$S_t \circ c(h)(a_s)_{ti} c(s) + \mathfrak{S}_e m^i n(a_r)$

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Stochastic integrate-and-fire models: a spectral approach

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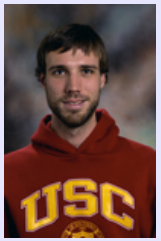

Time and Place: Monday February 11, 2008; 3:30–4:30 p.m.; LCB 219

This talk will focus on Stochastic Integrate-and-Fire Models (SIFMs) with small, Gaussian noise component. Associated with any such SIFM is a Markov Chain of firing phases on the circle which we analyze via spectral properties of the corresponding transition operator. Using a result of Durbin on first-passage-time densities, we show that the transition density for this sequence of firing phases is approximately Gaussian which motivates us to develop some general techniques for treating Gaussian perturbations of dynamical systems on the circle. One of the interesting outcomes of our analysis is in providing an example of how bifurcations in a deterministic system can often lead to important changes in the top eigenvalues of transition operators for associated randomly perturbed systems, a phenomenon we call a λ-bifurcation. We will also provide some examples demonstrating these results.