1158-92-232 **Alla Borisyuk*** (`borisyuk@math.utah.edu`) and **Gregory Handy**. *Effect of Astrocytes in Neuronal Networks.* Preliminary report.

Astrocytes are glial cells making up 50% of brain volume, with each one wrapping around thousands of synapses, and playing multiple important roles. However their exact effect in governing the dynamics of the synapse and neuronal networks is being debated. In particular, the tightness of their wrapping (or "degree of ensheathement") and the number of the synapses ensheathed varies by brain region and in certain disease states such as some forms of epilepsy. We set out to investigate whether the changes in ensheathment properties contribute to the disease state of the network or, conversely, play a protective role. First, we consider an individual synapse as a DiRT (Diffusion with Recharging Traps) model: diffusing particles can escape through absorbing parts of the boundary, or can be captured by traps on the boundary. We show that a synapse tightly ensheathed by an astrosyte makes neuronal connection faster, weaker, and less reliable. These influences can then be included in a neuronal network model by adding an "effective" astrocyte on every synapse. Depending on the number of synapses ensheathed, and the ensheathment strength, the astrocytes are able to push the network to synchron and to exhibiting strong spatial patterns, possibly contributing to epileptic disorder. (Received March 02, 2020)