

The hitting time of a clique factor

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In 1979 Shamir asked: When does a random r -uniform hypergraph contain a perfect matching, that is, a collection of n/r vertex-disjoint r -hyperedges? A closely related question is: When does a random graph contain an r -clique factor, that is, a collection of n/r vertex-disjoint cliques of size r ?

Johansson, Kahn and Vu solved both of these questions up to constant factors in their seminal paper in 2008. It had long been assumed that the main (or only) obstacle in finding a perfect matching are vertices not contained in any hyperedge. In the clique factor setting, the corresponding obstacle are vertices not contained in any r -clique. Recently Jeff Kahn solved Shamir's problem in the strongest possible sense, showing that in the random hypergraph process (where we start with an empty hypergraph and add the r -hyperedges in a uniformly random order), a perfect matching exists as soon as there are no more isolated vertices. However his sharper arguments do not apply to the clique factor setting.

We construct a coupling of the random hypergraph process and the cliques of the random graph process which allows us to transfer Kahn's result to the graph setting, yielding the analogous hitting time result for clique factors.

Joint work with Marc Kaufmann, Noela Müller, Matija Pasch.