# Dmitriĭ Vladimirovich Skobel'tsyn (on his ninetieth birthday)

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Academician Dmitriĭ Vladimirovich Skobel'tsyn, one of the most outstanding and honored scientists in our country, celebrated his 90th birthday on November 24, 1982.

Skobel'tsyn began his first work (1924) under the influence of one of the most striking scientific events of that time, the discovery of the Compton effect (1923). Compton's results, which confirmed Einstein's ideas about the corpuscular nature of radiation, were initially met with skepticism; the validity of his experimental data was disputed. On the other hand, the simultaneous discovery by C. T. R. Wilson of directly visible tracks of recoil electrons arising due to scattering of x-rays by the gas in the chamber that he invested could not reveal the mechanism of the phenomenon since the energy of these electrons was too low.

D. V. Skobel'tsyn proposed using $\gamma$ rays from radium to study recoil electrons in a Wilson chamber. His first visual observations with a beam of these rays (April 1924) already gave a definite, even though qualitative, confirmation of the corpuscular model of the phenomenon.

He used a magnetic field later, at first only to improve the conditions for observing recoil electrons arising in the gas in the chamber. This improvement in technique led to results of great significance. Photographs (August 1924) showed that for electron energies of the order of 0.5 MeV and higher it is possible to determine quite accurately the energy of the particle from the measured curvature of the electron track.

D. V. Skobel'tsyn completed (first in Leningrad, and then in M. Curie's laboratory in Paris) an extensive research program on the use of the Wilson chamber in a magnetic field to study the Compton effect and at the same time on $\gamma$-ray spectroscopy. The most significant result of his observations was the discovery (in 1927) of high-energy cosmic ray particles and the formation of showers of these rays. This work of D. V. Skobel'tsyn became the point of departure for new, main-line paths leading to the modern physics of high-energy particles.

In later years, D. V. Skobel'tsyn directed an extensive series of experimental and theoretical investigations of cosmic rays.

During World War II, while working on strictly applied problems, Dmitriĭ Vladimirovich continued to develop the cascade theory of showers formed in the

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earth's atmosphere by ultra-high-energy electrons and photons. It turned out that the computed characteristics of such showers did not agree with the experimental data already available at that time. The continuation of this work led to the conclusion that showers develop in the atmosphere not as a result of electromagnetic interactions, but rather as a result of nuclear interactions. This changed in a fundamental way the then existing concepts of the processes induced by high-energy particles in the atmosphere and quickly led to important results concerning the interactions of ultra-high-energy nuclear particles (hadrons, as they are now called).

Under the overall direction of D. V. Skobel'tsyn experimental study of nuclear processes at high energies began to be carried on by what by then had become large groups at the Physics Institute of the Academy of Sciences of the USSR and at the Moscow State University. This work was conducted along two directions: on high mountains and at sea level at the highest energies, and also in the stratosphere (and later in space) at comparatively moderate particle energies.

Research along a broad front led to completely new

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results. It became clear that in an elementary act of interaction of nucleons and nuclei, electron-photon cascades form (as became clear later on, due to the decay of neutral pions) in addition to the lower energy secondary hadrons, i.e., on the whole, so-called "electron-nuclear" showers are formed. Secondary hadrons, in their turn, produce electron-nuclear showers. According to this picture, an extended atmospheric shower, due to the nuclear-cascade process has a hadronic framework which is surrounded by cascades of electrons (and photons) as it passes through matter (the atmosphere).

The possibility of establishing a number of very important laws opened up: the approximate constancy of the hadronic cross sections up to enormous energies, the predominantly peripheral nature of the interaction of hadrons (smallness of the inelastic factor), the equality of the power-law indices of the energy spectra of secondary and primary particles (now called the energy scaling of the fragmentation) and much else, just as unexpected in the light of the early ideas and confirmed several decades later by experiments performed with accelerators.

In 1950, Dmitriĭ Vladimirovich presented these results in a report at the annual General Session of the Academy of Sciences of the USSR. The foundations of a new, very important branch of physics were laid in that report.

D. V. Skobel'tsyn has broad scientific interests. His monograph "The Twin Paradox in the Theory of Relativity" was published in 1966. At the end of the 1960s, D. V. Skobel'tsyn turned his attention to one of the unsolved fundamental problems of classical electrodynamics: the problem of ponderomotive forces in a medium. In the following years, he developed new approaches to the solution of paradoxes, discussed in the literature at that time, involving the problem of choosing one of two tensors for the energy-momentum of the electro-magnetic field in a medium, proposed by Minkowski and Abraham at the beginning of the century. D. V. Skobel'tsyn is the acknowleged head of a large and active group of students that he formed, many of whom are now distinguished scientists, leading specialists in nuclear physics, elementary particles, and cosmic rays and already have their own scientific schools and numerous students.

The scientific-organizational and social work of D. V. Skobel'tsyn was also very extensive. In 1951, after the death of the founder of the P. N. Lebedev Physics Institute of the USSR Academy of Sciences, Academician S. I. Vavilov, D. V. Skobel'tsyn became the director and scientific leader of this leading physics institute in our country (1951–1973). During the years of his directorship, the Physics Institute of the Academy of Sciences increased in size by almost a factor of 15, and many new areas of science, in particular quantum electronics, emerged and were successfully developed at the Institute. D. V. Skobel'tsyn showed an outstanding depth of understanding of the, for him, new area of physics and evaluated its possibilities when it was still in an embryonic stage. Of the achievements of the Institute in this area, it is enough to say that the directors of this new branch of physics, members of the Institute, Academicians N. G. Basov and A. M. Prokhorov, won the Lenin and Nobel Prizes.

In 1967, the Physics Institute was awarded the Lenin Prize.

But even before he became the director of the Physics Institute, D. V. Skobel'tsyn started a very important pedagogical and scientific-organizational undertaking.

While he was still at the Polytechnical Institute in Leningrad and later at the Moscow State University, he gave a number of lecture courses on nuclear physics. After the end of the war in 1946, he created the Scientific Research Institute of Nuclear Physics at Moscow State University, where for 14 years he was its director and the leader of nuclear physics work at Moscow State University. Many of our specialists in nuclear physics and atomic energy began their careers here.

D. V. Skobel'tsyn was a delegate of the Supreme Soviet, at first of the Russian Soviet Federal Socialist Republic, and later of the USSR at a number of sessions (1954–1974). In 1946–1948, he was an expert on atomic energy for the USSR delegation at the UN, while in 1955 he headed the USSR delegation at the First International Conference in Geneva on the Peaceful Uses of Atomic Energy and was the vice-president of this representative forum.

D. V. Skobel'tsyn is known throughout the world as an active fighter for peace. He was one of the organizers and active figures in the Pugwash movement of scientists for peace and chairman of the committee on international Lenin prizes for strengthening peace between the peoples of the world. His exceptional adherence to principle and independence, manifested always and in everything he did, won D. V. Skobel'tsyn enormous moral authority and respect. The Party and the Government have evaluated highly D. V. Skobel'tsyn's services to our country and to the Soviet people. He has been given the title of Hero of Socialist Labor, and has been awarded the State (1951) and Lenin (1982) Prizes. He has been awarded six Orders of Lenin and two Orders of Red Banner of Labor. The Academy of Sciences awarded him the S. I. Vavilov Gold Medal and the D. I. Mendeleev Prize.

We sincerly wish Dmitriĭ Vladimirovich, one of the oldest of Soviet physicists, good health and further creative pleasures.

Translated by M. E. Alferieff