



# Applied Mathematics



## CRM-McGill Applied Mathematics Seminar

March 9, 2006, 4:05 pm Friday  
At McGill, Burnside Hall 1205

“What makes a neuron spike: Optimality, noise, and phase resetting”

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*Coffee and refreshments will be served after the seminar*

### Abstract:

I will describe behavior of nearly regularly firing neurons in the presence of noisy stimuli. I first describe the phase resetting curve (PRC) and how it responds to noisy inputs. I show how there is an optimal shape for the PRC and discuss the effects of unshared noise. Next I turn to an important computational concept - the spike-triggered average. The STA is the optimal linear filter for reconstructing firing rates from stimuli. I show that the STA and the PRC are closely related. I then show that the reliability and the STA are related and use this to show that neurons are tuned to noise which has the spectral characteristics of excitatory synapses. This work is joint with Sashi Marella, Aushra Abouzeid, Nathan Urban and Roberto Fernandez-Galan