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PERSONALIA

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Nikolai Sergeevich Dikansky (on his 70th birthday)

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Nikolai Sergeevich Dikansky — Corresponding Member of the Russian Academy of Sciences (RAS), head of the laboratory at the G I Budker Institute of Nuclear Physics of the SB RAS, well-known scientist whose career focused on accelerator science and technology — celebrated his 70th birthday on July 30, 2011. Nikolai Sergeevich received the Russian State Prize in Science and Technology (2002) and was awarded the Order of Honor (1999). N S Dikansky's research is on accelerator physics and engineering, and also includes storing charged particles in storage rings and developing the method of colliding beams, where he successfully obtained a number of fundamental results.

N S Dikansky started his career in 1962 at the Institute of Nuclear Physics of the Siberian Branch of the RAS (INP, or IYaF in *Russ. abbr.*) as a laboratory assistant while still a junior student at Novosibirsk State University (NSU), and stayed on the staff of the INP after graduating from NSU in 1965. He soon joined the circle of leading scientists working with colliding electron–positron beams at the VEPP-2 facility, taking part in the study of nonlinear oscillations of particles in storage rings and in the program of studying the stability of coherent oscillations of stored beams. A generalization of the results of observations of coherent oscillations of bunches in the VEPP-2 in 1969 allowed N S Dikansky and his coauthors to build the foundation of the current universal theory of stability of coherent oscillations of beams in storage rings. This study makes it possible to establish a number of general laws related to the dynamics of stored beam evolution and the possibilities of damping coherent oscillations in them. The possibility of analyzing the general properties of coherent beam–beam oscillations and of the specific behavior of coherent oscillations in systems with strong beam cooling are important applications of the theory developed.

Work on the electron cooling of ion beams occupies significant place in the biography of N S Dikansky the researcher. He was one of the leaders of the program of designing and building the NAP-M facility, which was used to conduct the first experiments in the world on electron cooling of proton beams. The importance of the very first results of this program was so high that very soon a laboratory was established at the INP with the main task of studying in detail and developing the method of electron cooling of heavy charged particle beams. Ever since then, Nikolai Sergeevich has remained the irreplaceable head of this laboratory. The work of N S Dikansky and his colleagues showed that the physics of processes occurring during cooling of the stored ions by electrons reveals numerous features that could serve to multiply increase the cooling efficiency and to reach into the cryogenic range in stored ion beams. The international

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accelerator community is well aware of the main results of this work, which stimulated to a large extent the investigation, development, and use of cooling techniques for heavy particle beams at leading research centers the world over. Owing to this work of N S Dikansky and his colleagues, the merely metaphoric phrase 'ultracold beams' grew into one of the working terms of accelerator physics. In 2002, the research work of N S Dikansky and his coauthors on electron cooling of proton beams was awarded the Russian Federation State Prize in Science and Technology.

The electron cooling program yielded an additional gain in stimulating progress in the theory of coherent fluctuations in stored beams; this was a question that had attracted Nikolai Sergeevich for a long time and on which he worked for many years. It was found at some point that the universal theory of coherent oscillations developed by N S Dikansky and his coauthors greatly facilitated derivation of kinetic equations describing the heat transfer between particles in the beam and its spontaneous coherent oscillations (coherent fluctuations) that are initiated, for example, by thermal motion of particles in the beam. In particular, the theory developed permits conducting consecutive computations of the so-called turbulent lengthening of intense bunches — the

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phenomenon which had occupied the thoughts of accelerator physicists for many years.

Nikolai Sergeevich made a significant contribution to the design and construction of proton–antiproton and other hadron colliders incorporating electron cooling. Many theoretical and technical discoveries of N S Dikansky and his colleagues, published in the papers of this series, are now employed for substantial improvement in the parameters of existing installations.

Work on using ion beams started at the INP of the SB RAS on N S Dikansky's initiative more than thirty years ago and led to the development and manufacturing of a generation of implanters (a novelty at that time) for processing semiconductor materials. Some of these installations continue to function. After 1987, N S Dikansky's interests focused more and more on projects of construction of electron–positron factories at the INP, SB RAS. These are electron–positron colliders for relatively moderate energies (up to 3–9 GeV per beam) but with luminosity exceeding world average values by two to three orders of magnitude. Similar projects were suggested at the same time in the U.S. (SLAC), Japan (KEK), and Italy (INFN, Frascati). In contrast to laboratories abroad, implementation of this project at the INP required installation of a modern high-performance source of positrons. Nikolai Sergeevich devoted all his prodigious erudition, enthusiasm, and energy to solving this very difficult problem. One of the results of this activity of Nikolai Sergeevich and his colleagues was the construction and launching at the INP of a positron source that met the requirements of the factories.

At the beginning of the 1990s, in connection with still well-remembered events in our country, the rate of construction of electron–positron factories at the INP had to be cut substantially in order to help the Institute survive in the extremely tight financial atmosphere. The high reputation of N S Dikansky's research results in the international accelerator community proved crucially helpful for the INP in signing and executing a number of important and highly technological contract projects, which saved the Institute during the period of financial 'storms'. Among many such research projects, we should certainly mention the pilot project on the feasibility of designing so-called ultrahigh-luminosity electron–ion colliders. The main goal of this work was not the manufacture of 'hardware' but the results of the feasibility research and ideas on how to build these new accelerators with colliding beams.

N S Dikansky participated actively and productively in the international life of his Institute. His numerous reports at accelerator conferences and his organizing such conferences in this country go without saying; on top of this, he was a member of the ICFA Beam Dynamics subsection on the International Committee for Future Accelerators until 1993, a member of the ICFA (1993–1997), a member of the International Committees of the Electron–Positron Factories (1997–2001, Tsukuba, Japan) and SLAC (USA), a member of the Scientific Policy Committee of RIKEN (Japan), and a member of the editorial board of the international journal *Particle Accelerators* (1991–2001).

Nikolai Sergeevich's boundless energy, his profound multifaceted knowledge, and his managerial talents have always drawn young scientists towards him. Between 1977 and 1982 he taught physics to students of the Physics and Mathematics School at the NSU and provided strong stimulus for many talented youngsters to join the INP. For many years, N S Dikansky actively worked at Novosibirsk State University, having risen from student to Rector. In his capacity as Dean of the NSU Physics Department (1982–1991), he succeeded in having a faculty of accelerator physics organized at the NSU; he has headed it ever since. He occupied the post of NSU Rector between 1997 and 2007. That was a tough period, as the NSU suffered from painful financial difficulties. N S Dikansky was able to achieve normal budgetary financing of the university, and helped in working out of a policy statement on the expansion of the NSU and in obtaining a large Innovation grant for the NSU in 2007. N S Dikansky's teaching activities were celebrated by awarding him with the status of "Outstanding personality in higher professional education" (2001).

He invariably supported — and continues to support and strengthen — the educational system practiced at the NSU. The system was created by his predecessors at the initial stages of formation and maturation of the NSU; it is based on compulsory integration of senior-year students into research projects of the institutes of the Siberian Branch of the Russian (formerly USSR) Academy of Sciences.

We extend out best to Nikolai Sergeevich Dikansky from the bottom of our hearts on his 70th birthday and wish him further success in his creative activities.

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