Dense Random Clique Complexes
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X(n,p) is the model for a random simplicial complex which takes the
clique complex of the Erdős—Rényi random graph G(n,p). When p is small
enough that the expected dimension is a bounded finite number, it was
shown in joint work with Fowler, Hoffman and Kahle that X(n,p) yields
a bouquet of spheres in middle dimension with high probability. In
this talk I will discuss the evolution of X(n,p) as p increases beyond
this range, all the way up to a threshold at which X(n,p) becomes
contractible with high probability. In particular, there is
non-trivial homology in a widening interval around middle dimension up
to a threshold in p which is close to the known upper bound on
contractibility. I will describe a method for finding non-trivial
homology classes, and also various techniques for proving homology
vanishing theorems as p increases.