Dmitriĭ Vladimirovich Skobel'tsyn (Obituary)

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Academician D. V. Skobel'tsyn, a patriarch of Soviet physics, died on November 16, 1990 after a long and serious illness.

D. V. Skobel'tsyn was born on November 24, 1892 in St. Petersburg into the family of a professor of the St. Petersburg Polytechnic Institute. After completing university studies and devoting several years to teaching, in 1925 Skobel'tsyn became a member of the faculty of the Leningrad Physicotechnical Institute.

His first large-scale scientific research project was a study of the scattering of γ rays (emitted by radioactive materials) by electrons (the Compton effect).

D. V. Skobel'tsyn was the first to determine the characteristics of the recoiling electrons in this process. In his experiments he used a Wilson cloud chamber placed in a magnetic field and hence was able to measure not only the angles of departure of the recoiling electrons, but also their energy. In these experiments Skobel'tsyn convincingly confirmed the concept of the quantum nature of electromagnetic radiation and by means of highly accurate measurements showed in 1927–1929 that the scattering cross section closely agreed with the Klein–Nishina–Tamm formula and disagreed with earlier formulas for the cross section calculated by Compton himself, and also by Dirac.

D. V. Skobel'tsyn developed the method of detecting neutral radiation from measurements of the recoiling particles. This work of Skobel'tsyn formed the experimental basis of quantum electrodynamics as can be easily traced by references to it in the classical papers of the time. This was very important in the formative years of quantum mechanics and quantum field theory. Not surprisingly, the work of Skobel'tsyn at once earned him an international reputation (for example, in the summarizing monograph on radioactivity by Rutherford, Chadwick, and Ellis published in 1930, the work of Skobel'tsyn is given much attention).

In the first of these papers (in 1927), Skobel'tsyn noted unexpected tracks of particles entering the chamber from the outside that were not deflected by the magnetic field but in regard to ionization were indistinguishable from the tracks of relativistic electrons. He estimated their energy as exceeding 20 MeV. Hence these particles could not have been decay products of radioactive elements. Skobel'tsyn studied them in great detail. In 1928 he reported his discoveries orally in a conference in London and presented the details in a paper published in 1929 in "Zeitschrift für Physik". He ascribed the particles to cosmic rays in the atmosphere. He also noted that they often tend to show up in the chamber in groups, beyond the limits of pure statistical coincidence.

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Estimates of the total ionization produced by these undeflected particles were consistent with the then available data on ionization created by "ultra γ radiation" (as cosmic rays were then called) at sea level.

This discovery of a high-energy flux of cosmic-ray particles and their shower structure argued against the then-prevalent view that the energies of cosmic-ray particles were low (we note that in the most widely known reference journal of those years, "Physikalische Berichte," papers on cosmic rays were placed not only under the heading "Corpuscular Radiation," but also under "Geophysics" and even "Meteorology").

The discovery of D. V. Skobel'tsyn was the beginning of cosmic ray physics. During the following quarter century, the methods developed by Skobel'tsyn led to a number of important discoveries. In 1936 Skobel'tsyn published the monograph "Cosmic Rays," in which he summarized and analyzed the experimental state of the field. Here his characteristically deep understanding of the theory was evident. Skobel'tsyn was therefore in fact a founder of a new era in physics: high-energy physics.

In 1938, at the invitation of S. I. Vavilov, the Director of

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the P. N. Lebedev Physics Institute, D. V. Skobel'tsyn moved from Leningrad to Moscow and began to direct all of the Institute's research on cosmic rays and nuclear physics.

Skobel'tsyn studied the structure of wide atmospheric showers of cosmic rays produced by ultrahigh-energy particles (then up to 10^{15} eV) mainly using the multiple coincidence technique developed by him using a system of detectors placed over large areas. These large-scale studies were begun before the Second World War and expanded particularly after the war in Moscow and in the Pamir. They were conducted by Skobel'tsyn and his students (V. I. Veksler, S. N. Vernov, N. A. Dobrotin, G. T. Zatsepin, A. E. Chudakov, and others) and later by their students under the general supervision by Skobel'tsyn. These studies established important new facts. It was observed that a shower is a nuclear cascade process (and not electromagnetic multiplication of electrons and photons, as earlier thought). This in turn led to the discovery of the fundamental properties of the interaction of high and ultrahigh-energy hadrons, such as the completely unexpected result that the cross section of the interaction is approximately constant. These studies of Skobel'tsyn and his closest students were recognized by the awarding of the State Prize of the USSR to Skobel'tsyn in 1951, and later the Lenin Prize in 1982.

