Abstract

In this talk, I will discuss the existence of a family of periodic orbits, called $frozen\ \ planet\ \ orbits$, for a 1—d atomic model. We have n-electrons moving on a half-line with the nucleus sitting at the origin. Electrons are subject to reciprocal electric attraction/repulsion while the nucleus is fixed.

We will prove that, for any period $T > 0$, there exists a periodic solution of the following form. The first electron keeps bouncing on the nucleus whereas the others oscillate synchronously, without collisions. We call these trajectories $frozen\ planet\ orbits$, from a Hamiltonian perspective they are collisional periodic brake solutions.

If time permits, I will discuss a connection between a limit system, in which the negative charges disappear, and billiard dynamics. This is a joint work with G. Canneori and S. Terracini.