CHRISTOPHE WEIBEL, McGill University, Burnside Hall, 805 Sherbrooke West, Montreal, QC

Maximal f-vectors of Minkowski sums of large numbers of polytopes

It is known that in the Minkowski sum of r polytopes in dimension d, with $r < d$, the number of vertices of the sum can potentially be as high as the product of the number of vertices in each summand. However, the number of vertices for sums of more polytopes was unknown so far.

In this talk, I study polytopes in general orientations, and I show that the number of faces of a sum of r polytopes in dimension d, with $r \geq d$, is linearly related to the number of faces in sums of less than d of the summand polytopes. We can deduce from this exact formula a tight bound on the maximum possible number of vertices of the Minkowski sum of any number of polytopes in any dimension. In particular, the linear relation implies that a sum of r polytopes in dimension d, where summands have n vertices in total, has less than $\binom{n}{d-1}$ vertices, even when $r \geq d$.