



Join Keystone Symposia  
for the 2016 conference on:

# State of the Brain

May 22–26, 2016

Alpbach Congress Centrum | Alpbach | Austria

Scientific Organizers:

Terrence J. Sejnowski and Sten Grillner

*Recent years have seen rapid advances in our understanding of brain biology, driven in part by the development of novel technologies for studying neural networks. Consequently, major national research programs in the EU and US have been launched that will bring together teams of neuroscientists and engineers with the aim of achieving a major advance in understanding brain function and dysfunction. The challenge is to map the circuits of the brain, measure the fluctuating patterns of electrical and chemical activity flowing within those circuits and understand how they give rise to cognitive and behavioral capabilities. This Keystone Symposia conference brings together investigators from around the world to share their discoveries and to plan future projects in this exciting new era for brain research.*

*Session Topics:*

- International Brain Programs
- Discovering Diversity: Identifying Cell Types in the Brain
- The Brain in Action: Large-Scale Monitoring and Manipulating Neurons
- Maps in the Brain: Generating Multi-scale Neural Circuits
- Model Systems: Using Genetics to Deconstruct Neural Circuits
- Advancing Human Neuroscience: Understanding Mental Function and Dysfunction
- Big Data: Analyzing High-Dimensional Brain Datasets
- Discovering Principles: Theory, Models, Computation and Statistics



For additional details, visit  
[www.keystonesymposia.org/16R1](http://www.keystonesymposia.org/16R1).

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on Molecular and Cellular Biology  
*Accelerating Life Science Discovery*

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# KEYSTONE SYMPOSIA

on Molecular and Cellular Biology

## State of the Brain (R1)

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Lead Sponsor: Allen Institute for Brain Science

Abstract & Scholarship Deadline: January 21, 2016 / Abstract Deadline: February 23, 2016 / Discounted Registration Deadline: March 22, 2016

### SUNDAY, MAY 22

#### Arrival and Registration

### MONDAY, MAY 23

#### Welcome and Keynote Address

\***Sten Grillner**, Karolinska Institutet, Sweden

**Cornelia Bargmann**, Rockefeller University, USA  
*Understanding Brain Function and Dysfunction*

#### International Brain Programs

\***Terrence J. Sejnowski**, The Salk Institute, USA

**Felix Schuermann**, École Polytechnique Fédérale de Lausanne, Switzerland  
*The EU Human Brain Project*

**Walter J. Koroshetz**, NINDS, National Institutes of Health, USA  
*State of BRAIN: NIH's Initiative*

**Mu-ming Poo**, Institute of Neuroscience, CAS, China  
*China Brain Project and Non-Human Primate Research*

**Christof Koch**, Allen Institute for Brain Science, USA  
*Project MindScope - Big Science, Team Science, Open Science to Understand Mouse Cortex*

#### Panel 1: Coordinating International Programs

\***Cornelia Bargmann**, Rockefeller University, USA

**Sten Grillner**, Karolinska Institutet, Sweden

**Walter J. Koroshetz**, NINDS, National Institutes of Health, USA

**Mu-ming Poo**, Institute of Neuroscience, CAS, China

**Christof Koch**, Allen Institute for Brain Science, USA

**Thomas Skordas**, European Commission, Belgium

**Sharif Taha**, Kavli Foundation, USA

#### Discovering Diversity: Identifying Cell Types in the Brain

\***Hongkui Zeng**, Allen Institute for Brain Science, USA

**Botond Roska**, IOB, Switzerland  
*Cell Types and Circuits in the Visual System*

**Hongkui Zeng**, Allen Institute for Brain Science, USA  
*Genetic Approaches to Brain Circuit Mapping and Cell Type Characterization*

**Sara B. Linker**, The Salk Institute for Biological Studies, USA  
*Short Talk: Nuclear RNA-Seq of Single Neurons Reveals Molecular Signatures of Activation Across the Hippocampal Circuit*

**William Allen**, Stanford University, USA  
*Short Talk: Separately-Coordinated Brainwide Dynamics of Distinct Cell Types during Behavior*

#### Poster Session 1

### TUESDAY, MAY 24

#### The Brain in Action: Large-Scale Monitoring and Manipulating Neurons

**Karl Deisseroth**, Stanford University, USA  
*Optogenetic Approaches to Neural Circuits*

\***Mark J. Schnitzer**, Stanford University, USA

*Reading Neural Codes from a Thousand Neurons in Freely Behaving Mice*

**Susumu Tonegawa**, Massachusetts Institute of Technology and RIKEN Brain Science Institute, USA  
*Monitoring and Engineering Memory Engram Cells and their Circuits*

**Stuart Trenholm**, Friedrich Miescher Institute, Switzerland  
*Short Talk: Functional Cortical Connectivity Principles Revealed by Single-Cell-Initiated Circuit Tracing with Rabies Viruses*

**Kishore Kuchibhotla**, New York University School of Medicine, USA  
*Short Talk: A Synaptic and Circuit Switch for Control of Flexible Behavior*

