Non-vertex balanced factors in random graphs

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For a fixed graph H, and a (larger) graph G, an H-factor of G is a vertex disjoint collection of copies of H, that cover all the vertices of G. We are interested in the threshold functions for the existence of an H-factor in the Erdős-Rényi random graph. The case where H is a single edge (a perfect matching) has been known since 1964 but even the case where H is a triangle is far more difficult and remained unsolved until the 2008 paper by Johansson, Kahn, and Vu, which found thresholds for all strictly balanced graphs. In the same paper, the authors conjectured thresholds for all graphs; dividing them into two cases, depending on whether all vertices of H lie in a subgraph of maximum density. We call this property vertex-balanced, and in this talk we show how a generalisation of the strictly balanced case allows for proving the threshold conjectured by Johansson, Kahn, and Vu for non-vertex-balanced graphs.

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