

Stochastic Ising model with plastic interactions

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Abstract

We propose a new model based on the Ising model with the aim to study synaptic plasticity phenomena in neural networks. It is today well established in biology that the synapses or connections between certain types of neurons are strengthened when the neurons are co-active, a form of the so called synaptic plasticity. Such mechanism is believed to mediate the formation and maintenance of memories. The proposed model describes some features from that phenomenon. Together with the spin-flip dynamics, in our model the coupling constants are also subject to stochastic dynamics, so that they interact with each other. The evolution of the system is described by a continuous-time Markov jump process. This is a joint work with Guillem Via and Eugene Pechersky.