

# SPOKANE REGIONAL MATHEMATICS COLLOQUIUM

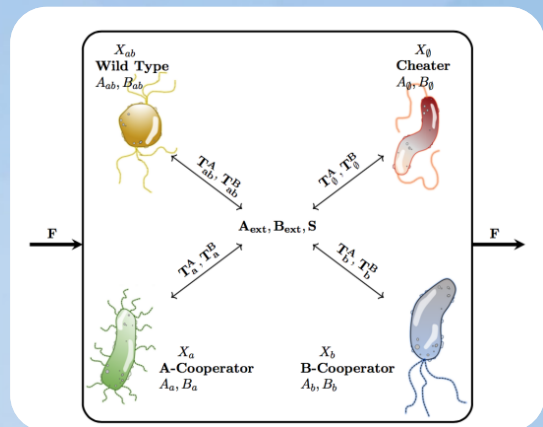
Presents:

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## Emergence of Cooperative Behavior in Microbial Consortia



Microbial communities that implement mutual cross-feeding are commonly observed in nature and with synthetic constructs in laboratory experiments. A mathematical model of competition in a chemostat is developed to investigate the role that resource allocation and transport of metabolites play in cooperation. The model contains four cell types that differ by whether they produce two, one, or none of two essential metabolites. Producing cell types may export these resources into the environment, and those that do not produce both metabolites must import the missing resource. The contribution to the emergence of a collaborative consortium of single resource producers from the transport rate of these metabolites and the type of transport used by the cell (active vs. passive) is studied. Multiple instances of bi-stability and tri-stability are observed, and the effect of the initial concentration of a non-cooperative cheater cell type on the final outcome of the competition is examined. When the cost of producing metabolites is introduced into the model, significant changes to the outcome of the competition are observed, including coexistence of multiple cell types.

WHERE: GONZAGA UNIVERSITY | HERAK CENTER 237

WHEN: WEDNESDAY, NOVEMBER 7, 2018, 5PM-6PM

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