Meeting: 1007, Santa Barbara, California, SS 1A, Special Session on Dynamical Systems in Neuroscience

1007-37-20 **Jeff Moehlis*** (moehlis@engineering.ucsb.edu), Dept Mechanical Environmental Engineering, Engineering II Building, Room 2350, University of California, Santa Barbara, Santa Barbara, CA 93117, **Eric Brown**, Courant Institute, and **Philip Holmes**, Princeton University. *The Response Dynamics of Neural Oscillator Populations.*

We undertake a probabilistic analysis of the response of repetitively firing neural populations to simple pulselike stimuli. This work is motivated by experimental data which shows that neurons in a region of the brain known as the locus coeruleus (LC) can exhibit distinct firing patterns which are strongly correlated with performance on cognitive tasks. Using a phase oscillator model for the LC neurons, we compute average firing probabilities for a pool of neurons in response to stimuli over many trials. This involves the solution of an advection-diffusion equation, and shows that neural response (1) is elevated in populations with lower baseline firing rates, and (2) decays due to noise and distributions of neuron frequencies. Similar results are obtained for other types of neurons, although the details of the response depend crucially on the type of bifurcation which leads to their repetitive firing. (Received November 30, 2004)