSICS*
  Bhattacharyya, S., Lahiri, S., Loganayagam, R., Minwalla, S.
  2008
- **Plasmarings as dual black rings** *JOURNAL OF HIGH ENERGY PHYSICS*
  Lahiri, S., Minwalla, S.
  2008

- **Supersymmetric states of N=4 Yang-Mills from giant gravitons** *JOURNAL OF HIGH ENERGY PHYSICS*
  Biswas, I., Gaiotto, D., Lahiri, S., Minwalla, S.
  2007

PRESENTATIONS

- Optimal synaptic strategies for different timescales of memory - Computational and Systems Neuroscience (2/26/2016)
- Modelling impaired and enhanced learning with enhanced plasticity - Computational and Systems Neuroscience (March 1, 2014)
- A memory frontier for complex synapses - Neural Information Processing Systems (12/5/2013 - 12/8/2013)
- Understanding impaired learning with enhanced plasticity - Sloan-Swartz Centers for Theoretical Neurobiology Annual Meeting (7/26/2013 - 7/28/2013)
- A general theory of learning and memory with complex synapses - Computational and Systems Neuroscience (2/28/2013 - 3/3/2013)
- Learning and memory with complex synapses - Sloan-Swartz Centers for Theoretical Neurobiology Annual Meeting (6/27/2012 - 6/29/2012)
- Black rings from Fluid mechanics - Harvard University, High Energy Theory Group (3/6/2009)
- Giant gravitons and the supersymmetric states of N= 4 Yang-Mills - 1st Asian Winter School on String Theory (1/8/2007 - 1/19/2007)