

Ludwig Boltzmann, in his search for an example of a chaotic dynamical system, studied the planar motion of a particle subject to a central force bouncing elastically at a line. As recently noticed by Gallavotti and Jauslin, the system is actually integrable if the force has an inverse-square law. I will review the construction of the second integral of motion and present the results: the orbits of the Poincaré map are periodic or quasi-periodic and anisochronous, so that KAM perturbation theory (Moser's theorem) applies, implying that for small perturbations of the inverse-square law the system is still not chaotic. The proof relies on mapping the Poincaré map to a translation by an element of an elliptic curve. A corollary is the Poncelet property: if an orbit is periodic for given generic values of the integrals of motions then all orbits for these values are periodic.