#### Panel 2: Bridging the Gap between Circuits and Behavior

\***Mu-ming Poo**, Institute of Neuroscience, CAS, China

**Karl Deisseroth**, Stanford University, USA

**Mark J. Schnitzer**, Stanford University, USA

**Susumu Tonegawa**, Massachusetts Institute of Technology and RIKEN Brain Science Institute, USA

**Winfried Denk**, Max Planck Institute of Neurobiology, Germany

**R. Clay Reid**, Allen Institute for Brain Science, USA

#### Maps in the Brain: Generating Multi-Scale Neural Circuits

**Winfried Denk**, Max Planck Institute of Neurobiology, Germany  
*Towards a Connectome of the Whole Mouse Brain*

\***R. Clay Reid**, Allen Institute for Brain Science, USA  
*Integrating Circuits, Recordings and Behavior*

**Terrence J. Sejnowski**, The Salk Institute, USA  
*Global Circular Waves in Human Cortex*

**Zeinab Fazlali**, Institute for Research in Fundamental Sciences, Iran  
*Short Talk: Locus Coeruleus Activity and Brain State: Implications for Sensory Coding in Rat Barrel Cortex*

#### Poster Session 2

### WEDNESDAY, MAY 25

#### Advancing Human Neuroscience: Understanding Brain Function and Dysfunction

**John Donoghue**, Wyss Center for Bio- and Neuro-Engineering, Switzerland  
*Brain Computer Interfaces*

**Helen S. Mayberg**, Emory University, USA  
*Iterative Strategies to Refine and Optimize DBS for Depression*

\***Patricia K. Kuhl**, University of Washington, USA  
*What Can Babies' Brains Tell Us About What it Means to be Human?*

**Niels Janssen**, University of La Laguna, Spain  
*Short Talk: Whole-Brain fMRI Activity at a High Temporal Resolution: A New Analytic Technique*

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### Panel 3: What are the Prospects for Helping Humans with Brain Disorders?

\***John Donoghue**, Wyss Center for Bio- and Neuro-Engineering, Switzerland

**Helen S. Mayberg**, Emory University, USA

**Patricia K. Kuhl**, University of Washington, USA

**Emery N. Brown**, MIT-Harvard Division of Health Sciences and Technology, USA

**Botond Roska**, IOB, Switzerland

\***Sten Grillner**, Karolinska Institutet, Sweden

**Joshua T. Vogelstein**, Johns Hopkins University, USA

*NeuroData: Enabling Petascale Neuroscience*

**Sean Hill**, Centre for Addiction and Mental Health, Canada

*Neuroinformatics: From Big Data to Knowledge Discovery*

### Meeting Wrap-Up: Outcomes and Future Directions (Organizers)

#### FRIDAY, MAY 27

#### Departure

### Discovering Principles: Theory, Models, Computation and Statistics

\***Terrence J. Sejnowski**, The Salk Institute, USA

**Emery N. Brown**, MIT-Harvard Division of Health Sciences and Technology, USA

*Deciphering the Dynamics of the Unconscious Brain under General Anesthesia*

**Sten Grillner**, Karolinska Institutet, Sweden

*Multi-Scale Modeling of Neuronal Networks - From Ion Channels to Selection of Behavior*

**Astrid Prinz**, Emory University, USA

*Embracing Variability: Ensemble Modeling in Neuroscience*

**Suresh J. Jesuthasan**, LKC School of Medicine, Singapore

*Short Talk: Investigating Neural Dynamics in the Zebrafish Habenula*

### Poster Session 3

#### THURSDAY, MAY 26

### Model Systems: Using Genetics to Deconstruct Neural Circuits

**Gerald M. Rubin**, Janelia Research Campus, USA

*A Comprehensive Approach to Understanding the Fly Brain*

**Florian Engert**, Harvard University, USA

*From Whole-Brain Data to Functional Circuit Models: The Zebrafish Optomotor Response*

\***Hideyuki Okano**, Keio University School of Medicine, Japan

*Disease Modeling and Brain Mapping Using Transgenic Marmosets*

**Ashiq Hussain**, Max Planck Institute for Neurobiology, Germany

*Short Talk: Neuropeptides Modulate Female Chemosensory Processing Upon Mating in Drosophila*

*Processing Upon Mating in Drosophila*

**Justus Kebschull**, Cold Spring Harbor, USA

*Short Talk: MAPseq: Massively Multiplexed Mapping of Single Neuron Projections by Sequencing of Barcoded RNA*

### Panel 4: Evolutionary Perspectives in Understanding the Brain

\***Sten Grillner**, Karolinska Institutet, Sweden

**Gerald M. Rubin**, Janelia Research Campus, USA

**Florian Engert**, Harvard University, USA

**Cornelia Bargmann**, Rockefeller University, USA

**Hongkui Zeng**, Allen Institute for Brain Science, USA

### Big Data: Analyzing High-Dimensional Brain Datasets