Edge colorings of graphs avoiding a given monochromatic bipartite subgraph

Hanno Lefmann, Fakultät für Informatik, TU Chemnitz, Straße der Nationen 62, D-09111 Chemnitz

Let $F$ be a fixed graph and $k$ be a positive integer. For a host graph $H$, we investigate the quantity $c_{k,F}(H)$, which counts the number of colorings of the edge set of $H$ with $k$ colors such that no monochromatic copy of $F$ arises. Let $c_{k,F}: \mathbb{N} \to \mathbb{N}$ be a function defined by $c_{k,F}(n) = \max\{c_{k,F}(H): |V(H)| = n\}$, i.e., $c_{k,F}(n)$ is equal to the maximum of $c_{k,F}(H)$ over all host graphs $H$ on $n$ vertices. In this talk we study the asymptotic behavior of $c_{k,F}(n)$ and determine the (unique) extremal graphs for some bipartite graphs $F$, in particular if $F$ is a matching, a path or a star. It turns out that the growth of $c_{k,F}(n)$ is related to the Turán number of the forbidden monochromatic subgraph $F$. This is joint work with Carlos Hoppen and Yoshiharu Kohayakawa.

Keywords: edge colorings, Turán number