

COMBINATORICS  
SEMINAR

*The complexity of perfect matchings and packings in dense  
hypergraphs*

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**Abstract:** Given two  $k$ -graphs  $H$  and  $F$ , a perfect  $F$ -packing in  $H$  is a collection of vertex-disjoint copies of  $F$  in  $H$  which together cover all the vertices in  $H$ . In the case when  $F$  is a single edge, a perfect  $F$ -packing is simply a perfect matching. For a given fixed  $F$ , it is generally the case that the decision problem whether an  $n$ -vertex  $k$ -graph  $H$  contains a perfect  $F$ -packing is NP-complete.

In this talk we describe a general tool which can be used to determine classes of (hyper)graphs for which the corresponding decision problem for perfect  $F$ -packings is polynomial time solvable. We then give applications of this tool. For example, we give a minimum  $l$ -degree condition for which it is polynomial time solvable to determine whether a  $k$ -graph satisfying this condition has a perfect matching (partially resolving a conjecture of Keevash, Knox and Mycroft). We also answer a question of Yuster concerning perfect  $F$ -packings in graphs.

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