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Title : Invertibility of adjacency matrices for random d -regular graphs

Abstract:

The singularity problem of random matrices asks the probability that a given discrete random matrix is singular. The first such result was obtained by Komlós in 1967. He showed a Bernoulli random matrix is singular with probability $o(1)$. This question can be reformulated for the adjacency matrices of random graphs, either directed or undirected. The most challenging case is when the random graph is sparse. In this talk, I will prove that for random directed and undirected d -regular graphs, their adjacency matrices are invertible with high probability for all $d \geq 3$. The idea is to study the adjacency matrices over a finite field, and the proof combines a local central limit theorem and a large deviation estimate.