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Hong-Kun Zhang* (hongkun@math.umass.edu), Department of Math. & Stat., University of Massachusetts Amherst, Amherst, MA 01003. *Billiards under small twists.*

Lorentz gas is a simple model of diffusive billiards in studying the transport process of electrons in an ionized metal. Since the key aim in statistical mechanics is to characterize the diffusion matrix that appear in the CLT. We study 2d periodic Lorentz gas in the presence of a twist force on the scatterers. In this system, billiard orbits are still geodesics between collisions, but do not reflect elastically when reaching the boundary. When the horizon is finite, i.e. the free flights between collisions are bounded, the resulting current J is proportional to the strength of the twist force. We prove the existence of a unique SRB measure, for which the Pesin entropy formula and Young's expression for the fractal dimension are valid. The classical CLT is verified and the diffusion matrix is calculated according to a formula involves the twist function. (Received September 01, 2011)