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Badal Joshi and **Anne Shiu*** (annejls@math.tamu.edu). *Which biochemical reaction networks are multistationary?*

Many dynamical systems arising in applications (in systems biology, for instance) are multistationary, and yet the following question is open: when taken with mass-action kinetics, which reaction networks admit multiple steady states? Mathematically, this question is: among certain parametrized families of polynomial systems, which families admit multiple positive roots (for some parameter values)? No complete answer is known, although various criteria now exist—some to answer the question in the affirmative and some in the negative. In this talk, we answer these questions for the smallest networks—those with only a few chemical species or reactions. Our results highlight the role played by the Newton polytope of a network (the convex hull of the reactant vectors). Finally, our work is motivated by recent results that connect the capacity for multistationarity of a given network to that of certain related networks which are typically smaller: we are therefore interested in classifying small multistationary networks, and our results form the first step in this direction. (Received January 15, 2016)