

Title: Asymptotic behavior of self-intersection of trajectories from the flow of a Z-periodic Lorentz gaz

Abstract: H.A Lorentz introduced in 1905 a model describing the behavior a constant speed moving point particle elastically colliding round obstacles, the Lorentz gas model. In this talk I present the Z-periodic Lorentz gaz (Lorentz gaz on a tube) in finite horizon, on which I study the number of self-intersections of the trajectory generated by a particle. Since such system seen through the Lebesgue measure is recurrent and ergodic, the number of self-intersections increases along with time and evaluating this growth leads us to some limit theorem. Such result is proven through describing the problem within a Z-extension over a Sinai Billiard. On such hyperbolic billiard, decorrelation results allows us to approximate the trajectories through the product of two parameters, one in local scale describing their states within some "cells" and a global one seen as a one dimensional random walk on the Z-extension.