1051-92-74 **Emily Stone*** (stone@mso.umt.edu), Dept. of Mathematical Sciences, The University of Montana, 32 Campus Drive, Missoula, MT 59812, and **Josh Lawrence** (john.lawrence@mso.umt.edu), Center for Struc. & Func. Neuroscience, Dept. Biomedical and Pharm. Sciences, The University of Montana, Missoula, MT 59812. *Neuromodulation of Synaptic Depression: Discrete dynamical system models predict changes in short term plasticity.* Preliminary report.

Parvalbumin-positive (PV+) basket cells (BC), interneurons that provide inhibition to the perisomatic regions of principal cells, play a critical role in the generation of gamma oscillations both in vitro and in vivo. Bath application of the cholinergic agonist carbachol readily evokes hippocampal gamma oscillations, but how cholinergic neuromodulation alters the intrinsic and synaptic properties of hippocampal PV+BCs is poorly understood. Experiments in Dr. J. Lawrence's lab demonstrate that such cholinergic neuromodulation relieves synaptic depression of PV+BCs in the CA1 region of the hippocampus at gamma (around 50 HZ) but not theta (around 5 HZ) frequencies. Specifically, in paired whole cell recordings in mouse CA1 hippocampus, activation of presynaptic metabatropic acetylcholine receptors inhibits transmission between presynaptic PV+BCs and postsynaptic pyramidal cells, in a frequency specific manner. This talk documents the development and analysis of return map models of this phenomenon, what aspects are essential, and the implications for the type of cellular mechanisms potentially involved in the neuromodulation. (Received August 13, 2009)