

# Bing Liu

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## Education

2005 – 2011      Ph.D in Neuroscience  
State Key Laboratory of Brain and Cognitive Science  
Institute of Biophysics, Chinese Academy of Science (CAS)  
Advisor: Prof. Yi Wang

2000 – 2004      B.S. in Biomedical Engineering,  
Xi'an JiaoTong University, Xi'an, Shanxi Province, China

## Research Interests

Brain-machine interface, Neuroprosthetics, Deep brain stimulation, System and computational neuroscience, Neural basis of cognition, Neural adaptation and learning, Neural encoding and decoding, Information theory.

## Research Experience

### 2018 – present Postdoctoral Research (Carmena Lab)

Department of Electrical Engineering and Computer Science, Helen Wills Neuroscience Institute, University of California, Berkeley, Advisor: Jose Carmena

Large-scale electrophysiology and closed-loop deep brain stimulation on behaving nonhuman primate. Brain-machine interface.

### 2012 - 2017 Postdoctoral Research (Osborne Lab)

Neuroscience Department, The University of Chicago, Advisor: Leslie Osborne

Investigating the efficient coding of motion information in MT neurons and smooth pursuits, using electrophysiology, behavioral experiment, information theory, simulation, and computational models.

### 2005 - 2011 PhD Student Research (Wang Lab)

Institute of Biophysics, Chinese Academy of Science, Advisor: Yi Wang

Neural coding of simultaneously presented multi-dimensional stimuli in primary visual cortex.

## Publications:

**B. Liu**, C.S. Deng, Y. Wang. “Synergistic and Separable Coding of Multiple Features in Primary Visual Cortex”. In preparation.

**B. Liu**, M.V. Macellaio, L.C. Osborne, “Efficiency and Ambiguity of adaptive coding in cortical area MT”. In preparation.

M.V. Macellaio, **B. Liu**, L.C. Osborne, “Why Sensory Neurons Are Tuned to Multiple Stimulus Features”. Submitted.

J. Lombardo, M.V. Macellaio, **B. Liu**, S.E. Palmer, L.C. Osborne, “State Dependence of Stimulus Induced Variability Tuning in Macaque MT”. Submitted.

Y.W. Jiang\*, X.J. Li\*, **B. Liu\***, et al. “Rational Design of Silicon Structures for Multiscale and Optically-Controlled Biointerfaces”, in revision.

S.E. Palmer, M.V. Macellaio, **B. Liu**, J. Lombardo, L.C. Osborne, “Spike Counts Encode More About The Stimulus Than Underlying Firing Rate in Cortical Neurons and Populations”, in revision.

T. Mukherjee, **B. Liu**, C. Simoncini, L.C. Osborne, “Spatial-Temporal Integration of Visual Motion for Pursuit Eye Movement in Human and Monkeys”, *Journal of Neuroscience*. Feb 8, 2017, 37(6) 1394-1412.

**B. Liu**, M.V. Macellaio, L.C. Osborne, “Efficient Sensory Cortical Coding Optimizes Pursuit Eye Movement”, *Nature Communications*. Sep 9, 2016, 7:12759. doi: 10.1038/ncomms12759.

**B. Liu**, Y. Wang, “Contrast and Orientation Discrimination in Simultaneous Orientation and Contrast Changes”, *Progress in Biochemistry and Biophysics*, 40(7): 662-667, 2013.

## **Conference Abstracts**

**B. Liu**, L.C. Osborne, “Adaptive Temporal Coding of Motion Information in MT Area and Smooth Pursuit”, 2017, Annual meeting Society for Neuroscience 2017, Washington, DC, USA.

**B. Liu**, M.V. Macellaio, L.C. Osborne, “Separate Adaptation Mechanisms for Mean and Variance in Cortical Area MT”, 2017, Computational and Systems Neuroscience (Cosyne), Salt Lake City, Utah, USA.

