

Topological data analysis studies the shape of data, like a point cloud. But to know whether the detected topological features are significant one needs to understand what is to be expected, the null-hypothesis. This leads naturally to the study of random graphs constrained by some underlying geometry and their higher dimensional analogue, random simplicial complexes. Given a random configuration of n points on a manifold one might then ask how large one needs to choose r -balls around these points so that the manifold is covered, or the associated Čech complex has homology isomorphic to that of the manifold. We will be interested in the asymptotic behaviour of the radius r as the number of points n goes to infinity. Surprisingly, the threshold formulae one gets depend on the homological degree and whether the manifold has boundary or not, but not on its geometry or topology. This talk is based on joint work with Henry-Louis de Kergorlay and Oliver Vipond building on previous results by Bobrowski, Oliveira, Weinberger, and others.