Minisymposium 18 - Hypergraphen

Generalizations of the removal lemma for hypergraphs

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Ruzsa and Szemerédi established the *triangle removal lemma* by proving that: Every n-vertex graph with $o(n3)$ triangles can be made triangle free by removing $o(n2)$ edges. More general statements of that type regarding graphs were successively proved by several authors. In particular, Alon and Shapira obtained a generalization (which extends all the previous results of this type), where the triangle is replaced by a possibly infinite family of graphs and containment is induced.

We prove the corresponding result for k-uniform hypergraphs and show that: *For every (possibly infinite) family $\mathcal{F}$ of k-uniform hypergraphs and every $\eta > 0$ there exist constants $c > 0$ and $C > 0$ such that every sufficiently large k-uniform hypergraph on n vertices, which contains at most cn^{v_F} induced copies of any hypergraph $F \in \mathcal{F}$ on $v_F \leq C$ vertices can be changed by adding and deleting at most $\eta\binom{n}{k}$ edges in such a way that it contains no induced copy of any member of $\mathcal{F}$.* As a consequence we obtain that every decidable, hereditary property of uniform hypergraphs is testable with one-sided error.

The proof is based iterated applications of the hypergraph generalizations of Szemerédi's regularity lemma. This is joint work with Vojtěch Rödl from Emory University.