

In memory of Sergei Petrovich Kapitza

DOI: 10.3367/UFNe.0182.201211m.1245

Professor Sergei Petrovich Kapitza, widely known Russian scientist and brilliant science popularizer, DSc, and Leading Researcher of the P L Kapitza Institute for Physical Problems, RAS died on 14 August 2012.

Sergei Petrovich was born on February 14, 1928 in Cambridge (UK) where his father, Petr Kapitza, was working at the time at the famous Cavendish Laboratory headed by Ernest Rutherford. Sergei started school at Cambridge but had to leave before graduation. In those years, his father used to visit the USSR quite often and never had a problem returning to England. He was considered a Soviet scientist on ‘a long business trip abroad.’ However, in autumn 1934, when Petr Leonidovich came to the Soviet Union to participate in the Mendelev Congress, the Soviet authorities chose to withdraw permission for returning to England.

In 1935, Anna Alekseevna, Sergei Petrovich’s mother, followed her husband to the Soviet Union, bringing with her Sergei and his younger brother, Andrei. During WWII, the family lived in Kazan, where Sergei Kapitza graduated from secondary school in 1943 without attending classes. After returning to Moscow, he enrolled in the Aircraft Industry Department of the Moscow Aviation Institute (MAI), from which he graduated in 1949. This started his career as an engineer and scientist. For two years after graduating from the institute, S P Kapitza worked at the N E Zhukovsky Central Aerohydrodynamic Institute (TsAGI), studying various aspects of heat transfer and aerodynamic heating at high flow rates. However, when Petr Kapitza, his father, fell from grace with the authorities, Sergei Petrovich was fired from TsAGI and this research program was terminated. The results achieved were sufficient to submit and defend a PhD thesis at a later date in 1956. Between 1951 and 1953, S P Kapitza worked as a junior researcher at the Institute of Geophysics, and in 1953 he moved to the Institute for Physical Problems of the USSR Academy of Sciences (now RAS). Since 1965, S P Kapitza combined this job with teaching physics at the Moscow Institute of Physics and Technology (MFTI) as Chair of General Physics.

The span of S P Kapitza’s interests in science was simply enormous. He published papers in supersonic aerodynamics, terrestrial magnetism, particle accelerators, applied electrodynamics, synchrotron radiation, and nuclear physics.

S P Kapitza’s main scientific achievement at that time was the creation (in collaboration with V P Bykov and V N Melekhin) of an efficient electron accelerator known as the microtron. The resulting microtron occupied a prominent place in the field of electron accelerators for energies of up to 30 MeV. Microtrons of this new type became widely used in nuclear physics, nondestructive scanning for defects of thick-



Sergei Petrovich Kapitza
(14.02.1928–14.08.2012)

walled parts, and radioactivation analysis, and also as injectors in high-energy accelerators, in physics research, etc. It should be emphasized that S P Kapitza supervised the design and building of an industrial-scale medical microtron for treating cancer. These microtrons were exceptional in their low cost, reliability, and simple maintenance requirements, and continued to be used in clinical practice until very recently. They operated for decades in various clinics in Moscow (P A Gertzen MNIOI), Obninsk, Kiev, Tallinn, and Minsk, and were intended for use by researchers in Czechoslovakia, Romania, Vietnam, South Korea, Japan, and India.

Having created an efficient microtron at IFP, S P Kapitza began supervising research on fundamental and applied nuclear physics. Experiments on photofission of heavy nuclei were conducted for many years together with the Institute for Physics and Power Engineering (IPPE, Obninsk) and the Joint Institute for Nuclear Research (JINR, Dubna). This work made an important contribution to our understanding of the fission process; among other things, these experiments proved the existence of the fission channels theoretically predicted by A Bohr. The detection of quadrupole photofis-

sion of even–even nuclei was certified as a discovery (in collaboration with G N Smirenkin, N S Rabotnov, A S Soldatov, L N Usachev, and Yu M Tsipenyuk). Experiments on the photofission of heavy nuclei also made a significant contribution to the knowledge of the double-humped structure of the fission barrier, theoretically predicted by V M Strutinskii.

