

# Thresholds for anti-Ramsey properties

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We call an edge-coloring of a graph a  $k$ -coloring if it uses no more than  $k$  colors and  $k$ -bounded if it uses no color more than  $k$  times. We call a subgraph homogeneous if all of its edges are colored the same and heterogeneous if all of its edges are colored differently.

A classical Ramsey theorem states that for every  $k$  and every  $n$  there exists an  $m$  such that any  $k$ -edge-coloring of  $K_m$  contains a homogeneous  $K_n$ . Rödl et al. proved the following anti-Ramsey theorem: for every  $k$  and every  $n$  there exists an  $m$  such that any  $k$ -bounded edge-coloring of  $K_m$  contains a heterogeneous  $K_n$ . Furthermore the minimum such  $m$  is  $O(kn^2)$  and  $\Omega(kn^2/\log(n))$ . Compare this to the Ramsey theorem in which the threshold is not well-understood.

Here we consider the threshold  $p(H, k)$  for every  $k$ -bounded coloring  $G_{n,p}$  to contain a heterogeneous  $H$ .

This is a joint work with Tom Bohman, Alan Frieze and Oleg Pikhurko.