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12. Probability and Statistics

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A lower bound for time correlation of lattice gas.

The (d-dimensional) lattice gas model in equilibrium is considered. We give a lower bound of the density-density time correlation $S(t)$ for large t, which involves the bulk diffusion matrix D in a physically natural way. More precisely, assuming that the family of jump rates satisfies some standard conditions to be specified in the talk and that the system has the reversible Gibbs measure with a suitable mixing property, we show that $S(t)t^{d/2} \geq \chi(\det(4\pi D))^{-1/2} + o(1)$ as $t \to \infty$, where χ is the static compressibility. This improves the similar bound obtained by Spohn (1991).

Reference: H. Spohn (1991), Large Scale Dynamics of Interacting Particles, Springer–Verlag, Berlin