For many years, S P Kapitza led a successful research program on high-sensitivity γ -activation analysis of the materials composition using the IFP microtron in collaboration with the V I Vernadsky Institute of Geochemistry and Analytical Chemistry (GEOKHI RAN). Results deserving special mention were obtained in measuring the content of gas-forming admixtures (nitrogen, oxygen, carbon). This work achieved record-breaking sensitivity of analysis, on the order of 10^{-6} by mass.

S P Kapitza was Vice Chair of the USSR AS Presidium Commission on Synchrotron Radiation and actively participated in organizing the building of synchrotron radiation sources in the country. At present, the development of this technology has led to powerful advances of research in various fields of science.

Sergei Petrovich always paid utmost attention to the history of science, to the methods and the theory of education. In 1973, he published a very interesting book (recently reprinted) titled *The Life of Science* — a collection of more than a hundred introductory words and prefaces to the main papers of the most famous scientists from the time of Copernicus to the present day.

In the 1980s, he became attracted to certain aspects of demography. The main subjects of his research were demographic revolution, the dynamic growth of global population, applications of the theory of dynamical systems and well-known methods of theoretical physics and synergetics in the art of future forecasting, and development of a phenomenological mathematical model of hyperbolic growth of Earth's population. S P Kapitza authored numerous publications in these fields, including two review papers in *Physics–Uspekhi* (“The phenomenological theory of world population growth” *Phys. Usp.* **39** 57 (1996), and “On the theory of world population growth” *Phys. Usp.* **53** 1287 (2010)) and the monograph *General Theory of the World Population Growth* (Moscow: Nauka, 1999).

Enlightenment activities occupied an important place in the life of Sergei Petrovich Kapitza. The universally revered TV series, *Obvious Yet Improbable*, enjoyed tremendous, truly nationwide popularity; he created and launched it in 1973 and was its irreplaceable voice and face all that time. Even this was only one part of his science enlightenment, science-publicistic, and, more widely, science-social drive. He was a founder and Editor-in-Chief of the scientific information journal *In the World of Science*, the Science Supervisor of the Russian New University, and the President of the Nikitsky Club.

Sergei Petrovich Kapitza was Vice President of the Russian Pugwash Committee and a member of such institutions as the European Physical Society, World Institute of Science, International Commission on Culture and Development, the Club of Rome, European Academy of Sciences, International Academy of Humanism, Manchester Literary and Philosophical Society, World Academy of Arts and Sciences, International Federation of Aeronautics, RF Presidential Art and Culture Council, Academy of Russian Television, and a number of other societies.

His achievements were awarded with numerous prizes and awards. He received the USSR State Prize in 1980, the UNESCO International Kalinga Prize in 1979, the Prize of the RAS Presidium for his contribution to science popularization in 1995, and the Education Prize of the Government of the Russian Federation (2002). S P Kapitza received the Order of Merit for his great contribution to the advancement of television broadcasting in this country and for many years of fruitful work (2006), the Order of St. Stanislaw (2006), the TEFI Prize (2008), and the Order of Service to the Fatherland IV Class (2011).

In 2012, S P Kapitza became the first holder of the RAS Gold Medal for extraordinary achievements in dissemination of scientific knowledge.

Sergei Petrovich Kapitza possessed encyclopedic knowledge, was an exemplary member of the true-blue intelligentsia, and was a great science enlightener. He was devoted to science and possessed the gift of rendering in simple words the gist of complicated scientific problems, so that the subject became accessible and exciting for wide audiences. Generation after generation used his *Obvious Yet Improbable* TV series as their university. Sergei Petrovich Kapitza was a brilliant representative of the intellectual elite of this planet.

The warm memory of Sergei Petrovich Kapitza and his brilliant life will remain with us forever.

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