The topology of random simplicial complexes has been the subject of intensive study over the past ten years or so. A number of papers have identified phase transitions for homology to appear or disappear, computed estimates for Betti numbers, and so on. One of the justifications for this emerging field is as a null hypothesis for topological data analysis.

With this application to topological inference in mind, we study the persistent homology of random geometric complexes. Essentially we ask: given a set of random points in d-dimensional space, how large is the largest k-dimensional hole? We measure the size of the hole topologically, as death radius / birth radius, for either the Vietoris-Rips filtration or the Čech filtration. We obtain upper and lower bounds for every k and d, agreeing up to a constant factor. (Received August 26, 2016)