Transference for loose Hamilton cycles in random 3-uniform hypergraphs

Kalina Petrova

A loose Hamilton cycle in a hypergraph is a cyclic sequence of edges covering all vertices in which only every two consecutive edges intersect and do so in exactly one vertex. With Dirac's theorem in mind, it is natural to ask what minimum d-degree condition guarantees the existence of a loose Hamilton cycle in a k-uniform hypergraph. For $k = 3$ and $d = 1$ or $d = 2$, the necessary and sufficient such condition is known precisely. We show that these results adhere to a 'transference principle' to their sparse random analogues. The proof combines several ideas from the graph setting and relies on the absorbing method. In particular, we employ a novel approach of Kwan and Ferber for finding rooted absorbers in subgraphs of sparse hypergraphs via a contraction procedure. In the case of $d = 2$, our findings are asymptotically optimal.