Monochromatic matchings in almost-complete and random hypergraphs

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The Ramsey number for matchings in graphs was determined by Cockayne and Lorimer [1] and later extended to hypergraphs by Alon, Frankl, and Lovász [2], who showed that every q-colouring of the complete r-uniform hypergraph on n vertices contains a monochromatic matching of size $\lfloor((n+q-1)/(r+q-1))\rfloor$.

In this talk I will present two extensions of this classical result. The first is a **defect version**, which asserts that every q-colouring of an *almost-complete* uniform hypergraph contains a monochromatic matching of comparable size to that in the complete case. The second is a **transference principle**, which demonstrates that a monochromatic matching of comparable size exists, with high probability, in any q-colouring of a *sparse, random* uniform hypergraph with sufficiently large constant average degree.

The proofs combine methods from extremal set theory with a variant of the weak hypergraph regularity lemma.

References

[1] E. J. Cockayne, P. J. Lorimer, The Ramsey number for stripes, *J. Austral. Math. Soc.* **19** (1975), 252–256.

[2] N. Alon, P. Frankl, L. Lovász, The chromatic number of Kneser hypergraphs, *Trans. Amer. Math. Soc.* **298** (1986), 359–370.