Titel: Hard-core model on 2D lattices

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Abstract:
"It is well-known that in R2 the maximum-density configuration of hard-core (non-overlapping) disks of diameter D is given by a triangular/hexagonal arrangement (Fejes Tóth, Hsiang). If the disk centers are placed at sites of a lattice, say, a unit triangular lattice L2 or a unit square lattice Z2, then we get a discrete analog of this problem, with the Euclidean exclusion distance.
I will discuss high-density Gibbs/DLR measures for the hard-core model on L2 and Z2 for a large value of fugacity z. According to the Pirogov-Sinai theory, the extreme Gibbs measures are obtained via a polymer expansion from dominating ground states. For the hard-core model the ground states are associated with maximally dense sublattices, and dominance is determined by counting defects in local excitations.
On L2 we have a complete description of the extreme Gibbs measures for a large z and any D; a convenient tool here is the Eisenstein integer ring. For Z2, the situation is made more complicated by various (related) phenomena: sliding, non-tessellation etc. Here, some results are available; conjectures of various generality can also be proposed. A number of our results are computerassisted.
This is a joint work with A. Mazel and Y. Suhov."