

Independent sets in hypergraphs and Ramsey properties of graphs and the integers

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(Joint work with Katherine Staden and Andrew Treglown)

Many important problems in combinatorics and other related areas can be phrased in the language of independent sets in hypergraphs. Recently Balogh, Morris and Samotij, and independently Saxton and Thomason developed very general container theorems for independent sets in hypergraphs; both of which have seen numerous applications to a wide range of problems. We use the container method to prove results that correspond to problems concerning tuples of *disjoint* independent sets in hypergraphs.

In particular, we generalise the *random Ramsey theorem* of Rödl and Ruciński by providing a resilience analogue. This result also implies the *random version of Turán's theorem* due to Conlon and Gowers, and Schacht. We prove a general subcase of the *asymmetric random Ramsey conjecture* of Kohayakawa and Kreuter. Both of the above results in fact hold for uniform hypergraphs. We also strengthen the *random Rado theorem* of Friedgut, Rödl and Schacht by proving a resilience version of the result.