

Joint
Center for Soft Matter and Biological Science
and
Condensed Matter Seminar

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Bottom-up Assembly of Microbial Communities: Modeling, Analysis and Engineering

Monday, April 3, 2017

4:00 pm—5:00 pm

304 Robeson Hall

Microbes are of fundamental importance to human health, environment and agriculture. To ultimately exploit their potential for various purposes, a fundamental challenge is to decipher the basic rules of microbial community organization that is heterogeneous in space and time. My lab aims to address the challenge using a bottom-up approach that combines biophysical modeling with experimental synthetic biology. Recently, we developed a computational platform that enables individual-based simulation of microbial communities across multiple scales. We also explored how the modes of cellular social interaction and the spatial scale of interaction contribute to microbial assemblages using the platform, both of which were subsequently determined using experimental ecosystems. Using engineered cellular interactions, we further demonstrated the utility of synthetic microbial consortia for metabolic engineering applications. Our studies provide insights into the organization of complex microbial communities and illustrate the potential of synthetic communities for practical goals.