

Geometric inequalities and Kendall's problem in spherical space revisited

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9 May 2025

Abstract

In Euclidean space, the asymptotic shape of large cells in various types of Poisson driven random tessellations has been the subject of a famous conjecture due to David Kendall. Since shape is a geometric concept and large cells are identified by means of geometric size functionals, the resolution of the conjecture is inevitably connected with geometric inequalities of isoperimetric type and their improvements in the form of geometric stability results, relating geometric size functionals and hitting functionals. The latter are deterministic characteristics of the underlying random tessellation. We explore specific and typical cells of random tessellations in spherical space. A key ingredient of our approach are new geometric inequalities and quantitative strengthenings in terms of stability results, for general and also for some specific size and hitting functionals of spherically convex bodies. As a consequence we obtain probabilistic deviation inequalities and asymptotic distributions of quite general size functionals. In contrast to the Euclidean setting, where the asymptotic regime concerns large size, in the spherical framework the asymptotic analysis is primarily concerned with high intensities.

