# Effects of Synaptic Coupling on Stochastic Phase Synchronization in a Neural Array

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In a recent paper [1], stochastic phase synchronization was studied in an array of coupled neurons [2] with gap-junction type connections. In that model, it was found that synchronization occurs for lower coupling constants when neurons are initially in a bursting state than when they are initially firing singlet spikes. The system passes though various synchronization regimes as the coupling constant is increased, and increased coupling induces bursting in neurons which initially fire singlet spikes. Here, we study the effects of a more realistic mode of coupling on the model, by introducing excitatory and inhibitory synaptic coupling terms. We will discuss the effects of varying ratios of excitation to inhibition on the bursting and synchronization properties of the model, and discuss the possible implications of the system as a model for the spread of seizure activity in the cortex.

[1] S. Bahar. Burst-enhanced synchronization in an array of noisy coupled neurons. *Fluctuation and Noise Letters* **4**(1):L87-L96, 2004.
[2] H. A. Braun, M. T. Huber, M. Dewald, K. Schäfer, and K. Voigt. Computer simulations of neuronal signal transduction: the role of nonlinear dynamics and noise. *Intl. J. Bifurcation and Chaos* **8**(5): 881-889, 1998.