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Title: Berry–Esséen-type inequalities for ultraspherical expansions

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This paper contains several variants of Berry–Esséen-type inequalities for *ultraspherical* expansions of probability measures on $[0, \pi]$. Similar to the classical results on \mathbb{R} , proofs will be based in some cases on ultraspherical analogues of Fejér-kernels. The inequalities in this paper in particular lead to relations between the spherical-cap-distance of probability measures on unit spheres $S^d \subset \mathbb{R}^{d+1}$ and the norms of associated L^2 -convolution operators. Moreover, the inequalities will be used to derive the order of convergence for some central limit theorems on $[0, \pi]$ and on S^d ; the limit distributions there are analogues of Gaussian measures and the uniform distribution.

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