

COMBINATORICS
SEMINAR

High-Definition Hedgehogs

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Abstract: Suppose I want to edge colour a complete hypergraph so that I avoid a fixed hypergraph H as a monochromatic subgraph. How large can my complete graph be? And how does the answer depend on the number of colours I use? Certainly I need to use 2 colours for the question to be non-trivial, but what if I use 3 or 5 or 173 colours, does this help?

In the case of graphs, the answer is “not much”, but, in a breakthrough paper “Hedgehogs Are Not ColorBlind”, Conlon, Fox and Rödl show that for a certain family of hypergraphs, called hedgehogs, it makes an exponential difference!

This observation has ramifications for some of the most important questions in quantitative Ramsey theory. Further, Conlon, Fox and Rödl asked, can we replace the exponential difference by a difference of a tower of arbitrary height? We answer this in the affirmative, showing that Hedgehogs see in high definition. In this talk, I will discuss the main ideas and consequences of the result, including some surprising conjectures. Joint work with Quentin Dubroff, António Girão and Corrine Yap.

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