

# THE CRM APPLIED MATHEMATICAL PHYSICS (CAMP) SEMINARS



CENTRE DE RECERCA MATEMÀTICA

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## Dynamics between steady states in microbial ecosystems

### Abstract:

Microbiomes are complex, dynamic communities intimately related to their environments. Despite the increasing efforts at developing a comprehensive ecological understanding of these microbial ecosystems, we are still far from a predictive theory to routinely engineer their community dynamics in order to promote health or fight environmental deterioration. Here, we study, both theoretically and experimentally, the dynamics between steady states of two different microbial ecosystems. The first model system permitted us to analyze how environmental resources shape the spatial dynamics of bacterial population fronts. Interestingly, we show that improved environments can slow down range expansions of mutualistic bacterial strains. In the second model, we explore transitions between population stable states induced by short-term perturbations. On the one hand, we show that environmental perturbations (such as antibiotic shocks) can induce shifts between stable states that can be predicted by analyzing the interactions between bacteria and their environment. On the other hand, we propose that transient invaders (alien species that interact with the community for short periods of time) can be a common cause of shifts between microbial stable states.

**Date:** May 12, 2017

**Place:** Room C1/028

**Time:** 12:00

