1051-60-27 **Berton A Earnshaw*** (earnshaw@math.msu.edu) and **James P Keener** (keener@math.utah.edu). *Global asymptotic stability of solutions of nonautonomous master equations: extensions of van Kampen's theorem.*

From chemical reactions to ion channel kinetics, many stochastic processes in biology are modeled as finite-state, continuous-time jump process. Under mild assumptions on the transition rates, one derives a *master equation* (ME) governing the evolution of the probability distribution for the process. When the ME is autonomous, van Kampen proved that, with additional constraints on the (constant) transition rates, all probability distribution solutions of the ME converge to a unique stationary distribution in the long-time limit.

However, most biological processes are subject to nonstationary, external forces that are either unknown or difficult to model. In these cases the ME is necessarily nonautonomous, yet one still wants to understand the long-time behavior of the probability distribution solutions. In this talk we demonstrate how a variety of different constraints on the nonconstant transition rates ensure that the probability distribution solutions of the ME are globally asymptotically stable, thus extending van Kampen's theorem. By constructing counterexamples, we show that certain natural assumptions on the transition rates do not in general ensure that the probability distribution solutions of the associated ME are globally asymptotically stable. (Received July 21, 2009)