A resolution of the Kohayakawa Kreuter conjecture for almost all pairs of graphs

Robert Hancock (Universität Heidelberg)

We study asymmetric Ramsey properties of the random graph $G(n,p)$. For $r \geq 2$ and a graph H, Rödl and Ruciński (1993-5) provided the asymptotic threshold for $G(n,p)$ to have the following property: whenever we r-colour the edges of $G(n,p)$, there exists a monochromatic copy of H as a subgraph. In 1997, Kohayakawa and Kreuter conjectured an asymmetric version of this result, where one replaces H with a set of graphs $H_1, ..., H_r$ and we seek the threshold for when every r-colouring contains a monochromatic copy of H_i in colour i for some $i \in \{1, ..., r\}$.

The 1-statement of this conjecture was confirmed by Mousset, Nenadov and Samotij in 2020. We extend upon the many partial results for the 0-statement, by resolving it for almost all cases. We reduce the remaining cases to a deterministic colouring problem.

Joint work with Candida Bowtell (University of Warwick) and Joseph Hyde (University of Victoria).