Competition between normal, sub diffusion and super diffusion in the bouncing ball system.

André Luís Prando Livorati [1],

[1] Departamento de Física - UNESP- IGCE - Rio Claro - SP

The dynamics of the bouncing model was investigated using a two dimensional mapping. Chaotic properties where characterized, and transition from local to global chaos allows the phenomenon of Fermi Acceleration (FA) to occur. Three growing regimes were characterized for FA. The Regular Fermi Acceleration (RFA), set by a normal diffusion; the Sticky Fermi Acceleration (SFA), set by infuence of stickiness orbits and characterized as sub diffusion; and the Ballistic Fermi Acceleration (BFA), related with featured resonances known as accelerator modes (AM), causing super diffusion. Through the analysis of the dispersion of the root mean square velocity, we were able to characterize a diffusive transition in a range were a period-1 AM is active. Considering transport properties, a description of the super diffusive scenario for the AM was achieved, where the probability of an ensemble to reach the AM, as function of the velocity and as function of the number of collision, present the same layout, with distinguished peaks in the ϵ range. [1, 2, 3]

References

[1] André L. P. Livorati, Tiago Kroetz, Carl P. Dettmann, Iberê Luiz Caldas, and Edson D. Leonel, Phys. Rev. E 86, 036203, (2012).

[2] Tiago Kroetz, André L. P. Livorati, Edson D. Leonel, and Iberê L. Caldas, Phys. Rev. E 92, 012905, (2015).

[3] André L. P. Livorati, Tiago Kroetz, Carl P. Dettmann, Iberê Luiz Caldas, and Edson D. Leonel, Phys Rev. E, 97, 032205, (2018).

Type

ORAL