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The Turán density of tight cycles in three-uniform hypergraphs

Turán-type problems for hypergraphs have been an intriguing area of research. Despite significant efforts, the Turán density of F is known for only a few three-uniform hypergraphs F . This talk concerns Turán-type problems for 3-uniform tight cycles C_k , where the number of vertices k is not divisible by 3.

The Turán density of a hypergraph F is the maximum density of an n -vertex hypergraph that does not contain any member of F . Mubayi and Rödl gave an “iterated blow-up” construction showing that the Turán density of C_5 is at least $2\sqrt{3} - 3$, and this bound is conjectured to be tight. Interestingly, their construction also excludes C_k for larger k not divisible by 3, indicating that it might be the extremal construction for these hypergraphs as well. Indeed, we have recently shown that the Turán density of C_k is $2\sqrt{3} - 3$ for sufficiently large k , in a joint result with Shoham Letzter and Alexey Pokrovskiy.