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PERSONALIA

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Aleksandr Nikolaevich Skrinsky (on his 80th birthday)

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The fifteenth of January 2016 was the 80th birthday of the outstanding physicist, Academician Aleksandr Nikolaevich Skrinsky, Research Supervisor of G I Budker Institute of Nuclear Physics of the Siberian Branch of the Russian Academy of Sciences (RAS). Many brilliant pages in the history of the development of charged particle accelerator physics and high-energy physics are closely related to the name A N Skrinsky.

The formulation and development of the colliding beam method based on charged-particle accumulation in storage rings is fundamental for today's experimental high-energy physics investigating the properties and laws of the world of elementary particles. Facilities with colliding electron–electron beams VEP-1 (1964) and electron–positron beams VEPP-2 (1966) were created under the guidance and with direct participation of A N Skrinsky. These facilities were employed for a series of experiments on the studies of quantum electrodynamics (1965–1967) and light vector mesons, and came up with revealing for the first time (1967–1970) the multiple hadron production in electron–positron annihilation events.

Making use of the VEP-1 and VEPP-2 facilities, A N Skrinsky and colleagues conducted a series of pioneering works on the study of collective effects in storage rings. They were the first to discover coherent longitudinal and transverse instabilities and to examine the mechanism of their occurrence, and also proposed and implemented techniques to suppress them. The particle encounter effects in cyclic accelerators were investigated theoretically and experimentally. A N Skrinsky was the first to point to the nonlinear character of such an interaction and to show the role of nonlinear resonances and stochastic instability in the restriction on luminosity in installations with colliding beams.

The avenue of work initiated by A N Skrinsky in 1966 on the practical production of polarized electron and positron beams in storage rings and their application for elementary particle physics and nuclear physics was very important and fruitful.

The theory of spin motion in real magnetic fields in accelerators and storage rings was formulated with the participation of A N Skrinsky, who proposed methods of spin motion control with the help of spin rotators and 'Siberian snakes', and the method of obtaining longitudinally polarized beams in storage rings, in particular, for colliding beams; the feasibility of this method was proven theoretically (1970).

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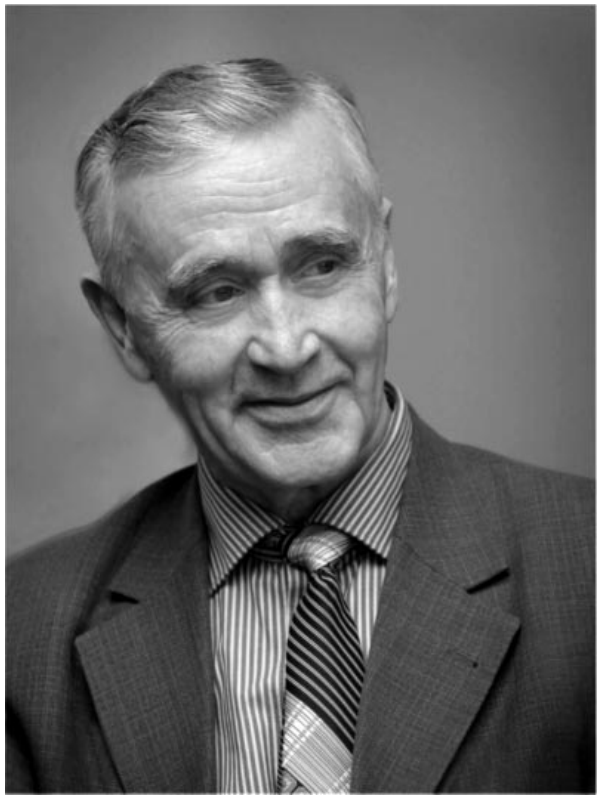

Aleksandr Nikolaevich Skrinsky

These methods found application in the electron ring of the HERA collider (Hamburg) in experiments with internal targets and, with the participation of Budker INP, on the RHIC storage facility (Brookhaven, USA) in obtaining longitudinally polarized colliding proton–antiproton beams, and on the NIKHEF (Amsterdam) and BATES laboratory (MIT, USA) storage facilities.

A N Skrinsky took part in working out the methods of circulating beam polarization measurements and in the experimental study (1970) of the mechanism of radiation beam polarization. A N Skrinsky and his colleagues proposed, developed, and implemented the method of precision measurement of elementary particle mass using resonance depolarization of electron–positron colliding beams (the first experiments were carried out in Novosibirsk in 1975). The method allowed the determination of the mass scale in the range from 1 GeV/c^2 to 100 GeV/c^2 to an accuracy of 3×10^{-6} (experiments on VEPP-4).

