

Columbia Workshop on Brain Circuits, Memory and Computation

Friday and Saturday, March 18-19, 2016 | 501 NWC Building

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.

Program Overview

Friday 09:00 AM - 05:30 PM

- 09:00 AM - 09:45 AM **Alexander Borst** (MPI Neurobiology), Functional Characterization of the Input Elements to the Drosophila Motion Detector
- 09:45 AM - 10:30 AM **Michael B. Reiser** (HHMI Janelia), The Circuit Basis of Directional Selectivity in the Drosophila Visual System
- 10:30 AM - 11:00 AM Coffee Break
- 11:00 AM - 11:45 AM **Thomas R. Clandinin** (Stanford), How Does Contrast Selectivity Emerge in Motion Processing Pathways
- 11:45 AM - 12:30 PM **Chung-Chuan Lo** (National Tsing Hua University), The Virtual Fly Brain – from Bench-Top to Cyberspace
- 12:30 PM - 02:00 PM Lunch Break (On your own, see a list of restaurants in the area on the back)
- 02:00 PM - 02:45 PM **J. Douglas Armstrong** (University of Edinburgh), VirtualFlyBrain.org - An Integration Hub for Drosophila Neuroscience
- 02:45 PM - 03:30 PM **Michael Hawrylycz** (Allen Institute for Brain Science), Multiscale Gene Expression Signatures in the Mammalian Brain
- 03:30 PM - 04:00 PM Afternoon Break
- 04:00 PM - 04:45 PM **Gaby Maimon** (Rockefeller University), Probing the Neurophysiological Basis of Cognitive Operations in Behaving Drosophila
- 04:45 PM - 05:30 PM **Stanley Heinze** (Lund University), Merging Information about Direction and Distance - the Bee Central Complex as the Potential Neural Substrate for Path Integration

Saturday 09:00 AM - 05:30 PM

- 09:00 AM - 09:45 AM **Glenn C. Turner** (HHMI Janelia), The Mushroom Body and Learning - Flexibly Assigning Valence to Odors
- 09:45 AM - 10:30 AM **Vanessa Ruta** (Rockefeller University), Circuit Mechanisms for Flexible Sensory Processing in Drosophila
- 10:30 AM - 11:00 AM Coffee Break
- 11:00 AM - 11:45 AM **Marta Zlatic** (HHMI Janelia), Circuits Principles of Memory-Based Behavioral Choice
- 11:45 AM - 12:30 PM **Friedrich T. Sommer** (UC Berkeley), Interplay of Structural and Weight Plasticity: Effects on Memory Capacity and Connections to Cognitive Phenomena
- 12:30 PM - 02:00 PM Lunch Break (On your own, see a list of restaurants in the area on the back)
- 02:00 PM - 02:45 PM **Mala Murthy** (Princeton University), Neural Mechanisms for Dynamic Acoustic Communication in Flies
- 02:45 PM - 03:30 PM **Matthieu Louis** (Center for Genomic Regulation, Barcelona), Bayesian Maggots: Multisensory Integration in the Drosophila Larva
- 03:30 PM - 04:00 PM Afternoon Break
- 04:00 PM - 04:45 PM **Kwabena Boahen** (Stanford University), Neuromorphic Chips: Combining Analog Computation with Digital Communication
- 04:45 PM - 05:30 PM Panel Discussion: The Logic of NeuroInformation Processing of the Fruit Fly Brain

Registration is free but all participants have to register at: <https://bcmc16.eventbrite.com/>

Workshop Website: <http://www.bionet.ee.columbia.edu/workshops/bcmc/2016>