

Extremal results for Berge-hypergraphs

Dániel Gerbner, MTA Rényi Institute

(joint work with Cory Palmer)

Let H be a hypergraph and G be a graph. We say that H contains G if we can embed G into the vertex set of H such that each edge of G can be associated with a distinct edge of H containing it. We say H is G -free if it does not contain G . (When H is a graph this is the ordinary notion that H does not contain G as a subgraph).

We would like to determine the maximum possible size of the sum of the vertex degrees in an G -free hypergraph H on n vertices. (When H is a graph this maximum is twice the extremal number of G). Győri and Lemons showed that for 3-uniform hypergraphs, when G is an even cycle that this maximum has the same order as the extremal number of even cycle in graphs. Surprisingly, for cycles of length $2k + 1$ the parameter is the same order as for cycles of length $2k$ (this is significantly different from the extremal number of odd cycles in graphs). We examine this question in a slightly more general setting and show that for any graph G , the maximum degree sum cannot behave too differently from the extremal number of G . We then focus on the particular case when G is a complete bipartite graph to get an analogue of the Kővari-Sós-Turán theorem.