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Programming bio-synthetic dynamical systems

Elisa Franco

Control and Dynamical Systems, California Institute of Technology, Pasadena, CA

Abstract:

The functionalities of every living organism are wired in the biochemical interactions existing among proteins, nucleic acids and all the other molecules that constitute life's building blocks. Understanding how to embed any function in this "hardware of life" via "molecular programming" is an exciting and challenging task for modern bioengineers and synthetic biologists.

A simple tool kit to investigate molecular programmability from a theoretical and experimental point of view, can be built by using exclusively nucleic acids and a few protein species. Despite its simplicity, this setting allows us to achieve a high computational complexity.

In this talk, I will describe the analysis and experimental synthesis of molecular circuitry built using in vitro genetic circuits, with particular attention to the challenges of regulation and modularity.