Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Modeling spatiotemporal patterns of neocortical activity in epileptic seizures DAISUKE TAKESHITA, FRANK MOSS, SONYA BAHAR, Center for Neurodynamics, Department of Physics and Astronomy, University of Missouri at St. Louis — Epileptic seizures are characterized by excess and synchronized neural activity. To investigate how seizures initiate and terminate, we develop a model of a neocortical network based on a model suggested by Wilson [1]. We simulate the effect of the potassium channel blocker 4-aminopyridine, which is often used in experiments to induce epileptic seizures, by decreasing the conductance of the potassium channels in a small fraction of neurons in our model. We show that the firing frequency of a single neuron is increased by decreasing the conductance in some cases. By coupling one normal neuron to another neuron which has decreased potassium conductance, changes in behavior such as an increase in firing rate, switching from spiking to bursting, and synchronized activity are observed depending on the coupling strength between the neurons. We will also discuss the effect of decreased conductance on the spread of activity through the network, and on the initiation and termination of seizure-like events. [1] Wilson HR, J. theor. Biol. (1999) 200, 375-388

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Date submitted: 30 Nov 2004 Electronic form version 1.4