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Boris Chirikov 1928–2008

Boris Chirikov, an outstanding physicist at the Budker Institute of Nuclear Physics in Novosibirsk, Russia,who pioneered the physics of chaos, passed away on 12 February. Consequently, world science has lost one of its most eminent scholars.

Chirikov's early scientific interests were in the field of accelerator and plasma physics – he regarded Gersh Budker as his teacher. He started his career in experimental physics with investigations into ionic compensation of high-intensity relativistic beams. He soon became interested in theoretical aspects of the stability of motion of charged particles in accelerators and magnetic traps. His seminal paper of 1959 revealed an unexpected phenomenon of chaotic oscillations that occur in Hamiltonian systems as a result of interaction between nonlinear resonances. Based on these studies, Chirikov proposed his "criterion of overlapping resonances" that turned out to be efficient in finding the conditions under which "deterministic chaos" arises in classical Hamiltonian mechanics. Eventually, this universal phenomenon was found to occur in the very different fields of geophysics, meteorology, astronomy, biology, economics, and social sciences.


(http://images.iop.org/objects/ccr/cern/48/4/17/CCobit3_04_08.jpg)
Boris Chirikov (http://images.iop.org/objects/ccr/cern/48/4/17/CCobit3_04_08.jpg)

In his explorations of stochasticity, Chirikov was strongly influenced by the mathematicians Andrei Kolmogorov and Vladimir Arnold, whose pioneering works initiated the field. Chirikov, however, was the first to approach the problem as a physicist, opening up new horizons. The analytical approach he developed allowed him to solve many physical problems and predict new effects that were later confirmed experimentally. His review paper of 1979, published in *Physics Reports*, summarizes the main results on classical chaos. Nowadays, cited in a few thousand

research papers, this review remains a "bible of chaos" for many researchers worldwide.

In the mid-1970s Chirikov initiated the enthralling hunt for manifestations of dynamical chaos in quantum physics. Investigations by a group that he led provided a basis for the creation of a new field of theoretical physics, "quantum chaos", which attracted the interest of a wide circle of researchers. Since then there have been numerous studies of quantum chaos with applications in nuclear, atomic, molecular and solid-state physics, and so on. Predictions of the theory have been confirmed in experiments with heavy nuclei, complex atoms, quantum dots and superlattices.

Chirikov's brilliant achievements were largely due to his unique research style, which combined intuition with refined analytical methods, simple estimates and numerical simulations. The use of models, as simple as possible but not simpler than necessary, was his maxim, and a creative one it proved to be. His so-called "standard map", which described a planar rotator driven by time-periodic short kicks, became a paradigm of deterministic chaos in both classical and quantum domains.

As a teacher, Chirikov contributed much to the foundation and development of Novosibirsk State University. His bright, original lectures and interesting, non-standard textbooks helped many generations of physicists to find their way in science. His scientific ideas and warm personality will be sorely missed by everybody who worked with him, including his numerous friends and students. Chirikov would have been 80 this year. His former students and collaborators plan to gather in Novosibirsk at the end of May to remember and honour their remarkable colleague and teacher.

His colleagues and friends.

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