Geometric Random Graphs

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Title: Percolation and (geometric) random graphs in the hyperbolic plane

Abstract: I will describe some recent and ongoing work on random geometric graphs and Poisson-Voronoi percolation in the hyperbolic plane.
Random geometric graphs are obtained by taking a random set of points in the plane (usually either generated by a Poisson process or sampled i.i.d. uniformly from a large disk or square), and then joining any pair of points by an edge whose distance is less than some parameter $r > 0$. In the Poisson-Voronoi percolation model, we take a constant intensity Poisson process and assign to each point its Voronoi-cell, that is the set of all points closer to it than to any other Poisson point, and then we flip a coin for each cell to determine whether it will be coloured black or white. We say that percolation occurs if the set of black cells contains an unbounded component.

For both these models it turns out that the hyperbolic versions display behaviour that is spectacularly different from their Euclidean counterparts.

(Based on recent and ongoing works with E. Broman, N. B. Hansen, J. Tykesson.)