

Abstract Submitted
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Astrocytes optimize synaptic fidelity¹ SUHITA NADKARNI, Center for Theoretical Biological Physics, UC SanDiego, PETER JUNG, Dept. of Physics and Astronomy, Ohio University, HERBERT LEVINE, Center for Theoretical Biological Physics, UC SanDiego — Most neuronal synapses in the central nervous system are enwrapped by an astrocytic process. This relation allows the astrocyte to listen to and feed back to the synapse and to regulate synaptic transmission. We combine a tested mathematical model for the Ca^{2+} response of the synaptic astrocyte and presynaptic feedback with a detailed model for vesicle release of neurotransmitter at active zones. The predicted Ca^{2+} dependence of the presynaptic synaptic vesicle release compares favorably for several types of synapses, including the Calyx of Held. We hypothesize that the feedback regulation of the astrocyte onto the presynaptic terminal *optimizes* the fidelity of the synapse in terms of information transmission.

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