D V Skobeltsyn lived a long life — almost 100 years — and influenced many prominent scientists who regarded him as their mentor. The story of his life is of interest not only to specialists in cosmic ray problems. Dmitrii Vladimirovich Skobeltsyn lived through revolutions and wars, was one of the creators of revolutionary changes in physics, and took active part in training specialists for the Soviet Atomic Project and in launching space research projects. The range of his scientific interests covered the physics of elementary particles and atomic nuclei, and cosmic ray physics.

D V Skobeltsyn was honored with the degree of the USSR Hero of Socialist Labor, six Orders of Lenin, and two Orders of the Red Banner of Labor. He won the USSR State and Lenin Prizes and was a member of many international scientific societies. There can be no doubt that D V Skobeltsyn was one of the greatest scientists in our country.

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Academician D V Skobeltsyn and Moscow State University

V A Sadovnichy

The twenty fourth of November was the 120th anniversary of the birth of Academician Dmitrii Vladimirovich Skobeltsyn — the patriarch of nuclear physics in the USSR, a scholar of international renown, a Hero of Socialist Labor, a laureate of the Lenin and USSR State Prizes, the founder of the first department of experimental nuclear physics in the USSR and of the Division of Nuclear Physics in the Faculty of Physics at Lomonosov Moscow State University (MSU) and MSU Institute of Nuclear Physics (NIIYaF MGU in *Russ. abbr.*), which has borne his name since 1993.

D V Skobeltsyn's name is inseparable from important events in the history of physics. His pioneering work in the observation of tracks left by charged particles in magnetic cloud chambers was the cornerstone of the experimental foundations of quantum electrodynamics. D V Skobeltsyn's discovery of cosmic ray showers consisting of genetically related high-energy particles launched a new avenue of research in high-energy physics. He was for a long time the scientific leader of a large series of experimental programs in cosmic-ray physics, whose development in consequent years led to results of the highest importance.

The teaching and research activities of Dmitrii Vladimirovich Skobeltsyn at Moscow State University began in 1940 when the Department of Atomic Nucleus and Radioactivity was created in the MSU Faculty of Physics at the initiative of Academician Sergei Ivanovich Vavilov, Director of P N Lebedev Physical Institute of the USSR Academy of Sciences (FIAN) at that time. D V Skobeltsyn, one of the most outstanding scientists in the Soviet Union, whose name was closely connected with the paramount results in nuclear physics, was appointed as its Head.

The creation of the new department at MSU was due to the fact that the fundamental discoveries in nuclear physics made in the early 1930s set in motion a rapid development of this field of knowledge. It is the nuclear physics that was becoming one of the most significant areas among the natural sciences. In the USSR, this was pursued at institutes in Leningrad and Kharkov. The creation in 1934 in Moscow of the Physical Institute named after Petr Nikolaevich Lebedev prepared the foundation there for the development of experimental and theoretical research in nuclear physics. Obviously, this meant the need to train physicists specializing in nuclear physics. After moving in 1938 from Leningrad to Moscow, D V Skobeltsyn became Head of the Laboratory of Atomic Nucleus at FIAN, which worked in close cooperation with its Theory Department headed by Igor' Evgen'evich Tamm.

In those years, the conditions at MSU to conduct experimental work in nuclear physics were nonexistent. Students keen on studying nuclear physics were therefore assigned to experimental departments whose specializations were as close as possible to nuclear physics. Theoretical physicists did their work on nuclear physics either at MSU or at FIAN under the supervision of I E Tamm and his colleagues.

D V Skobeltsyn's organization of the department of experimental nuclear physics in 1940 at MSU Faculty of Physics played the decisive role in the Great Patriotic War years when, beginning with the fall of 1942, the widespread investigation into the Soviet Atomic Project was launched.

Already in October 1943, D V Skobeltsyn's department resumed training specialists in nuclear physics, having invited the leading scientists from FIAN and Laboratory No. 2 headed by I V Kurchatov to lecture for the students. A laboratory was equipped at the department where it became possible to conduct physics research in cosmic rays and nuclear spectroscopy.

