SOVIET PHYSICS USPEKHI VOLUME 15, NUMBER 6 MAY-JUNE 1973

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DMITRIĬ VLADIMIROVICH SKOBEL'TSYN

(On His Eightieth Birthday)

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Usp. Fiz. Nauk 108, 771–772 (December, 1972)

DMITRIĬ Vladimirovich Skobel'styn, one of the most prominent and meritorious of Soviet physicists, celebrated his eightieth birthday on November 24, 1972.

Skobel'tsyn's research on the mechanics of the interaction of gamma rays with matter and especially his discovery of cosmic-ray charged particles and showers have become classics and are set forth in detail in all basic textbooks and handbooks on nuclear physics and cosmic rays.

Skobel'tsyn began his work in nuclear physics about 50 years ago, at a time when one of the most pressing problems of physics was that of the quantum nature of light scattering. He was the first to use the Wilson cloud-chamber method to study the interaction of gamma rays with matter. This approach enabled him to observe and photograph the tracks of recoil electrons in the cloud chamber after they had interacted with gamma rays. These studies directly confirmed the hypothesis of the quantum nature of the Compton effect.

At the same time, Skobel'styn's work on recoil electrons not only led to the development of a new method of beta and gamma spectroscopy, but also transformed the Wilson cloud chamber in a magnetic field into one of the most effective tools of nuclear and cosmic-ray physics. It was with this method that a number of discoveries of prime importance were subsequently made in various countries.

Using a Wilson cloud chamber placed in a magnetic field, Skobel'styn himself observed high-energy particles that had been produced, as he showed, by the cosmic radiation. These observations were the first to reveal the immediate cause of the ionization produced by cosmic rays, the nature of which had remained elusive for 15 years. He discovered the cosmic-ray particle showers by the same method.

Skobel'tsyn's discoveries showed that processes take place at high energies that do not have analogs at lower energies. In so doing, he laid the foundation of the entire modern physics of high-energy particles. Skobel'tsyn's papers marked a decisive stage in the development of this field.

In the years that followed, and to this day, Skobel'tsyn has guided broad-gauge research on cosmic radiation.

He authored a profound analysis of the conditions under which electron-photon showers develop in dense matter and in the atmosphere. Skobel'tsyn showed that the cascade theory inevitably leads to the conclusion that there is a sharp particle-number maximum at a certain depth of development of the cascade and that the absence of this maximum on the experimental curves available at the time was due to the fact that the experiment was designed without consideration of the possible scattering of the particles. To the contrary,

the experiments of Skobel'tsyn's students showed that a theory that takes account of scattering and absorption of low-energy particles in electron-photon cascades correctly describes the behavior of the electrons and photons up to very high energies.

During the war, Skobel'tsyn also made a profound analysis of the development of electron-photon showers in the atmosphere and compared the results of his calculations with experimental data on extensive cosmic-ray showers in the atmosphere. A number of profound discrepancies between theory and experiment were brought out. The disagreement led Skobel'tsyn to the fundamental conclusion that nuclear processes have a decisive role in the development of the showers and served as a basis for an extensive research series on the propagation of cosmic-ray particles of high and ultrahigh energy through the atmosphere.

The work was developed in two directions: instruments developed by Skobel'tsyn's students were used in the upper layers of the atmosphere and later in outer space to study the properties of particles with

comparatively moderate energies, and interaction characteristics at the highest energies were studied at mountain elevations.

These two series of studies resulted in a new conception of the propagation of high- and ultrahigh-energy particles through matter. It was found that secondary nuclear-active particles and particles of the electron-photon component (electron-nuclear showers) are produced in elementary nuclear-interaction events. The nuclear cascade process, which is the basis for the production of extensive showers in the atmosphere, comes into play at the highest energies.

In the famous paper that he read to the general conference of the USSR Academy of Sciences in 1950, Skobel'tsyn set forth the foundations for a new understanding of cosmic-ray physics as the nuclear physics of high- and ultrahigh-energy particles.

In 1951, Skobel'tsyn and his studies were awarded a First Degree State Prize for this work.

In later years, most of Skobel'tsyn's scientific activity was devoted to experimental verification and further development of the picture that he had elaborated of the penetration of ultrahigh-energy particles through matter. This was done in a long series of experimental and theoretical papers written both by Skobel'tsyn himself and by his students under his supervision.

This conception has now been generally accepted. In essence, the work of Skobel'tsyn and his school advanced nuclear physics into a new range of high and ultrahigh energies and thereby created a new and highly important subdivision of this physics.

Skobel'tsyn is recognized as the head of a large and active school of Soviet physicists and specialists on the atomic nucleus, cosmic rays, and accelerators who owe their tutelage to him. Many of his students have now themselves become prominent scientists with their own scientific following and numerous students of their own.

Skobel'tsyn's scientific-organizational, teaching, and social activities have also been extensive. He organized and for many years headed the nuclear physics department of the physics faculty at Moscow State University, where many specialists received their training. Skobel'tsyn organized the Moscow State University Scientific Research Institute of Nuclear Physics in 1946 and was its director for 14 years. He has invested a great deal of work in the management of the P. N. Lebedev Physics Institute of the USSR Academy of Sciences, of which he became director in 1951, on the death of Academician S. I. Vavilov, the founder of that Institute.

Skobel'tsyn's exceptional erudition and intuition and his widely recognized respect for fundamentals and tremendous authority have come clearly to the fore during his tenure in this position. He not only supports research in areas contiguous to his own specialty, but also actively promotes such new subdivisions of physics as quantum radioelectronics, radio astronomy, and others.

Under Skobel'tsyn's guidance, the Academy of Sciences Physics Institute has become the mainstay of Soviet physics. It was awarded the Order of Lenin in 1967.

Skobel'tsyn's characteristic profound insight into difficult problems of physics is also in evidence in his comparatively recently published monograph on "The Paradox of Twins in the Theory of Relativity," in which he presents a brilliant analysis of one of the most complex problems of relativity theory.

Skobel'tsyn is a former deputy of the RSFSR Supreme Soviet and has been a deputy of the USSR Supreme Soviet at a number of its recent conventions.

In 1946–1948, Skobel'tsyn served as a Soviet atomic energy expert to the United Nations.

Skobel'tsyn's work as an active pacifist is widely known. He is the permanent Chairman of the Committee of the International Lenin Prize for "The Strengthening of Peace Between Nations." In this position, he works actively for the dissemination of Lenin's great idea on friendship between nations to all of progressive humanity. He was one of the organizers and activists of the Pugwash movement of scientists for peace.

The Party and Government hold Skobel'tsyn's record high before the Soviet people. He has been named a Hero of Socialist Labor and awarded four Orders of Lenin and two Orders of the Red Banner of Labor. The USSR Academy of Sciences has honored him with the S. I. Vavilov Gold Medal and the D. I. Mandeleev medal.

Translated by R. W. Bowers