

# 2022 BIG BRAIN IMAGING WORKSHOP



*(Credit: Florian Maderspacher, Current Biology, 2016)*



**NeuroNex** Nemonic



Neurophotonics Center

## **FOR IN PERSON ATTENDEES: MAPS AND DIRECTIONS**



**DAY 1: Photonics Center, 9<sup>th</sup> Floor, 906 PHO, 8 St. Mary's St.**

**DAY 2: Hillel House, Bay State/Castle Rooms, 213 Bay State Rd.**

## **FOR ONLINE ATTENDEES: ZOOM DIRECTIONS**

To access the meeting over ZOOM at any time, use the link below to register with the email address associated with your zoom account:

[https://bostonu.zoom.us/meeting/register/tJ0rc--qqz8pH9P5VZC-W\\_Z1Cwn3gZPFLMwQ](https://bostonu.zoom.us/meeting/register/tJ0rc--qqz8pH9P5VZC-W_Z1Cwn3gZPFLMwQ)

After registering, you will receive a confirmation email containing the zoom meeting link and information about joining the meeting. The zoom link is good for both Days 1 and 2.

Note: This ZOOM registration is in addition to the original Eventbrite meeting registration

## AGENDA

### DAY 1: Photonics Center, 906 PHO, 8 St. Mary's St.

8:15 AM Check-in trainees arrive: Manuel Marte, Cara Ravasio, Michael Scimeca  
8:30-9:00 Breakfast (All Attendees) / Check-in  
9:00-9:10 Jerry Chen, Welcome

#### SESSION 1 What Are the Limits For Optical Imaging? I

Session Chairs: Joseph Green, Manuel Marte

9:10-9:35 **Adam Charles.** Johns Hopkins University  
*Consider the data: The computational side of big imaging*  
10:35-10:00 **Alipasha Vaziri.** Rockefeller University  
*Towards cortex-wide volumetric recording of neuroactivity at cellular resolution*  
10:00-10:15 **Gordon Smith.** University of Minnesota  
*Universality of modular correlated networks across the developing neocortex.*  
  
10:15-10:25 *Break*

#### SESSION 2 What Are the Limits For Optical Imaging? II

Session Chairs: David Lee, Xin Ye

10:25-10:50 **David Fitzpatrick.** Max Planck Florida Institute for Neuroscience  
*Functional synaptic architecture of visual cortex*  
10:50-11:15 **Jerome Mertz.** Boston University  
*Strategies for fast volumetric imaging*  
11:15-11:40 **David Hildebrand.** Rockefeller University  
*Progress toward examining populations of marmoset face cells with calcium imaging*  
11:40-12:00 Discussion (Sessions 1 and 2)  
  
12:00-1:20 *Lunch (All Attendees)*

#### SESSION 3 Considering Neuronal and Non-Neuronal Signals

Session Chairs: Bingxue Liu, Alanna Carey

1:20-1:45 **Prakash Kara.** University of Minnesota  
*3-photon imaging in cat visual cortex: An ideal system for determining the neural basis of fMRI across cortical layers*  
1:45-2:10 **Anna Devor.** Boston University  
*Imaging of O<sub>2</sub> consumption across cortical layers with 2-photon phosphorescence microscopy*  
2:10-2:35 **Eyal Seidemann.** University of Texas Austin  
*Toward "reading" and "writing" topographic neural population codes in the primate cortex*  
2:35-2:50 Discussion  
  
2:50-3:05 *Break*

#### SESSION 4 Wearable Technologies for Freely Moving Animals

Session Chairs: Antonio Ortega-Martinez, De'Ja Rogers

- 3:05-3:30 **Emily Gibson.** University of Colorado Anschutz Medical Campus  
*Miniature head-attached microscopes for imaging deeper into the brain*
- 3:30-3:55 **Daniel Aharoni.** University of California Los Angeles  
*Large-scale imaging of network dynamics in freely behaving animals.*
- 3:55-4:20 **Lei Tian.** Boston University  
*Towards wearable large-scale neural imaging by computational miniature mesoscope*
- 4:20-4:35 Discussion
- 4:35-4:45 *Break*
- 4:45-6:00 3 Breakout sessions

