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Asymmetry of convex polytopes and vertex index of symmetric convex bodies

In 2002 Gluskin and I showed that a polytope with few vertices is far from being symmetric in a sense of Banach–Mazur distance. More precisely, it was shown that Banach–Mazur distance between such a polytope and any symmetric convex body is large. In this talk we introduce a new, averaging-type parameter to measure the asymmetry. It turns out that, surprisingly, this new parameter is still very large, in fact it satisfies the same lower bound as Banach–Mazur distance. We apply our results to provide a lower estimate on the vertex index of a symmetric convex body, which was recently introduced in by Bezdek and myself. Furthermore, we give the affirmative answer to a conjecture by K. Bezdek on the quantitative illumination problem.

This is joint work with E. D. Gluskin.