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Subgraph and cluster counting in the random connection model

Joint with Günter Last and Franz Nestmann

The random connection model is a spatial random graph, whose vertices are the points of a stationary Poisson point process in Euclidean space. Two vertices are connected by an edge with a probability depending on their distance independently from all other pairs of vertices. This model generalizes the random geometric graph, where the probability for drawing an edge is one if the distance does not exceed a given threshold and zero otherwise. In this talk, we consider the number of connected components of the random connection model which are isomorphic to a given graph and belong to a compact convex observation window as well as the number of k -clusters within the observation window. For increasing observation windows variance asymptotics and central limit theorems are shown. The proofs rest upon new bounds for the normal approximation of functionals of pairwise marked Poisson point processes, which can be derived via the Malliavin-Stein method.