Abstract Submitted
for the TSF07 Meeting of
The American Physical Society

**Emergence of Alpha and Gamma Like Rhythms in a Large Scale Simulation of Interacting Neurons**[1] PHILIPP GAEBLER[2], Harvey Mudd College, BRUCE MILLER, Texas Christian University — In the normal brain, at first glance the electrical activity appears very random. However, certain frequencies emerge during specific stages of sleep or between quiet wake states. This raises the question of whether current mathematical and computational models of interacting neurons can display similar behavior. A recent model developed by Eugene Izhikevich appears to succeed. However, early dynamical simulations used to detect these patterns were possibly compromised by an over-simplified initial condition and evolution algorithm. Utilizing the same model, but a more robust algorithm, here we present our initial results, showing that these patterns persist under a wide range of initial conditions. We employ spectral analysis of the firing patterns of a system of interacting excitatory and inhibitory neurons to demonstrate a bimodal spectrum centered on two frequencies in the range characteristic of alpha and gamma rhythms in the human brain.

[1]partial support provided by TCU REU program, NSF Grant 0453577
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Date submitted: 04 Oct 2007 Electronic form version 1.4