

# Time-dependent fluctuations and superdiffusivity in the driven lattice Lorentz gas

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We consider a tracer particle on a lattice in the presence of immobile obstacles. Starting from equilibrium, a force pulling on the particle is switched on, driving the system to a new stationary state. We solve for the complete transient dynamics of the fluctuations of the tracer position along the direction of the force. The analytic result, exact in first order of the obstacle density and for arbitrarily strong driving, is compared to stochastic simulations. Upon strong driving, the fluctuations grow superdiffusively for intermediate times; however, they always become diffusive in the stationary state. The diffusion constant is nonanalytic for small driving and is enhanced by orders of magnitude by increasing the force.

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