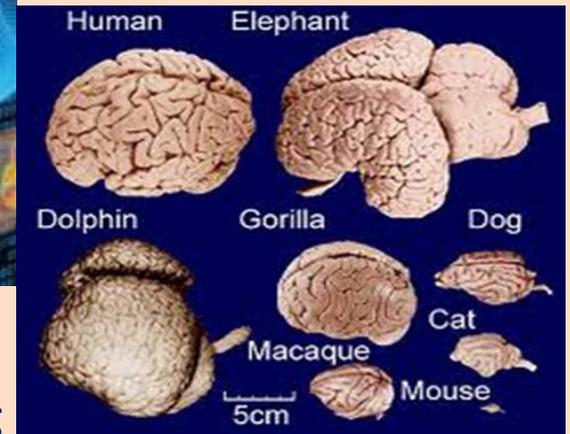
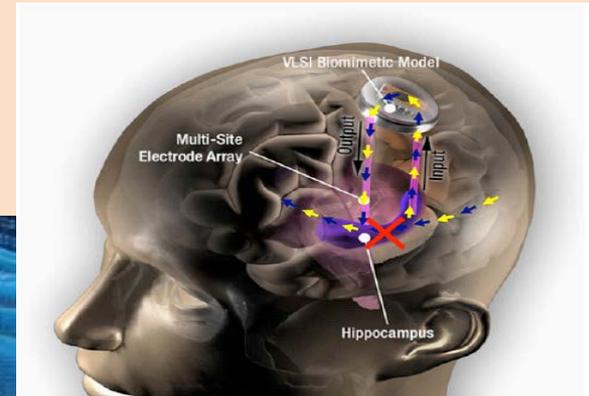
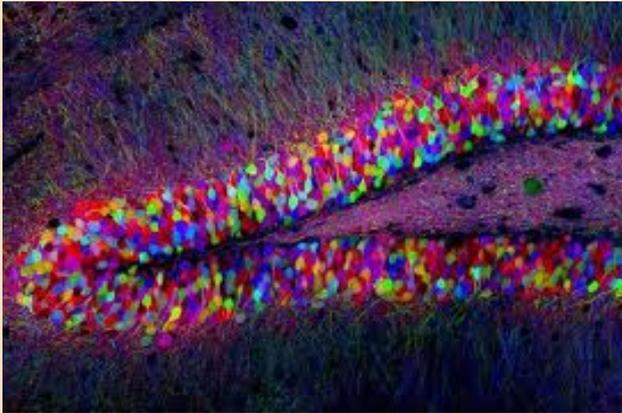


# Neuroscience and the BRAIN Initiative at NSF



Advisory Committee Meeting  
Directorate for Biological Sciences  
March 12, 2014

# Snapshot of NSF Neuroscience History

First NSF awards to study nervous system and neurological responses

1951

Behavioral and Neural Science division (BNS) established

1976

Division refocuses and expands to 8 programs\*

1982-89

Behavioral Neuroendocrinology established

1988

BNS splits & Division of Integrative Biology & Neuroscience (IBN) formed

1992

First workshop on steroids and brain function

1993

First meeting of the new Society for Behavioral Neuroendocrinology

1997

NSF Sponsored Four Workshops

2006-7

NSF: Neuroscience is everywhere!

2008



\*Psychobiology-Animal behavior; Neurobiology-Sensory Systems; Integrative Neural Systems-Behavioral Neuroscience; Developmental; Molecular & Cellular; Synaptic Mechanisms; Computational, Cognitive & Theoretical Neuroscience-Computational Neuroscience



# Recent Political and Public Interests in Accelerating Neuroscience Research at NSF

## **Patrick Kennedy (November, 2010)**

Impassioned speech entitled: "A Neuroscience 'Moonshot': Rallying a New Global Race for Brain Research," to SFN attendees and the General Public. Referred to this as the 'inner space program' and called for new interdisciplinary approaches to brain research

