

## Igor' Pavlovich Stakhanov (Obituary)

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Usp. Fiz. Nauk **155**, 731–732 (August 1988)

Igor' