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A central limit theorem for the area of random disc-polygons

We consider the following probability model of random disc-polygons. Let K be a convex disc in the Euclidean plane with at least C^2_+ smooth boundary (twice continuously differentiable with everywhere positive curvature). Fix $r > 0$ such that it is larger than the maximum radius of curvature of the boundary of K. Take n independent random points from K according to the uniform probability distribution. Let K^r_n be the intersection of all radius r closed circular discs that contain the random points. This object is called a (uniform) random disc-polygon, and it is known to be contained in K. Various asymptotic properties of K^r_n (as $n \to \infty$) have been determined before, including an asymptotic formula for the expectation of the area of K not covered by K^r_n, and also lower and upper bounds of matching orders of magnitude (in n) for the variance of the area of K^r_n. In this talk we present a quantitative central limit theorem for the area of K^r_n based on Stein's method. Joint work with Dániel Papvári (Szeged, Hungary).

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