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Christoph Borgers* (cborgers@tufts.edu), Department of Mathematics, Tufts University, Medford, MA 02421. *Gamma-generating networks with inhibitory cells that do not participate in the rhythm.* Preliminary report.

Gamma (30-80 Hz) oscillations in the hippocampus and neocortex are thought to come about from the interaction of pyramidal cells and a specific class of inhibitory neurons, the parvalbumin-positive basket cells. The firing of many other types of inhibitory neurons in the brain is modulated only weakly by ongoing gamma oscillations. The work presented here is part of a larger project in which we try to understand the roles of some of these cell types in gamma oscillations.

A constant low-level bath of inhibition affecting the gamma-generating networks facilitates the formation of gamma oscillations and amplifies winner-take-all competition among pyramidal cells. I will explain why and in which sense this is so by analyzing model problems, and illustrate the effects by numerical examples. These observations support the suggestion that CCK-positive basket cells may play a role in thresholding pyramidal cells during gamma oscillations (Tukker et al, J. Neurosci. 2007).

I will then present a numerical study of the effects of random fluctuations in the strength of the bath of inhibition. Stochasticity appears to soften the thresholding. It also introduces random fluctuations in the gamma period, thereby making the behavior of the gamma-generating model networks more realistic. (Received September 07, 2010)