

PHYSICAL CHEMISTRY SEMINAR



Prof. Michael B. Elowitz

Caltech and HHMI

Monday, February 7, 2022

4:00 PM

Young Hall 2033

“Multicellular Circuit Design”



Abstract: Multicellular systems depend on molecular pathways, or circuits, for cell-cell communication, cell fate control, memory, and other core functions. Better understanding the perplexing designs of these circuits could allow us to control cells more precisely and to program new cellular behaviors. Our recent work brings “build to understand” synthetic biology approaches and quantitative analysis of natural pathways to identify new circuit design principles in mammalian cells. In particular, I will focus on a fully synthetic, but naturally inspired, cell fate control system that establishes multiple stable states, as well as synthetic circuits that allow cells to control their own population sizes using a “private” communication channel. I will also discuss the ability of promiscuous ligand-receptor interactions to enable specificity in cell-cell communication. These results highlight unexpected circuit design principles that enable both natural and synthetic circuit behaviors.