Generic bursty and slow dynamics in network models

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Quenched disorder is known to play a relevant role in dynamical processes and phase transitions. By studying the Contact Process (CP) we showed that Griffiths Phases (GP) and other rare region effects, leading rather generically to anomalously slow relaxation on Erős-Rényi networks with explicit quenched disorder. We found that GPs can also emerge solely as the consequence of topological heterogeneity in networks exhibiting finite topological dimensions [1-2]. Similar power-law dynamics can also be observed on scale-free trees, in case of disassortative weighting schemes, in the neighborhood of smeared phase transitions [3]. Recently, I have pointed out that localization, described by quenched mean-field approximations is related to the existence of rare region effects and GPs in case of Susceptible Infected Susceptible (SIS) models on various complex networks [4-7].
Bursty dynamics of agents is shown to appear at criticality or in extended GPs even in case of Poisson processes. I provide numerical evidence for power-law type of intercommunication time distributions by simulating the CP and SIS. This observation suggests that in case of non-stationary bursty systems the observed non-poissonian behavior can emerge as the consequence of an underlying, hidden poissonian network process, which is either critical or exhibits strong rare-region effects [7].

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