

Knudsen billiards and random walks in random environment with unbounded jumps.

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Resumo/Abstract:

We consider a random walk in a stationary ergodic environment in \mathbb{Z}^d , with unbounded jumps. In addition to uniform ellipticity and a bound on the tails of the possible jumps, we assume a condition of strong transience to the right which implies that there are no “traps”. We prove the law of large numbers with positive speed, as well as the ergodicity of the environment seen from the particle. Then, we consider Knudsen stochastic billiard with a drift in a random tube in \mathbb{Z}^d , $d \geq 3$, which serves as environment. The tube is infinite in the first direction, and is a stationary and ergodic process indexed by the first coordinate. A particle is moving in straight line inside the tube, and has random bounces upon hitting the boundary, according to the following modification of the cosine reflection law: the jumps in the positive direction are always accepted while the jumps in the negative direction may be rejected. Using the results for the random walk in random environment together with an appropriate coupling, we deduce the law of large numbers for the stochastic billiard with a drift. This is a joint work with Francis Comets