## **NRC Report (2010)**

The Second Grand Challenge – Understanding the Brain

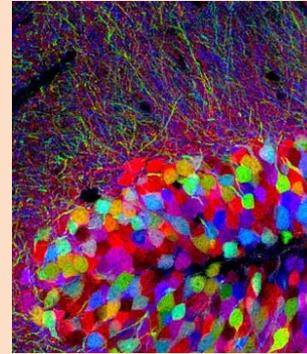
## **Congressman Chaka Fatah (PA) (May, 2011 staff visit to NSF)**

Ranking member of Commerce, Justice and Science Subcommittee

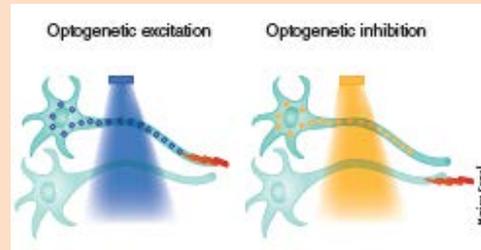
## **The BRAIN Initiative (rolled out by President Obama, April 2013)**

# New Tools and Opportunities for Understanding Brain Activity Underlying Behavior

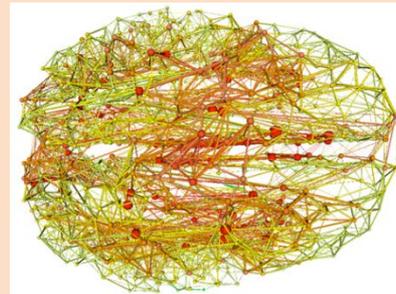
High resolution imaging



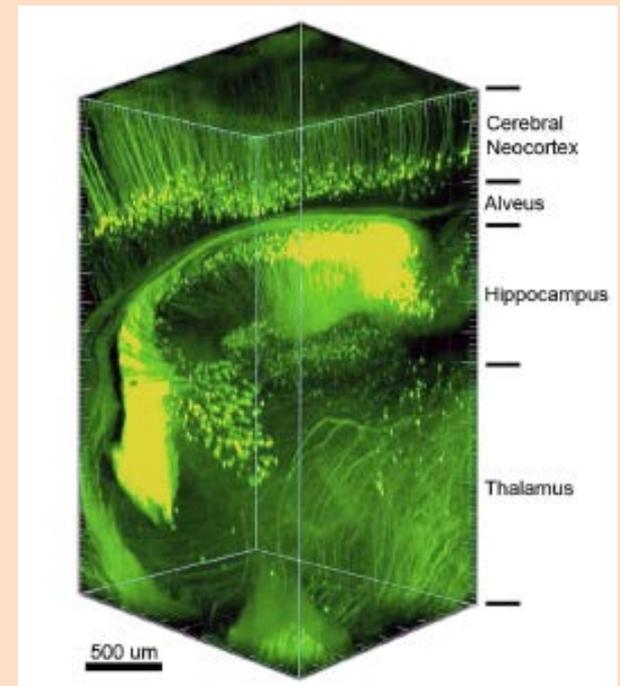
Optogenetics



Computation



Combine these for 4-D analyses  
(CR-CNS; INSPIRES; CIF21 and Big Data)



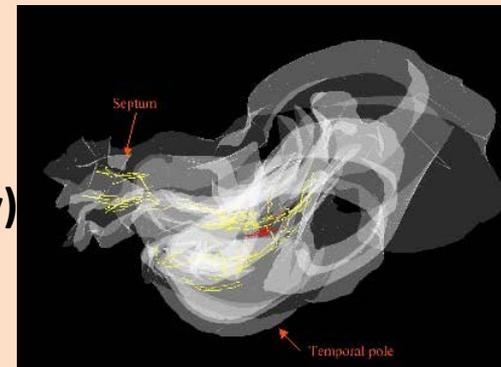
# Recent Awards Exploring the Emergent/Functional Properties of Neural Circuits

