

Diameter of Polyhedra: Combinatorial Abstractions and New Upper Bounds

One of the most prominent mysteries in convex geometry is the question whether the diameter of a polyhedron is bounded by a polynomial in the number of facets. The gap between the best known lower bound (linear) and the best known upper bound ($n^{\log d}$ by Kalai and Kleitman) is impressive.

After Francisco Santos refuted the classical Hirsch conjecture in 2010, the polynomial Hirsch conjecture, stating that the answer to the question above is "Yes", has received considerable attention. In this talk I present the best known bounds mentioned above in a very simple abstract setting that does not involve any geometry. The polynomial Hirsch conjecture is also open in this abstract setting. I furthermore show polynomial upper bounds on the diameter of polyhedra that are defined by matrices with small sub-determinants and close with open problems.