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# CARLOS RODRIGUEZ

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CV

PARTICIPANT AT:

## SYNTHETIC BIOLOGY. FROM STANDARD BIOLOGICAL PARTS TO ARTIFICIAL LIFE

**September, 17<sup>th</sup>-18<sup>th</sup>, 2015, Barcelona**

**Carlos Rodriguez**, Postdoctoral researcher at the Complex Systems lab at the Universitat Pompeu Fabra and part-time lecturer in the biomedical engineering degree, Barcelona, Spain

Postdoctoral researcher at the Complex Systems lab at the Universitat Pompeu Fabra and part-time lecturer in the biomedical engineering degree. With a background in Biology he combines theoretical, computational and experimental approximations to the study of the principles of biological organisation at molecular and cellular scale, from the perspective of systems and synthetic biology. His research spans different branches of Molecular Biology, Physics and Computation applied to the study of complex biological networks, hierarchical systems and systems dynamics.

B-DEBATE IS AN INITIATIVE OF:



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ABSTRACT

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### **The Wrong Use of Hill Functions for Synthetic Biology Designs: Lessons from Enzymology**

Within the field of synthetic biology, a rational design of genetic parts should include a causal understanding of their input-output responses—the so-called transfer function—and how to tune them. However, a commonly adopted strategy is to fit data to Hill-shaped curves without considering the underlying molecular mechanisms. Here we provide a novel mathematical formalization that allows prediction of the global behavior of a synthetic device by considering the actual information from the involved biological parts. This is achieved by adopting an enzymology-like framework, where transfer functions are described in terms of their input affinity constant and maximal response. As a proof of concept, we characterize a set of Lux homoserine- lactone-inducible genetic devices with different levels of Lux receptor and signal molecule. Our model fits the experimental results and predicts the impact of the **receptor's** ribosome-binding site strength, as a tunable parameter that affects gene expression.

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