### **BREAKOUT SESSIONS – In Person Sign-Ups at Registration Table**

#### **1. Imaging Bigger Brains During Freely Moving Behavior**

**In Person Room: PHO 339 (3<sup>rd</sup> Floor)**

**Virtual Room: FreelyMoving**

Moderator: Lei Tian

Note Takers: Gabriela Rodriguez-Morales, Kelton Wilmerding

#### **2. Pushing the Optical Limits in Bigger Brains**

**In Person Room: PHO 901 (9<sup>th</sup> Floor)**

**Virtual Room: OpticalLimits**

Moderator: Prakash Kara

Note Takers: Jacob Norman, Caroline Habjan

#### **3. Overcoming Challenges in Animal Preparation**

**In Person Room: PHO Boardroom (9<sup>th</sup> Floor)**

**Virtual Room: AnimalPrep**

Moderator: Kristina Nielsen

Note Takers: Eleanor Brown, Naomi Shvedov

6:00-8:00p Dinner (Speakers and Organizers only)

## **DAY 2: Hillel House, Bay State/Castle Rooms, 213 Bay State Rd.**

8:00 AM Check-in Trainees Arrive: Jaimie Girniss, Songyang Wang, Qianwan Yang,

8:15-8:45 Breakfast (All Attendees) / Check-in

8:45-9:15 **Breakout Session Recap**

### **SESSION 5 Tools and Applications I**

Session Chairs: Sudiksha Sridhar, Songyang Wang

9:15-9:40 **Chris Xu.** Cornell University

*Imaging deep and fast with multiphoton microscopy*

9:40-10:05 **Anitha Pasupathy.** University of Washington

*Multiphoton imaging in the nonhuman primate.*

10:05-10:20 **Xindong Song.** Johns Hopkins University

*A silent two-photon imaging system for studying in vivo auditory neuronal functions in awake marmosets*

10:20-10:35 **Timo van Kerkoerle.** NeuroSpin, CEA Saclay (Online)

*Reliable and long-term three-photon imaging in macaque monkey cortex*

10:35-10:45 *Break*

### **SESSION 6 Tools and Applications II**

Session Chairs: Qianwan Yang, Songyang Wang

10:45-11:10 **Kristina Nielsen.** Johns Hopkins University

*Tools for two-photon imaging in ferrets and monkeys*

11:10-11:35 **Nicholas Priebe.** University of Texas Austin

*The operating regime of sensory cortex*

11:35-12:00 **Bijan Pesaran.** New York University (Online)

*A robotic platform for multiregional calcium imaging in the non-human primate brain*

12:00-12:20 Discussion (Session 5 and 6)

12:20-12:25 *Closing Remarks*

12:25 Lunch (All Attendees) and Departure

## **BREAKOUT SESSION TOPICS**

### **1. Imaging Bigger Brains During Freely Moving Behavior**

**In Person Room: PHO 339 (3<sup>rd</sup> Floor)**

**Virtual Room: FreelyMoving**

Moderator: Lei Tian

Note Takers: Gabriela Rodriguez-Morales, Kelton Wilmerding

- What are the critical neuroscience questions that would benefit from freely moving imaging in larger species?
- What are the technical requirements for freely moving imaging in larger species?
- What are the challenges and potential solutions for achieving these requirements? Are these specific to vs. common across species?
- Are there technologies that are not currently being considered worth exploring?
- What community efforts are needed to accelerate progress?

### **2. Pushing the Optical Limits in Bigger Brains**

**In Person Room: PHO 901 (9<sup>th</sup> Floor)**

**Virtual Room: OpticalLimits**

Moderator: Prakash Kara

Note Takers: Jacob Norman, Caroline Habjan

- What are the critical neuroscience questions that would benefit from pushing the optical limits in larger species?
- Which optical limits needed to be pushed to answer these neuroscience questions?
- What are the challenges and potential solutions for achieving these requirements? Are these specific to vs. common across species?
- Are there technologies that are not currently being considered worth exploring?
- What community efforts are needed to accelerate progress?

### **3. Overcoming Challenges in Animal Preparation**

**In Person Room: PHO Boardroom (9<sup>th</sup> Floor)**

**Virtual Room: AnimalPrep**

Moderator: Kristina Nielsen

Note Takers: Eleanor Brown, Naomi Shvedov

- What are the critical neuroscience questions that would benefit from improving current animal preparation approaches?
- What are the challenges and potential solutions for optical implants? Are these specific to vs. common across species?
- What are the challenges and potential solutions for expressing sensors of neural activity? Are these specific to vs. common across species?
- Should we be considering label-free imaging modalities?
- What community efforts are needed to accelerate progress?