A brilliant page in the history of the development of accelerator physics is the 'electron cooling' method proposed by G I Budker in 1967. A N Skrinsky and colleagues developed the 'electron cooling' theory and in 1974 obtained

experimental proof of the theory. Soon (1978), numerous effective applications of the method in rather important areas were found. The method is being widely employed in many laboratories in the world, in many cases with the participation of Budker INP (CERN; GSI, Germany; IMP, China). Solutions have recently been found allowing a radical extension of the energy range up to teraelectron-volts (2015).

At the present time, the international community of high-energy physicists is working on a project of the international linear electron–positron collider at superhigh energies, whose conceptions were developed by A N Skrinsky along with G I Budker and V E Balakin as far back as the 1970s.

Today in Novosibirsk, A N Skrinsky is taking active part in high-energy physics experiments on VEPP-4M and the new VEPP-2000 colliders and is also designing the project of an essentially new installation — Super charm-tau-factory, one of the most ambitious projects in high-energy physics, not only in Russia, but all over the world.

A N Skrinsky made a significant contribution to the development of applied work on the basis of fundamental elaborations of Budker INP: the application of synchrotron radiation in different areas of science and technology, and the development of electron-beam technologies for various fields of industry.

As to free electron lasers (FELs), A N Skrinsky proposed a very important modification — the optical klystron (1977) especially fit to obtaining generation employing electron storage rings. In many laboratories, laser operation is based on the optical klystron, and short-wave radiation with a wavelength of 0.24 microns was obtained with the VEPP-3 storage ring (1988). This remained a record achievement for 10 years (it was somewhat improved only in 1997).

Particularly interesting and promising are electron lasers with high average power using accelerators-recuperators (1994). The creation of the Novosibirsk free electron laser — a unique source of coherent electromagnetic radiation in the wavelength range from 5 to 240 microns — has now been accomplished. The mean radiation power of the Novosibirsk FEL amounts to 0.5 kW, which exceeds greatly analogous foreign setups in their wavelength ranges.

The Center of Photochemical Research at SB RAS founded on the basis of the Novosibirsk FEL provides unique possibilities for research in the field of photochemistry ('laser catalysis') and other areas of science and technology.

For several recent years A N Skrinsky has taken an active part in working out the conception of the international project of muon colliding beams using ionization cooling of muons, which he proposed as far back as the 1970s in collaboration with Academician G I Budker. The conception of fourth-generation synchrotron radiation sources now being developed with his assistance employing energy recuperation accelerators has won international recognition.

Largely owing to A N Skrinsky's efforts, a whole range of Russian institutes took an active part in big international projects, first of all in the Large Hadron Collider project in CERN (Switzerland), in experiments at B-factories at KEK Center for High-Energy Physics (Japan), and at Stanford (USA).

A N Skrinsky is the author and co-author of more than 400 scientific publications, and he takes an active part in the training of scientific brain-power. Among his disciples are two academicians, four corresponding members of RAS, 15 doctors of sciences, and 45 candidates of sciences.

A N Skrinsky conducts extensive scientific-organizational work. For many decades he was a member of the Presidium of RAS and Presidium of SB RAS, head of the Section of Nuclear Physics of the Physical Sciences Division of RAS, and in 2001–2004 he was a member of the RF Presidential Council on Sciences and High Technologies.

A N Skrinsky is a laureate of the Lenin Prize (1967), State Prize of the USSR (1989), State Prize of RF (2001), State Prize of RF (2006), State Prize of Novosibirsk region (2010), and the Demidov Prize (1997), and he was decorated with the V I Veksler Gold Medal of RAS (1991) and P L Kapitza Gold Medal of RAS (2004).

In 2001, A N Skrinsky received the American Physical Society's R R Wilson Prize. He was awarded the A P Karpinsky Prize of the Alfred Töpfer Foundation (Germany) in 2003, the commemorative medal of the International Society of Accelerators for achievements in and contribution to the field of beam cooling and their application (2015).

A N Skrinsky was elected a Full Member of the American Physical Society in 1999, and a Foreign Member of the Swedish Royal Academy of Sciences in 2000.

He was awarded Orders of the Red Banner of Labor (1975), of the October Revolution (1982), 'For Services to the Fatherland' of the 4th degree (1996), 'For Services to the Fatherland' of the 3rd degree (2000), and 'For Services to the Fatherland' of the 2nd degree (2006).

A N Skrinsky has very high international scientific authority and is a member of a number of Russian and international committees that determine the strategy of the development of high-energy physics in the world.

We wish Aleksandr Nikolaevich Skrinsky good health, long and fruitful activities, and new scientific results.

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