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Title : Mixing times for random walks on random graphs with communities

Abstract : The mixing time of random walks on finite connected graphs is tightly related to the existence of bottlenecks in the graph: intuitively, the harder it is for the walk to escape some sets, the larger its mixing time. Moreover, strong bottlenecks usually prevent cutoff, which describes an abrupt convergence to equilibrium. In this talk, we will be interested in the mixing behavior of the non-backtracking random walk on random graphs of size N with given degrees and with a two-community structure. Such graphs have a bottleneck, whose strength can be tuned by controlling the fraction of edges that go from one community to the other. Under some degree assumptions, it occurs that there is a precise threshold for the fraction of inter-community edges, around which the walk switches from a fast mixing regime with cutoff, to a slow mixing regime without cutoff.