# Columbia Workshop on Brain Circuits, Memory and Computation

*Thursday and Friday, March 21-22, 2019 | Davis Auditorium, CEPSR*

Organizer and Program Chair: Aurel A. Lazar (Columbia University)

The goal of the workshop is to bring together researchers interested in developing executable models of neural computation/processing of the brain of model organisms. Of interest are models of computation that consist of elementary units of processing using brain circuits and memory elements. Elementary units of computation/processing include population encoding/decoding circuits with biophysically-grounded neuron models, non-linear dendritic processors for motion detection/direction selectivity, spike processing and pattern recognition neural circuits, movement control and decision-making circuits, etc. Memory units include models of spatio-temporal memory circuits, circuit models for memory access and storage, etc. A major aim of the workshop is to explore the integration of various sensory and control circuits in higher brain centers.

## The BCMC workshop is sponsored by

► Department of Electrical Engineering, Columbia University
► Center for Computing Systems for Data-Driven Science, Data Science Institute, Columbia University
► School of Engineering and Applied Science, Columbia University

## Program Overview

### Thursday 09:00 AM - 05:30 PM

09:00 AM - 09:45 AM **Gero A. Miesenboeck** (University of Oxford), The Somnostat: Mechanisms for Balancing Sleep Need and Sleep

09:45 AM - 10:30 AM **Karla Kaun** (Brown University), Circuits that Encode and Predict Alcohol Associated Preference

10:30 AM - 11:00 AM Coffee Break

11:00 AM - 11:45 AM **Paul A. Garrity** (Brandeis University), Thermosensing in the Fly: from Genes to Cells to Behavior

11:45 AM - 12:30 PM **Richard Benton** (University of Lausanne), Olfactory Evolution in Drosophilids: Receptors, Neurons and Behaviours

12:30 PM - 02:00 PM Lunch Break

02:00 PM - 02:45 PM **Stephan Saalfeld** (HHMI Janelia), Better Connectome Reconstruction from Large Electron and Light Microscopy Volumes of the *Drosophila* Brain

02:45 PM - 03:30 PM **Anton Arkhipov** (Allen Institute of Brain Science), Data-Driven Modeling of the Cortex Based on a Systematic Experimental Platform

03:30 PM - 04:00 PM Afternoon Break

04:00 PM - 04:45 PM **Kristin Branson** (HHMI Janelia), Using Machine Vision and Learning to Discover How the Brain Generates Behavior

04:45 PM - 05:30 PM **Benjamin L. de Bivort** (Harvard University), The Neural Circuit Basis of Behavioral Individuality

### Friday 09:00 AM - 05:30 PM

09:00 AM - 09:45 AM **Stephen F. Goodwin** (University of Oxford), Neural Circuits Underlying Sex-Specific Behaviours

09:45 AM - 10:30 AM **Gwyneth Card** (HHMI Janelia), Towards a Brain Architecture for Visual Behavior Selection

10:30 AM - 11:00 AM Coffee Break

11:00 AM - 11:45 AM **Venkatesh N. Murthy** (Harvard University), Decoding and Demixing Smells

11:45 AM - 12:30 PM **Kevin M. Franks** (Duke University), Neural Circuits for Odor Coding in Piriform Cortex

12:30 PM - 02:00 PM Lunch Break

02:00 PM - 02:45 PM **Aurel A. Lazar** (Columbia University), Building the Functional Map of the Fruit Fly Brain

02:45 PM - 03:30 PM **Srinivas C. Turaga** (HHMI Janelia), Connecting the Structure and Function of Neural Circuits

03:30 PM - 04:00 PM Afternoon Break

04:00 PM - 04:45 PM **Tim Jarsky** (Allen Institute of Brain Science), Microcircuitry of the Cortex: Connectivity, Strength, and Short-Term Plasticity

04:45 PM - 05:30 PM **Louis Scheffer** (HHMI Janelia), Completing the Fly Model?