In 1940 Skobel'tsyn organized the nuclear physics department in the physics faculty of Moscow State University, where he lectured on nuclear physics. In 1946, when the training of specialists in nuclear physics was strongly emphasized, he reorganized the department into the "Structure of Matter" Division of the Physics Faculty of Moscow State University.

In the same year Skobel'tsyn organized the Nuclear Physics Research Institute at Moscow State University and became its Director. This was the beginning of his long career in science administration. In 1951 Skobel'tsyn succeeded S. I. Vavilov as Director of FIAN (Physics Institute, Academy of Sciences of the USSR) (the Directorships of the Nuclear Physics Research Institute and the Division of nuclear physics at Moscow State University were given to S. N. Vernov in 1960). Skobel'tsyn remained Director of FIAN for more than 20 years, until retiring in 1973.

The period of Skobel'tsyn's directorship was exceptionally important for the development of the Institute. The number of staff members at FIAN incresed severalfold during this time, even though during this period several laboratories were split off from the Institute and became the Acoustics Institute, the Institute for Nuclear Research of the Academy of Sciences of the USSR, the High-Energy Laboratory of the Joint Institute for Nuclear Research, and the Institute of Spectroscopy of the Academy of Sciences of the USSR. More than 500 scientific and technical staff members at FIAN were transferred to these laboratories. In this same period a number of new facilities were created as part of the Institute: the Tien-Shan high-altitude science station for the study of cosmic rays, the Crimean science station, the Radio-Astronomy station at Pushchino, the Institute's own Design department at Troitsk (Moscow District, and constantly operating Pamir expedition with the regular participation of foreign scientists. New buildings for laboratories and support staff at the Institute (total size about 40,000 square meters) were also constructed during this period.

In 1984 Skobel'tsyn became the Honorary Chairman of the Science Council at the Institute and in 1988 its Honorary Director. During these years he was present almost daily at the Institute and closely followed the research being done at the Institute.

His Directorship (as well as other community and government posts: in 1946–1948 he was an expert on the USSR's delegation to the UN talks on the ban on atomic weapons; for 25 years he was a representative on the International Lenin Peace Prize Committee, in 1954–1974 he was a deputy of the Supreme Soviet first of the Russian Republic, and later of the USSR) did not keep him from his scientific work, but he was no longer able to conduct experiments directly. However, his style of work (a deep insight into the physics of the most complicated problem) benefited the work of the scientific organizations that he managed. For example, he actively supported the work of V. I. Veksler on charged-particle accelerators, and he was one of the first to understand the physics and the importance of quantum electrodynamics. He very much encouraged the rapid growth of this work at FIAN.

An illustration of Skobel'tsyn's breadth of scientific interest and his outstanding scientific qualifications is his monograph "The Twin Paradox in the Theory of Relativity," which he wrote and published in 1966. Later, after working on complicated theoretical questions on the energy-momentum tensor in matter, he related its 80-year history by the publication in Usp. Fiz. Nauk of a large paper (40 pages) devoted to the long controversy surrounding the problem (the choice between the Abraham and Minkowski tensors).

His exceptional integrity, his constancy in fighting for his point of view, regardless of personalities, his attentiveness to his students and to people in general earned D. V. Skobel'tsyn great respect and authority.

He was honored with the title Hero of Socialist Labor and was awarded numerous orders and medals, including the S. I. Vavilov Gold Medal, the Medal of the World Peace Council, the D. I. Mendeleev Prize, and others.

Even after he became seriously ill, Skobel'tsyn continued to be interested in science and the affairs at the Institute and often conducted long discussions with his students and colleagues.

The name Dmitriĭ Vladimirovich Skobel'tsyn will forever be inscribed in gold in the history of Soviet and world science.

Translated by J. D. Parsons