## Stimulus-induced neural networks (ACTIVATION Program)

Award Number: 1257923; Principal Investigator: William Frost at Rosalind Franklin U.  
[Escape Swim Behavior of Tritonia From Sea Star](#)

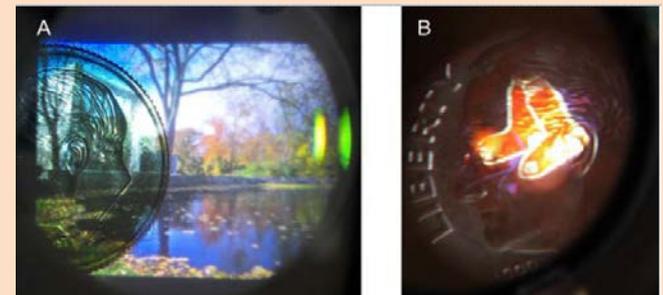
## US-French Collaboration: Mechanisms of emergent Oscillations in the septo-hippocampal network-MOTION (CR\_CNS, OISE, and ORGANIZATION Programs with the French National Research Agency)

Award Number: 1310378; Principal Investigator: Ivan Soltesz at UC-Irvine



## The Functional Role of Experience in the Development of Visual Cortical Circuits

Award Number: 1120938; Principal Investigator: Stephen Van Hooser;  
Co-Principal Investigator: Jozsef Fiser - Brandeis University





# NSF BRAIN Initiative

**Goal:** The **NSF BRAIN Initiative** aims to generate *an array of physical and conceptual tools* needed to determine how healthy brains function over the lifespan of humans and other organisms; and to develop a workforce to create and implement these tools aimed at establishing a more comprehensive understanding of how thoughts, memories and actions emerge from the dynamic activities in the brain.

## BRAIN Thematic Areas

**Multi-scale Integration of the Dynamic Activity and Structure of the Brain**

**Neurotechnology and Research Infrastructure**

**Quantitative Theory and Modeling of Brain Function**

**Brain-Inspired Concepts and Designs**

**BRAIN Workforce Development**



# NSF BRAIN Initiative

## **BRAIN Thematic Areas (derived from recent community-organized workshops):**

### **Multi-scale Integration of the Dynamic Activity and Structure of the Brain**

- Elucidate and link dynamics of the brain and neural circuits with brain function, including its real-time physiological, behavioral and cognitive outputs

### **Neurotechnology and Research Infrastructure**

- Create tools to image, sense, record and affect real-time brain function and complex behavior, and develop theories and systems to collect, visualize, analyze, model, store, and distribute BRAIN data

### **Quantitative Theory and Modeling of Brain Function**

- Reveal emergent properties of the brain and provide predictive theoretical frameworks to guide future research

### **Brain-Inspired Concepts and Designs**

- Capitalize on insights gained from BRAIN to inspire novel conceptual paradigms and innovative technologies and designs that will benefit society

### **BRAIN Workforce Development**

- Educate a BRAIN workforce and create new career opportunities for BRAIN discovery and innovation



National Science Foundation  
WHERE DISCOVERIES BEGIN

QUICK LINKS

SEARCH



HOME

FUNDING

AWARDS

DISCOVERIES

NEWS

PUBLICATIONS

STATISTICS

ABOUT NSF

FASTLANE

NSF 14-044

## Dear Colleague Letter: BRAIN EAGERs to Enable Innovative Neurotechnologies to Reveal the Functional and Emergent Properties of Neural Circuits Underlying Behavior and Cognition

Date: March 7, 2014

The National Science Foundation (NSF) is a partner in President Obama's "Brain Research Accelerated by Innovative Neurotechnologies" ("BRAIN") Initiative. As part of a broader range of activities related to the BRAIN Initiative, the Divisions of Integrative Organismal Systems (IOS) and Biological Infrastructure (DBI) in the Biological Sciences Directorate (BIO) seek Early Concept Grants for Exploratory Research (EAGER) proposals with the potential to transform our ability to analyze brain function underlying behavioral and cognitive processes.

**Questions?**