M A T H E M A T I C A L P H Y S I C S S E M I N A R

Rutgers University
Hill Center - Room 705

Speed Distribution of N Particles in the Thermostated Periodic Lorentz Gas with a Field

Federico Bonetto, Georgia Tech.
Thursday, November 8, 2012 - 2:00 PM

Abstract

We study the long time evolution and stationary speed distribution of N point particles in $2D$ moving under the action of an external field E, and undergoing elastic collisions with either a fixed periodic array of convex scatterers, or with virtual random scatterers. The total kinetic energy of the N particles is kept fixed by a Gaussian thermostat which induces an interaction between the particles. We show analytically and numerically that for weak fields this distribution is universal, i.e. independent of the position or shape of the obstacles or the nature of the stochastic scattering. Our analysis is based on the existence of two time scales; the velocity directions become uniformized in times of order unity while the speeds change only on a time scale of $O(|E|^-2)$.