1054-37-89 **Peter H. Baxendale*** (baxendal@math.usc.edu), Department of Mathematics, University of Southern California, 3620 South Vermont Avenue, KAP 108, Los Angeles, CA 90089-2352. *A Spectral Analysis of the Stochastic Integrate-and-Fire Oscillator.*

The integrate and fire oscillator is a widely used model for the evolution of the membrane potential in a nerve cell. One important problem is to determine the effect of periodic modulation of the input current or the firing threshold function on the sequence of firing times. For a noise-free system the sequence of firing phases (modulo the period of the modulation) is a deterministic dynamical system on the circle, and its bifurcation scenario has been studied by many authors. When white noise is added to the membrane potential, the sequence of firing phases becomes a uniformly ergodic Markov chain on the circle and the bifurcation behavior is smoothed out. However numerical computations with small noise intensity suggest that some of the deterministic behavior shows up in the eigenvalues of the Markov transition operator. This talk will describe recent theoretical results, obtained jointly with John Mayberry (Cornell University), on small noise asymptotics of the spectrum of this Markov transition operator. (Received September 07, 2009)