Universidade Federal da Paraíba

Centro de Ciências Exatas e da Natureza

Programa de Pós-Graduação *Stricto Sensu* em Física

Colóquio

"Correlations Induced by Depressing Synapses in Quenched Critically Self-Organized Networks"

RESUMO: In a recent work, mean-field analysis and computer simulations were employed to analyze critical self-organization in annealed networks of excitable cellular automata, where randomly chosen links were depressed after each spike. Calculations agree with simulations of the annealed version, showing that the nominal branching ratio σ converges to unity in the thermodynamic limit, as expected of a self-organized critical system. However, the question remains whether the same results apply to a biologically more plausible, quenched version, in which the neighborhoods are fixed, and only the active synapses are depressed. We show that simulations of the quenched model yield significant deviations from $\sigma = 1$, due to spatial correlations. However, the model is shown to be critical, as the largest eigenvalue λ of the synaptic matrix is shown to approach unity in the thermodynamic limit. We also study the finite size effects near the critical state as a function of the parameters of the synaptic dynamics.

Prof. Dr. Mauro Copelli
UFPE

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