

Long paths and cycles in random hypergraphs and related algorithms

Julian Zalla

Given integers k, j with $1 \leq j \leq k - 1$, we consider the length of the longest j -tight path in the binomial random k -uniform hypergraph $H^k(n, p)$. We show that this length undergoes a phase transition from logarithmic length to linear and determine the critical threshold, as well as proving upper and lower bounds on the length in the subcritical and supercritical ranges. In particular, for the supercritical case we introduce the ‘Pathfinder’ algorithm, a depth-first search algorithm which discovers j -tight paths in a k -uniform hypergraph and the ‘CoreConstruct’ algorithm, which is a peeling process for a relevant subhypergraph of $H^k(n, p)$.