Understanding full well that in the war years it would be impossible to organize the training of a required number of specialists for work on the Atomic Project without a special decision of the State Defense Committee (GKO), D V Skobeltsyn and I V Kurchatov (who became an MSU professor since November 1944) succeeded in pushing through the governmental resolution, "On training specialists in the physics of the atomic nucleus", in February 1945. The resolution specified the planned numbers of specialist that would graduate from the department and the need to provide laboratory space to set up a practicum on nuclear physics, and formulated an order to the Committee on Higher Education Affairs to build a cyclotron for MSU and another order to the military services to urgently demob from the Soviet Army and transfer to "D V Skobeltsyn's authority" a group of graduates of the MSU Faculty of Physics for the purpose of retraining. Students, lecturers, and staff of the department were exempt from conscription. These students' scholarships were increased.

Following the orders of this resolution, in 1945 D V Skobeltsyn organized for the second-year students of the Faculty of Physics a special group which also accepted students of the 2nd and 3rd years from other educational institutes, extended the pre-planned training of students of the 3rd and 4th years, created a group for retraining 5th-year

V A Sadovnichy Lomonosov Moscow State University, Moscow, Russian Federation
E-mail: info@rector.msu.ru

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students, and on September 1, 1945 opened the first practicum for nuclear physics in the country.

During the autumn term of 1945, D V Skobeltsyn delivered to specialists who were given additional training a course of lectures, Radioactive Decay and Nuclear Reactions, which was later published as a textbook. D V Skobeltsyn's course of lectures became a brilliant textbook on nuclear physics, written by an outstanding scientist and teacher. There is no doubt that in the post-war years it was the best textbook in the country and played a huge role in the training of skilled research workers.

By the end of 1945, D V Skobeltsyn's first ten retrained nuclear physics specialists graduated from the department to work on the Atomic Project. After Hiroshima and Nagasaki, however, the work on implementation of the Soviet Atomic Project speeded up significantly, and the output of the department had to be multiplied. A decision was made to create specialized research and educational institutes to provide staff for the Atomic Project.

On 22 December 1945, a special committee in the USSR Council of People's Commissars endorsed a decision to provide MSU with new buildings and working space, thus expanding the existing department to the Institute of the Physics of Atomic Nucleus. The work at the institute began on 1 February 1946; in nonclassified documents, it was referred to as the Second Physics Institute (NIFI-2),[1] and the original department became known as the Department of the Structure of Matter.

At the end of 1945, D V Skobeltsyn began work on organizing at MSU a research and training center for students graduating in nuclear physics, in which teaching would be closely tied to high-level scientific work conducted with modern own research equipment.

D V Skobeltsyn's plan involved building for the institute a cyclotron and an electrostatic generator, acquiring equipment and instruments for the study of cosmic rays using radiosonde balloons, modern electronic equipment, new alpha-, beta-, and gamma-ray spectrometers and mass spectrometers, and creating modern practicums for students. It should be emphasized at this point that by the end of 1945 or at the beginning of 1946, none of our educational institutes had their own experimental base for conducting research. Therefore, the program of equipping the university with the required technology as formulated by D V Skobeltsyn was very novel and started to be followed by other institutes in the country only a few years later.

D V Skobeltsyn and his colleagues brilliantly solved the problem of establishing a research and education institute of a new type within the higher education system, and it took them only a few years to complete the program.

To achieve high-quality training of specialists at the Department of the Structure of Matter, and later at the MSU Faculty of Physics Division of the Structure of Matter, D V Skobeltsyn came up with a novel idea, which he later implemented, of integrating academic research and education by involving the leading professors and scientists in delivering lectures, taking part in seminars, and supervising the research of under- and postgraduates.

Included in the structure of the institute were laboratories for students, operating as bases for special practicums: one on nuclear physics, one on electronic devices, and one on atomic physics. These practicums were, in fact, modern educational laboratories on nuclear physics and were capable of providing in full the training in experimental nuclear physics for students of both this specialization and other branches of the Faculty of Physics. In these practicums, students' work was supervised by the staff of both MSU and academic institutes.

