Institut für Diskrete Mathematik

Combinatorics Seminar

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AE06 Steyrergasse 30, EG

The cop number of random hypergraphs

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The vertex-persuit game *Cops and Robbers* is usually played on a graph, in which a group of cops attempt to catch a robber moving along the edges of the graph. The *cop number* of a graph is the minimum number of cops required to win the game. An important conjecture in this area due to Meyniel states that the cop number of a connected graph is $O(\sqrt{n})$. In 2016, Prałat and Wormald showed that this conjecture holds with high probability for connected random graphs. Moreoever, Łuczak and Prałat found that on a log-scale the cop number shows a surprising *zigzag* behaviour in dense random graphs. In this paper, we consider the game of cops and robbers on a hypergraph, where the players move along hyperedges instead of edges. We conjecture that the cop number of a connected k-uniform hypergraph is $O\left(\sqrt{\frac{n}{k}}\right)$ and show that this conjecture holds with high probability up to log-factors for the random binomial k-uniform hypergraph $G^k(n, p)$ for a broad range of parameters p and k. As opposed to the case of $G(n, p)$, on a log-scale our upper bound on the cop number arises as the minimum of two complementary zigzag curves.

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