

# Rishidev Chaudhuri

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## Professional Positions

- Assistant Professor** 04/2019 – present  
University of California, Davis  
Center for Neuroscience  
Department of Neurobiology, Physiology, and Behavior  
Department of Mathematics
- Postdoctoral Fellow** 06/2018 – 10/2018  
The University of Texas at Austin, Center for Learning & Memory  
Adviser: Ila Fiete
- Google Research Fellow** 01/2018 – 05/2018  
University of California, Berkeley,  
Simons Institute for the Theory of Computing
- Postdoctoral Fellow** 08/2014 – 01/2018  
The University of Texas at Austin, Center for Learning & Memory  
Adviser: Ila Fiete
- Postdoctoral Associate** 09/2013 – 07/2014  
New York University, Center for Neural Science  
Adviser: Xiao-Jing Wang

## Education

- Ph.D. in Applied Mathematics** 05/2013  
Yale University  
Dissertation title: *Timescales and the large-scale organization of cortical dynamics*  
Adviser: Xiao-Jing Wang
- M.Phil. in Applied Mathematics** 2010  
Yale University
- B. A. in Physics** 2006  
Amherst College  
Magna cum laude

## Awards & Honors

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| Google Research Fellowship at Simons Institute for the Theory of Computing, Berkeley | 2018             |
| Finalist for Burroughs-Wellcome's Career Award at the Scientific Interface           | 2016, 2017       |
| Best Tutorial Award, Janelia Neurotheory Workshop                                    | 2016             |
| Amherst College Fellowship for graduate study  | 2007, 2008, 2009 |
| Phi Beta Kappa   | 2005             |
| Amherst College Dean of Faculty Grant for summer research                            | 2005             |
| Howard Hughes Fellowship for summer research   | 2004             |
| Basset Prize for Physics   | 2002             |

## In Review

Kriener B\*, **Chaudhuri R\*** & Fiete IR (\* denotes equal contribution). Robust parallel decision-making in neural circuits with nonlinear inhibition. *bioRxiv* doi: 10.1101/231753

## Publications

**Chaudhuri R** & Fiete IR (2019). Bipartite expander Hopfield networks as self-decoding high-capacity error correcting codes. *Advances in Neural Information Processing Systems (NeurIPS)* **32**

**Chaudhuri R**, Gerçek B\*, Pandey B\*, Peyrache A & Fiete IR (\* denotes equal contribution) (2019). The intrinsic attractor manifold and population dynamics of a canonical cognitive circuit across waking and sleep. *Nature Neuroscience* **22**, 1512

**Chaudhuri R**, He B & Wang XJ (2018). Random recurrent networks near criticality capture the broadband power distribution of human ECoG dynamics. *Cerebral Cortex* **28**, 3610

**Chaudhuri R** & Fiete IR (2016). Computational principles of memory. *Nature Neuroscience* **19**, 394 (Review)

**Chaudhuri R**, Knoblauch K, Gariel M-A, Kennedy H & Wang XJ (2015). A large-scale circuit mechanism for hierarchical dynamical processing in the primate cortex. *Neuron* **88**, 419

**Chaudhuri R**, Bernacchia A & Wang XJ (2014). A diversity of localized timescales in network activity. *Elife* **3**, e01239

Churchland AK, Kiani R, **Chaudhuri R**, Wang XJ, Pouget A & Shadlen MN (2011). Variance as a signature of neural computations during decision-making. *Neuron* **69**, 818

## **Selected Invited Talks**

Neural Theories of Cognition Meeting, Aspen Meadows Resort. October 2019.

Title: *Approaching cognitive computation via error-correcting codes and hash functions.*

Janelia Research Campus. Computation & Theory Seminar Series. August 2019.

Title: *The attractor manifold and population dynamics of a canonical cognitive circuit across waking and sleep.*

University of California, Berkeley. Redwood Seminar. May 2018.

Title: *Expander graph architectures for high-capacity neural memory.*

Google Campus, Mountain View. Algorithms Seminar. May 2018.

Title: *Architectures for high-capacity memory and efficient decision-making in the brain.*

University of California, Berkeley. Simons Institute, Industry Day. May 2018.

Title: *Expander graph architectures for high-capacity neural memory.*

The University of Texas at Austin. Faculty Recruitment Seminar, Departments of Neuroscience and Mathematics, March 2016.

Title: *Architectures for high-capacity neural memory.*

Princeton University, Princeton. July 2015.

Title: *Exponential capacity and robust error correction in Hopfield networks with sparse random constraints.*

Computational and Systems Neuroscience Annual Meeting, Snowbird. Workshop on “How the brain makes prediction: Relevance of time and spontaneous activity”. March 2015.

Title: *A large-scale circuit mechanism for hierarchical dynamical processing in the primate cortex.*

New York University Shanghai, Shanghai, China. March 2014.

Title: *Timescales and hierarchy in the large-scale organization of the brain.*

National Institutes of Health, Bethesda. July 2012

Title: *The timescales of large-scale brain circuit dynamics.*

Sloan-Swartz Centers Annual Meeting, San Diego. June 2012.

Title: *The timescales of large-scale brain circuit dynamics.*

## **Selected Conference Presentations & Posters**

Moore E, Chaudhuri R (2020). *Using noise to probe network structure and prune synapses.* Poster at Computational and Systems Neuroscience annual meeting. Denver, CO.

Chaudhuri R, Fiete IR (2020). *High-capacity pattern labeling and robust retrieval with internally modular attractor networks*. Poster at Computational and Systems Neuroscience annual meeting. Denver, CO.

Chaudhuri R\*, Kriener B\*, Fiete IR (2018). *How fast is neural winner-take-all when deciding between many options?* Poster at Computational and Systems Neuroscience annual meeting. Denver, CO.

Chaudhuri R, Gerçek B, Pandey B, Fiete IR (2017). *Unsupervised latent variable extraction from neural data to characterize processing across states*. Poster at Computational and Systems Neuroscience annual meeting. Salt Lake City, UT.

Chaudhuri R\*, Kriener B\*, Fiete IR (2016). *Time-complexity and accuracy in neural winner-take-all computation*. Poster at Computational and Systems Neuroscience annual meeting. Salt Lake City, UT.

Chaudhuri R, Fiete IR (2015). *Using expander codes to construct Hopfield networks with exponential capacity*. Poster at Computational and Systems Neuroscience annual meeting. Salt Lake City, UT.

Chaudhuri R, He B, Wang XJ (2014) *The temporal structure of a random network near criticality and human ECoG dynamics*. Poster at Computational and Systems Neuroscience annual meeting. Salt Lake City, UT.

Chaudhuri R, Bernacchia A, Wang XJ. (2013) *Diversity of timescales in network activity*. Poster at Computational and Systems Neuroscience annual meeting. Salt Lake City, UT.