Asymptotics for Turán numbers of cycles in 3-uniform linear hypergraphs

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Let $\mathcal{F}$ be a family of 3-uniform linear hypergraphs. The *linear Turán number* of $\mathcal{F}$ is the maximum possible number of edges in a 3-uniform linear hypergraph on n vertices which contains no member of $\mathcal{F}$ as a subhypergraph.

In this talk, we show that the linear Turán number of the five cycle C_5 (in Berge sense) is $\frac{1}{3\sqrt{3}}n^{3/2}$ asymptotically.

We also establish a connection between the linear Turán number of the linear cycle of length $2k+1$ and the extremal number of edges in a graph of girth more than $2k-2$. Combining our result and a theorem of Collier-Cartaino, Graber and Jiang, we obtain that the linear Turán number of the linear cycle of length $2k+1$ is $\Theta(n^{1+\frac{1}{k}})$ for $k = 2, 3, 4, 6$.