

# **Extensions of Birch's Theorem, with applications to dynamical systems**

*Anne Shiu*  
*University of Chicago*

Birch's Theorem states that the intersection of the image of a certain monomial map and a related polyhedron is a single point. In the context of Algebraic Statistics, this theorem gives the existence and uniqueness of maximum likelihood estimates for log-linear models. In the setting of dynamical systems, the theorem gives the existence and uniqueness of equilibria for certain chemical reaction systems. We present an extension of Birch's Theorem which allows us to make progress on a long-standing conjecture concerning the long-term dynamics of chemical reaction systems.

This is joint work with Manoj Gopalkrishnan and Ezra Miller.