CHEMICAL DISTANCE IN GEOMETRIC RANDOM GRAPHS WITH LONG EDGES AND SCALE-FREE DEGREE DISTRIBUTION

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Abstract. We study geometric random graphs defined on the points of a Poisson process in d-dimensional space, which additionally carry independent random marks. Edges are established at random using the marks of the endpoints and the dis- tance between points in a flexible way. Our framework includes a large class of graph models with scale-free distribution and edges spanning large distances. We give a sharp criteria for the absence of ultrasmallness of the graphs and in the ultrasmall regime establish a limit theorem for the chemical distance of two points. Here the boundary of the ultrasmall regime and the limit theorem depends not only on the power-law exponent of the graph but also on a geometric quantity, the influence of the spatial distance of two typical points on the probability of an edge connecting them.

This is joint work with Peter Gracar and Peter Mörters.