

in partnership with



## Florian Engert

Professor of Molecular and Cellular Biology  
Harvard University, USA

*Host: Caroline Lei Wee (IMCB)*



Friday, 15 December (Hybrid)

2:00 PM-3:00PM

IMCB Seminar Room 3-46, Level 3, Proteos, Biopolis  
Singapore 138673 (or scan QR code for zoom registration)

## The Heart and the Mind: The role of the Central Nervous System in modulating Cardiac Homeostasis

In systems neuroscience, research is often focused on uncovering algorithms that enable the brain to calculate and generate appropriate motor behaviors to respond to external sensory stimuli. However, the body also plays a critical role in influencing the computations performed by the brain, both as targets to control, but also as a source of critical information about the internal state of the animal. Here, our goal is to understand the bidirectional interactions between cardiac and brain activity. This includes not only determining how the brain controls heart rate, but also how cardiac state might influence neural dynamics at a brain-wide level. To this end, we use the larval zebrafish, which enables simultaneous whole-body behavioral monitoring and brain-wide calcium imaging in intact animals. With this system, we identify neural populations across the brain with activity that mirrors cardiac state. We then use a combination of brain wide imaging and EM based connectomics to elucidate how these regions are inter-connected. We identify several key areas, including the habenula, the dorsal raphe and the periaqueductal gray as key conduits for representing and modulating cardiac state as well as motor output.

**Florian Engert** is Professor of Molecular and Cellular Biology at Harvard University, USA. He received his Ph.D. in physics from Ludwig Maximilian University of Munich 1997, and spent the following two years as a postdoctoral fellow at the Max Planck Institute for Neurobiology in Munich with Tobias Bonhoeffer. This was followed by two more years as a postdoc with Mu-ming Poo, first at the University of California, San Diego, and then at the University of California, Berkeley. In 2002, he accepted a position as an assistant professor at Harvard University, where he received tenure and was promoted to full professor in 2009. The general goal of his laboratory at present and in the intermediate future is the development of the larval zebrafish as a model system for the comprehensive identification and examination of neural circuits controlling various aspects of natural behaviors.