

Some problems in extremal set theory

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Abstract:

Consider an r -uniform hypergraph:

1. it is called t -cover-free if for any $t + 1$ distinct edges A_1, \dots, A_t, B , it holds that $B \not\subseteq \bigcup_{i=1}^t A_i$;
2. it is called t -union-free if for any two distinct subsets \mathcal{A}, \mathcal{B} , each consisting of at most t edges, it holds that $\bigcup_{A \in \mathcal{A}} A \neq \bigcup_{B \in \mathcal{B}} B$;
3. it is called t -cancellative if for any $t+2$ distinct edges A_1, \dots, A_t, B, C , it holds that $(\bigcup_{i=1}^t A_i) \cup B \neq (\bigcup_{i=1}^t A_i) \cup C$.

Let $F_t(n, r)$, $C_t(n, r)$, $U_t(n, r)$ denote the maximum number of edges of these hypergraphs, respectively. In this talk, we will introduce the best known lower and upper bounds on these functions. Several interesting problems are left open.