

## **Optimal Control on Polynomial Dynamical Systems Expedited by Use of Algebraic Geometry**

Franziska Hinkelmann

Mathematical Biosciences Institute, The Ohio State University

Systems biology aims to explain how a biological system functions by investigating the interactions of its individual components from a systems perspective. Modeling is a vital tool as it helps to elucidate the underlying mechanisms of the system.

My research is on methods for inference and analysis of polynomial dynamical systems (PDS). This is motivated by the fact that many discrete model types, e.g., Boolean networks or agent-based models, can be translated into the framework of PDS, that is, time- and state-discrete dynamical systems over a finite field where the transition function for each variable is given as a polynomial. This allows for using a range of theoretical and computational tools from computer algebra, which results in a powerful computational engine for model construction, parameter estimation, and analysis methods such as steady state behavior and optimal control.