In 1947, the government voted in a decree on constructing new buildings for MSU in the Lenin (Vorob'evy) Hills and on providing faculties and institutes with new equipment. The NIIYaF came up with a proposal to build a higher-power cyclotron and the corresponding individual building for it. However, in view of insufficient funding, this proposal of the institute was not included in the resulting governmental decree. In summer 1948, the situation changed, however, after D V Skobeltsyn's return from New York (where he worked in 1946–1948 at the Soviet mission to the UN). Having secured the support of Academicians I V Kurchatov, S I Vavilov (President of the USSR Academy of Sciences), and A N Nesmeyanov (Vice Chancellor of MSU), D V Skobeltsyn succeeded in obtaining an additional decree of the USSR Council of Ministers on constructing a special building for accelerating installations and another for studying extensive air showers of cosmic rays. D V Skobeltsyn also succeeded in persuading the leadership of the country of the need to assign additional funds for acquiring research equipment and instruments for Moscow State University.

Dmitrii Vladimirovich scrutinized numerous separate issues involved in creating new buildings for the institute. For instance, he planned to build in one of the wings of NIIYaF not only lecture rooms for special courses but also relaxation rooms for the faculty.

The preparation for the move into the new buildings of MSU in the Vorob'evy Hills involved certain changes in the structure of Moscow State University. For instance, a 1951 resolution of the USSR Council of Ministers ordered the liquidation of six research institutes. Only three were to survive: the P K Sternberg State Astronomical Institute (GAISh), NIFI-2, and the Institute of Anthropology. The creation of divisions which would merge large groups of related departments was decided for most large university faculties.

D V Skobeltsyn firmly advocated retaining at each of these faculties divisions that would ensure training for the new and actively expanding research fields, as well as retaining and expanding research institutes within MSU. He succeeded in retaining within the Faculty of Physics the division of the structure of matter that the planners expected to be liquidated. The resuscitation of the doomed institutes and creation of new ones was the best confirmation of the viability of D V Skobeltsyn's concept of how the University should grow.

D V Skobeltsyn considered it most important that the university allow its young promising graduates to follow their careers at MSU. Those 120 specialists whom he retained at NIIYaF made up the core of his scientific school; on the whole, almost fifteen hundred specialists were trained in fifteen years.

D V Skobeltsyn possessed brilliantly wide scientific intuition. He formulated very clearly the necessity and the possibility of implanting at the institute new lines of inquiry, such as high-temperature plasma physics, atomic physics, quantum electronics, and space physics. At the Division of the Structure of Matter, he organized the training of specialists for these new fields. All these efforts helped the

[1] It was later renamed the Institute of Nuclear Physics (NIIYaF).

vigorous growth of fundamental and applied research in these areas.

D V Skobeltsyn's characterization as scientist, mentor, and science organizer would be incomplete if we forgot to mention his activities as science popularizer. He wrote a number of articles on various aspects of nuclear physics in the *Great Soviet Encyclopedia*, articles on the discovery of radioactivity, and articles about outstanding physicists.

Dmitrii Vladimirovich was a kind man, and was very attentive to the people around him. He knew and loved books and music (people say that he was in awe of Mozart's and Bach's music). Memoirs left by his colleagues and disciples tell us that he had a highly original personality, that the clarity of his mind, the crispness of his judgements, and his firmness in defending his views never left him until the very last days of his life.

Dmitrii Vladimirovich Skobeltsyn belongs to the constellation of scientists of whom Moscow State University is proud. His name is inseparable from the epoch-making achievements of our country in the Soviet Atomic Project and in space exploration. The University remembers with deep gratitude the accomplishments of one of its greatest scientists. The scientific school that he created, his students, and the Institute bearing his name continue successfully the work that he started and to which he gave so much of his knowledge, strength of mind, and abilities.

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Academician D V Skobeltsyn as the founder of the MSU school of nuclear physics

M I Panasyuk, E A Romanovskii

On February 1, 1940, Moscow State University (MSU) opened a Department of Atomic Nucleus and Radioactivity. Dmitrii Vladimirovich Skobeltsyn, elected in 1939 to the USSR Academy of Sciences as a Corresponding Member, was appointed the Head. The department was established for training specialists in experimental nuclear physics. This essentially was the date when Skobeltsyn started to build the scientific school of nuclear physics at Moscow State University.

