Distributed algorithms on random graphs.

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Distributed model of computing is one of the natural models to depict functioning Ad Hoc Networks. One of the key problems concerning the model is finding a maximal independent set (MIS) in a given arbitrary graph on n vertices. The problem is closely related to the information transmission problems and routing in Ad Hoc Networks. The best known distributed algorithm finds MIS in an arbitrary graph on n vertices in $O(\log n)$ synchronous rounds with probability tending to 1 as $n \to \infty$ (w.h.p.). If one restrict to some subclass of graphs the results might be improved. Namely, for bounded degree and growth-bounded graphs there exist deterministic algorithms which find MIS in $O(\log^* n)$ synchronous rounds. For trees there exist algorithm which w.h.p. find MIS in $O\sqrt{\log n \log\log n}$ synchronous rounds.

In the talk we will concentrate on the model of random graphs for the parameters near phase transition and connectivity threshold. We will present a distributed algorithm which w.h.p. finds MIS in Erdős–Rényi random graph in $o(\log n)$ synchonous rounds.

We will also present related result concerning matchings.