1027-05-94 **Peter Keevash*** (keevash@caltech.edu), Mathematics, Caltech, Pasadena, CA 91125, and **Dhruv Mubayi**. *Set systems without a simplex or a cluster.*

A d-simplex is a collection of $d+1$ sets with empty intersection, every d of which have nonempty intersection. A k-uniform d-cluster is a collection of $d+1$ sets of size k with empty intersection and union of size at most $2k$.

We prove the following result which partially settles an old conjecture of Chvátal and a recent conjecture of Mubayi. For $d \geq 2$ any $\zeta > 0$ there is a number T such that the following holds for sufficiently large n. Let G be a k-uniform set system on $[n] = \{1, \cdots, n\}$ with $\zeta n < k < n/2 - T$, and suppose either that G contains no d-simplex or that G contains no d-cluster. Then $|G| \leq \binom{n-1}{k-1}$ with equality only for the family of all k-sets containing a specific element.

In the non-uniform setting we obtain the following exact result that generalises a theorem of Milner, who proved the case $d = 2$. Suppose $d \geq 2$ and G is a set system on $[n]$ that does not contain a d-simplex, with n sufficiently large. Then $|G| \leq 2^{n-1} + \sum_{i=0}^{d-1} \binom{n-1}{i}$, with equality only for the family consisting of all sets that either contain some specific element or have size at most $d - 1$.

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