Students majoring in theoretical nuclear physics were trained at the Department of Theoretical Physics. From 1925 till 1930 this department was headed by Leonid Isaakovich Mandelshtam, and from 1930 till 1941 by Igor' Evgen'evich Tamm. By the end of the 1930s and the beginning of the 1940s, a large group of students had graduated from the Department of Theoretical Physics and the experimental physics departments of the Faculty of Physics, which were close in their subject-matters to nuclear physics; later, they contributed brilliantly to the expansion of nuclear physics. Among them were M A Leontovich, D I Blokhintsev, I M Frank, M A Markov, E L Feinberg, V L Ginzburg, V V Vladimirskii, V S Fursov, A D Galanin, I N Golovin, A S Davydov, S Z Belen'kii, I I Levintov, F L Shapiro, Ya P Terletskii, G I Budker, and A D Sakharov.

It is well known that moving the Academy of Sciences from Leningrad to Moscow in 1934 and the transformation of the Department of Physics in the Institute of Physics and Mathematics of the USSR Academy of Sciences into the P N Lebedev Physical Institute of the USSR Academy of Sciences (FIAN) was of great importance for the further development of research in nuclear physics at MSU. The FIAN Director between 1934 and 1951 was Sergei Ivanovich Vavilov, who invited such prominent physicists as L I Mandelshtam, N D Papaleksi, G S Landsberg, I E Tamm, and M A Leontovich to FIAN from MSU; moreover, all of them after this transfer were allowed to combine research at FIAN with holding departments and lecturing to students in the Faculty of Physics.

S I Vavilov was also (temporarily) Head of the Laboratory of Atomic Nucleus at FIAN. Its staff included L V Groshev, N A Dobrotin, I M Frank, and P A Cherenkov. In 1935, having defended his PhD degree in Leningrad, S N Vernov became a doctoral candidate at FIAN (on the recommendation of Academicians S I Vavilov and V I Vernadsky) where he was doing research in cosmic ray physics under the guidance of S I Vavilov and D V Skobeltsyn.

In 1938, D V Skobeltsyn accepted S I Vavilov's suggestion to move to FIAN as leader of the research program in nuclear physics and cosmic rays. A memorandum sent from FIAN to the Presidium of the USSR Academy of Sciences, "On the organization of work for the study of the atomic nucleus in the institutes of the USSR Academy of Sciences", emphasizing the achievements of FIAN in the investigations on the physics of atomic nuclei, formulated a proposal to create, using FIAN as a base, a central academic laboratory with a powerful cyclotron, and the need to start training young nuclear physicists for this specialization. At the end of November 1938, the FIAN memorandum was discussed at a meeting of the Presidium of the USSR Academy of Sciences. One of the items in the Resolution of the Presidium of the USSR Academy of Sciences contained the following instruction: "MSU will prepare for the task of establishing the experimental department focused on the physics of atomic nucleus with an appropriate laboratory" [1].

In those years, A S Predvoditelev was the Dean of the MSU Faculty of Physics and Chairman of the Learned Council of the Faculty of Physics. He wrote to D V Skobeltsyn on behalf of the Learned Council with a request to "take the trouble to organize the teaching of subjects essential for the atomic nucleus and radiology at the MSU Faculty of Physics", "to deliver a talk to the Council of the faculty on how the work on setting up the department of the physics of atomic nucleus is planned to unfold," and informed D V that "the administration of the university has already resolved the issue of organization of the department in the affirmative" [2].

In order to create a new department at MSU, it was necessary to have an order issued by the Committee on Higher Education Affairs of the USSR Council of People's Commissars (VKVSh under USSR SNK). In the years we are dealing with here, students of universities and of educational institutes were taught some aspects of nuclear physics within lectures on general physics. VKVSh and other organizations

M I Panasyuk, E A Romanovskii D V Skobeltsyn Institute of Nuclear Physics of M V Lomonosov Moscow State University, Moscow, Russian Federation
E-mail: panasyuk@sinp.msu.ru, besp@sinp.msu.ru

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