Oberseminar Mathematische Stochastik

Mittwoch, 25. November 2015, 17:00 Uhr, M 6

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Rigidity of 2D crystals: the hard disk model

Abstract:
The hard disk model is a particularly simple two-dimensional Gibbsian point process. The particles can be viewed as disks and the only interaction is that any two disks are not allowed to overlap. It is conjectured that the particles arrange themselves into a triangular lattice provided that the particle density is sufficiently high. We would like to know how rigid this lattice structure is. For increasing size of the system it is believed that the fluctuations of the lattice direction remain small; on the other hand it is known that the fluctuations of particle positions grow unboundedly. We give a lower bound on these fluctuations: If the size of the system is $2n \times 2n$ and the disks are of size 1, then the fluctuations of particle positions are at least $c\ log(n)$ with positive probability. The result carries over to fairly general interacting particle systems in two dimensions, but in this context hard disks are particularly interesting and difficult.