**B. Liu**, M.V. Macellaio, L.C. Osborne, “Gain Adaptation With and Without Rate Adaptation in Cortical Area MT”, 2016, Annual meeting Society for Neuroscience 2016, San Diego, CA, USA.

**B. Liu**, M.V. Macellaio, L.C. Osborne, “Rapid Gain Adaptation optimizes pursuit

accuracy”, 2016, Computational and Systems Neuroscience (Cosyne), Salt Lake City, Utah, USA.

**B. Liu**, M.V. Macellaio, L.C. Osborne, “Rapid Gain Rescaling Maximizes Information About Motion Fluctuations in MT Neurons and Pursuit Eye Movements”, 2015, Annual meeting Society for Neuroscience 2015, Chicago, IL, USA.

**B. Liu**, L.C. Osborne, “Efficient Coding of Visual Motion Signals in Area MT and Smooth Pursuit”, 2014, Annual meeting Society for Neuroscience 2014, Washington DC, USA.

**B. Liu**, L.C. Osborne, “Efficient Coding of Visual Motion Signals in Area MT and Smooth Pursuit”, 2014, Computational and Systems Neuroscience (Cosyne), Salt Lake City, Utah, USA.

**B. Liu**, C.S. Deng, Y. Wang, “The Discriminative Ability to Contrast and Orientation of Transient Stimuli by Neurons in Cat Primary Visual Cortex.” The 4th National Conference on Brain and Cognitive Sciences, 2009, Chengdu, China

## **Talks**

**B. Liu**, M.V. Macellaio, L.C. Osborne, “Efficiency and Ambiguity of adaptive coding in cortical area MT”, Mar 2017, Neuroscience Post-Doc seminar Series, The University of Chicago.

**B. Liu**, M.V. Macellaio, L.C. Osborne, “Mechanisms of Efficient Sensory Coding in Cortical Neurons and Behavior ”, Jan 2017, The CNS seminar meeting, The University of Chicago.

**B. Liu**, “Strategy and Efficiency in Visual Information Processing”, Nov 2016, Washington University in St. Louis.

**B. Liu**, M.V. Macellaio, L.C. Osborne, “Rapid Gain Rescaling Maximizes Information About Motion Fluctuations in MT Neurons and Pursuit Eye Movements”, Dec 2015, Neuroscience Post-Doc seminar Series, The University of Chicago.

**B. Liu**, M.V. Macellaio, L.C. Osborne, “Rapid Gain Rescaling Maximizes Information About Motion Fluctuations in MT Neurons and Pursuit Eye Movements”, 2015, Annual meeting Society for Neuroscience 2015, Chicago, IL, USA.

**B. Liu**, C.S. Deng, Y. Wang, “The Discriminative Ability to Contrast and Orientation of Transient Stimuli By Neurons in Cat Primary Visual Cortex.” 2009, The 4th National Conference on Brain and Cognitive Sciences, Chengdu, China.

## **Research Skills**

### **Neurophysiology**

In vivo extracellular recording on alert monkey; Optical imaging based on intrinsic signals; Craniotomy and surgery

### **Hardware, Software, and System**

Setting up the electrophysiological recording and eye tracking systems; Developing online/offline analysis software

### **Computation**

Computational methods in neuroscience; Information theory; Modeling; Machine Learning;

## **Honors and Awards**

The Best Poster Award, Annual Retreat in the Community of Cognitive Neuroscience and Computational Neuroscience, The University of Chicago, 2013

The Second-Class Research Scholarship, State Key Laboratory of Brain and Cognitive Sciences, Institute of Biophysics, Chinese Academy of Science, 2008-2009.

The Third-Class Research Scholarship, State Key Laboratory of Brain and Cognitive Sciences, Institute of Biophysics, Chinese Academy of Science, 2007-2008.

The Third-Class Research Scholarship, State Key Laboratory of Brain and Cognitive Sciences, Institute of Biophysics, Chinese Academy of Science, 2006-2007.

The Second Prize, Electronics Design Competition of Xi'an JiaoTong University, 2003.

## **Professional Affiliations**

Society of Neuroscience