Johns Hopkins University

Department of Biology Seminar Series

Thursdays, 4:00pm

For more information go to:
https://bio.jhu.edu/events

Mudd Room 100 - September 28th, 2022

Bradley Dickerson

Assistant Professor

Princeton Neuroscience Institute,
Princeton University

Host: Andrew Gordus

Functionally stratified encoding in a biological gyroscope

Flies are among nature's most agile flying creatures. This exquisite maneuverability is due in part to their possession of specialized mechanosensory organs known as the halteres. The halteres are evolved from the hindwings and provide flies with dynamic mechanosensory feedback on a wingstroke-to-wingstroke basis. Additionally, halteres are biological "gyroscopes;" they rapidly detect rotational perturbations and help flies maintain a stable gaze and flight posture. Thus, the halteres serve as multifunctional sensory structures that provide essential timing information to the flight circuit. Halteres are covered in arrays of mechanosensors known as campaniform sensilla, that are arranged in distinct groups. Although longstanding hypotheses suggest that these different arrays may provide different information relevant to flight control, we know little about how haltere sensor location maps to physiology and behavior. I will discuss ongoing work in which we use a genetically encoded calcium indicator to visualize activity changes in the mechanosensors embedded in the haltere during active, visually mediated flight. I will also address how we are exploring the mechanisms by which mechanosensory input is recruited using reverse correlation analysis. Finally, I will cover our initial forays into connectomics and our development of an atlas describing the structure-function relationship between rapid mechanosensory feedback and motor systems.