

Introduction to Fermi acceleration problem in dynamical systems

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Fermi acceleration is a mechanism, first suggested by Enrico Fermi in 1949, to explain heating of particles in cosmic rays. Fermi studied charged particles being reflected by the moving interstellar magnetic field and either gaining or losing energy, depending on whether the “magnetic mirror” is approaching or receding. In a typical environment, Fermi argued, the probability of a head-on collision is greater than a head-tail collision, so particles would, on average, be accelerated. Since then Fermi acceleration has been used to explain a number of natural phenomena and several simple mathematical models demonstrating Fermi acceleration have been proposed. We will focus on Fermi-Ulam models, and explain the connections to various aspects of dynamical systems, such as billiards. This is joint work with Jing Zhou.

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