**Abstract of diploma. Alexandra K. Krasnova. "Fermi acceleration as a probable mechanism of rapid diffusion of clusters on graphite surface". Supervisor: Olga A. Chichigina.**

Diffusion of nanoclusters on a highly oriented pyrolytic graphite (HOPG) substrate is investigated. We propose a solution to the contradiction between the extremely high value of the diffusion coefficient and its Arrhenius-type temperature dependence. It is shown that Fermi acceleration, which is inherent to time-dependent open-horizon two-dimensional billiards, can be applied to this problem. The average velocity of the billiard particle as a function of time is analytically obtained through Fokker-Plank equation, for the stochastic and different types of periodic oscillations of the scatterers. Oscillations of the scatterers result in superdiffusion of particles with the mean squared displacement growing asymptotically quadratically in time. The case of finite mass of scatterers is considered.