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Title: On the volume ratio of two convex bodies

Abstract: Let K and L be two convex bodies in $\mathbb{R}^n$. The volume ratio $\mathrm{vr}(K,L)$ of K and L is defined by $\mathrm{vr}(K,L) = \inf(|K|/|T(L)|)^{1/n}$, where the infimum is over all affine transformations T of $\mathbb{R}^n$ for which $T(L) \subseteq K$. We show that

$$\mathrm{vr}(K,L) \leq c\sqrt{n}\log n,$$

where $c > 0$ is an absolute constant. This estimate is optimal up to the logarithmic term. The proof is probabilistic in nature and uses the idea of "random orthogonal factorizations".