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E. Queirolo* (elena.queirolo@rutgers.edu), elena.queirolo@rutgers.edu. *How to choose parameters: a first outlook.*

In this talk, we concentrate on cell biological applications, where the dynamical equations are relatively well known and parameters are plentiful (in the order of hundreds). Experiments can detect the qualitative behaviours of the system but not the values of the parameters. Then, we want to determine in which parameter regime the detected behaviours are possible. So we are interested in answering the question:

Given a dynamical system dependent on a high dimensional parameter, can we find regions of parameter space where the system has a given qualitative dynamics?

The initial results presented in this talk are based on the toggle switch, a 2D dynamical system that is known to generically exhibit either 1 or 3 equilibria. The core difficulty of the problem relies on the high dimensionality of parameter space: our toy problem already requires 9-dimensional parameters.

To gather a first understanding of the problem, we approximate the toggle switch by a switching system. Understanding the behaviour of the switching system allows us to have a first approximation of the dynamics. We then refine it by numerically searching for the bifurcation manifold that should divide the two behaviours. (Received January 08, 2021)