

Title: Neuronal dynamics and functional resilience

Authors: Walter G. Gonzalez and Carlos Lois

Abstract: The brain is continuously exposed to a multitude of changes that can affect neuronal function. Nonetheless, the brain has evolved mechanisms to adapt to these disturbances to ensure continuity of behavior. Understanding the adaptive mechanisms that maintain and restore brain function at the cellular level would not only provide insight into the functioning of the normal brain but also guide future approaches to treat neurological disorders. However, to understand these mechanisms, it is necessary to investigate a behavior that is highly stereotypical and can be rigorously measured. Additionally, it is necessary to develop tools and methods to analyze the activity of a large number of neurons in freely behaving animals as well as to perturb neuronal function in a selective manner. We will employ mice as a platform to study the evolution and resilience of brain activity across a distributed circuit and zebra finches as a model of a highly stereotypic motor control. We present results from ongoing studies using mice and zebra finches to gain insight into the mechanisms of memory persistence and motor control using genetic manipulations, lesions, and in-vivo imaging.