Guangzhou Discrete Mathematics Seminar

Extremal results on cycles in hypergraphs

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A cycle of length m in a graph G consists of a cyclic list of m vertices $x_1, x_2, \ldots, x_m$ together with edges $x_i x_{i+1}$ for $i = 1, 2, \ldots, m$ (subscript mod m). Cycles are fundamental structures in the study of graphs. There are many classic extremal results on the study of cycles such as the Erdős-Gallai theorem on the density condition guaranteeing the existence of cycles of length at least a prescribed number and the Bondy-Simonovits theorem on the density condition guaranteeing cycles of a given exact length.

An r-uniform hypergraph H consists a set V of elements called vertices and a set E of elements called hyperedges (or edges) where each hyperedge is a subset of V of size r. In recent years there has been a lot of successful effort on extending some of the classic extremal results on cycles to uniform hypergraphs, where there are several natural notions of cycles for hypergraphs. In this talk, we discuss some of these results and briefly touch upon the tools employed in such a study.