

ALMOST REPRESENTATIVE FORESTS

Emma Hogan

`emma.hogan@maths.ox.ac.uk`

University of Oxford

(This talk is based on joint work with Alex Scott and Dmitry Tsarev.)

Let G be a k -edge-coloured graph. We call G colour-balanced if each of its k colour classes has the same size, and almost colour-balanced if each colour class has size ‘close’ to $|E(G)|/k$. Inspired by zero-sum Ramsey problems, recent work has studied the problem of finding almost colour-balanced copies of fixed subgraphs inside colour-balanced complete graphs. In particular, bounds are known for certain target subgraphs, including perfect matchings and spanning forests.

We generalise these questions by studying “almost representative” subgraphs in vector-labelled complete graphs. In this new setting, we prove a strengthening of a conjecture of Pardey and Rautenbach on the existence of almost colour-balanced perfect matchings in complete graphs. As a consequence of this strengthened conjecture, we obtain a method for proving similar bounds for far more complex subgraphs. In this talk, we will summarise the method and explain how it can be applied to obtain improved bounds for embeddings of fixed spanning forests. We further show that when the isomorphism class is not fixed, every colour-balanced complete graph contains a colour-balanced spanning tree.