University of Birmingham

A Summer Day of Ramsey Theory

13th July 2026

Rainbow paths in edge-coloured graphs

Candy Bowtell

Let K_n be properly edge-coloured, meaning that no two edges with the same colour are incident to the same vertex. It is natural to ask for which graphs H we can find a rainbow copy of H, that is, a copy using at most one edge of each colour, in any proper edge-colouring of K_n. In 1989, Andersen conjectured that every properly edge-coloured K_n contains a rainbow path covering at least $n-1$ vertices. That is, a path which uses any colour at most once. We confirm this conjecture for sufficiently large n, moreover, showing that when at least n colours are used, one can find a rainbow Hamilton path. Our proof combines results of Montgomery on rainbow matchings in bipartite graphs with a novel relaxation of a sorting network.

This is joint work with Richard Montgomery, Alp Müyesser and Alexey Pokrovskiy.

Odd-Ramsey numbers of Hamilton cycles

Simona Boyadzhiyska

We will discuss a new variant of the classic Ramsey problem, arising from Alon's work on graph codes. The odd-Ramsey number $r_{\text{odd}}(n, H)$ of a graph H is the minimum number of colors r such that there exists an r-coloring of the edges of K_n with the property that every copy of H in K_n intersects some color class in an odd number of edges. In this talk, we will first give a general introduction to this relatively new topic and then discuss recent results concerning odd-Ramsey numbers of Hamilton cycles.

This is joint work with Shagnik Das, Thomas Lesgourgues, and Kalina Petrova.

Infinite Ramsey theory for finite graph-theorists

Louis DeBiasio

Much of the existing literature on infinite Ramsey theory approaches the subject from a set-theoretic perspective and consequently addresses questions which are of interest to set-theorists (often using deep set-theoretic machinery). In this talk, I will discuss a body of work on infinite Ramsey theory which has stemmed from the types of questions a finite graph-theorist such as myself would ask. These questions are of essentially two types:

1) Quantitative results in the countable case (building on a result of Erdős and Galvin from the early 1990s regarding countably infinite paths). For instance, for every countably infinite tree T and every 2-coloring of the complete graph K on the natural numbers, there exists a monochromatic copy of T in K which has upper density at least 1/2 (and there exists trees for which this is tight).

2) Qualitative results in the general case of infinite cardinals, where our goal is to determine necessary and sufficient conditions for an infinite graph G to be "Ramsey-large" (that is, in every 2-coloring of the complete graph K of cardinality $|V(G)|$ there is a monochromatic copy of G in K which covers all but fewer than $|V(G)|$ many vertices). For instance, we are able to characterize all acyclic graphs which are Ramsey-large.

This is based on joint work(s) with Jan Corsten, Ander Lamaison, Richard Lang, Raj Limbasia, and Paul McKenney.

Ramsey-type problems for tilings

Andrea Freschi

Given a graph H and an integer $m \geq 1$, we write mH to denote the graph consisting of m vertex-disjoint copies of H. Members of the family $\{mH : m \in \mathbb{N}\}$ are called *H-tilings*.

Ramsey numbers of tilings are well-understood. A seminal result of Burr, Erdős and Spencer states that $R(mH) = (2|V(H)| - \alpha(H)) \cdot m + C$ for any $m \geq m_0$, where m_0 and C are constants depending on H, and $\alpha(H)$ is the independence number of H. Burr provided an algorithm to compute C explicitly, and Bucić and Sudakov obtained sharp bounds for m_0.

In this talk, we explore several variations of these Ramsey-type questions. For example, we consider the problem of finding a monochromatic copy of mH within a graph that is not necessarily complete, namely the random graph $G(n, p)$ and graphs with large minimum degree.

This is based on joint work with József Balogh, Ryan Martin and Andrew Treglown.

Ramsey numbers of trees and beyond

Matías Pavez-Signé

The study of the Ramsey number of a general tree started in the 1970s when two cornerstone conjectures were proposed: the Burr–Erdős conjecture and the Burr conjecture. In this talk, I will show recent results around both conjectures, including the solution of Burr's conjecture for trees with small degree, a resilience version of the Burr–Erdős conjecture for bounded-degree trees, and the first steps towards a hypergraph version of this problem.