On the trace of random walks on random graphs

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Given a base graph and a starting vertex, we select a vertex uniformly at random from its neighbours and move to this neighbour, then independently select a vertex uniformly at random from that vertex's neighbours and move to it, and so on. The sequence of vertices this process yields is a *simple random walk* on that graph. The set of edges traversed by this walk is called the *trace* of the walk, and we consider it as a subgraph of the base graph.

In this talk, we shall discuss graph-theoretic properties of the trace of a random walk on a random graph. We will show that if the random graph is dense enough to be typically connected, and the random walk is long enough to typically cover the graph, then its trace is typically Hamiltonian and highly connected.

For the special case where the base graph is the complete graph, we will present a hitting time result, according to which, with high probability, exactly one step after the last vertex has been visited, the trace becomes Hamiltonian.

Finally, we will present results concerning the appearance of small subgraphs in the trace.

The talk is based on joint works with Alan Frieze, Michael Krivelevich and Ron Peled.