

B. Chirikov [Shepelyansky, Lichtenberg, Lieberman]

Boris Chirikov is the pioneer of the classical and quantum chaos. He was the first physicist who in far 1959 invented the criteria for emergence of chaos in Hamiltonian systems known now as the Chirikov criteria of overlapping resonances. In this paper (B.Chirikov, At. Energ. v.6, p.630 (1959)) he not only proposed this criteria but using it explained the experiments on the plasma confinement obtained at that time in Kurchatov Institute and presented in the same issue. Without ANY doubts this was the FIRST PHYSICAL theory of chaos which explained the REAL EXPERIMENT. One should keep in mind that this result was obtained much before than the computers made the image of chaos so familiar to everyone. Later this criteria found broad applications in the physics of plasma, accelerators, astronomy, microwave ionization of Rydberg atoms and mesoscopic physics. Up to now it is the only simple physical criteria which allows to find analytically the chaos border in Hamiltonian systems.

After this first work which marked the birth of physics of chaos Chirikov obtained many other results in this new field. Among them I can mention: determination of the border of strong chaos and explanation of the results of Fermi-Pasta-Ulam problem (beta-model); derivation of the chaos border for Fermi acceleration model; numerical computations of the Kolmogorov-Sinai entropy in area-preserving maps; investigations of Arnold diffusion; modulational diffusion; demonstration that the models of classical Yang-Mills fields can have positive Kolmogorov-Sinai entropy and therefore are generally not integrable; discovery of the power law decay of correlations in the Hamiltonian systems with divided phase space; demonstration that the dynamics of the Halley comet is described by a simple map and that its motion is chaotic.

In 1977 he with collaborators invented the kicked rotator model which showed that the quantum effects lead to localization of classical chaotic diffusion. This led to the theory of dynamical localization which represents the deterministic analogue of the Anderson localization in disordered systems. These results found their confirmation in experiments on microwave ionization of highly excited atoms (Bayfield, Koch, Walther) and cold atoms in laser field (Raizen).

The influence of Chirikov's ideas in the field of chaos can be also seen from the terminology which we usually use and which was introduced in his papers: the Kolmogorov-Arnold-Moser (KAM) theorem, the Kolmogorov-Sinai (KS) entropy, the Arnold diffusion, the standard map, the kicked rotator, the dynamical localization.

Definitely the theory of chaos is the fundamental ground for the ideas of Boltzmann and modern statistical physics. The fundamental pioneer results of Chirikov in the field of chaos should be marked by the Boltzmann medal. In this way the Commission will clearly show that even in Siberian fields one is a warrior.