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Intrinsic volume moments of random beta-prime polytopes

We consider random beta-prime polytopes, which are convex hulls of i.i.d. beta-prime distributed random points in $\mathbb{R}^d$. After a suitable scaling, these polytopes converge in distribution to the convex hulls of Poisson point processes with power-law intensity density functions. We prove convergence of moments for the intrinsic volumes of random beta-prime polytopes.

We also consider a related spherical model in the upper open hemisphere of S^d. We choose i.i.d. random points in S^d_+ according to the uniform distribution or certain other rotationally symmetric distributions around the north pole of the hemisphere. The spherical convex hull of the random points is a spherical random polytope. After gnomonic projection, the push-forwards of such polytopes are beta-prime polytopes. We prove moment convergence of the spherical volume of the spherical random polytopes.

Joint work with Ferenc Fodor and Péter Kevei (both from the University of Szeged).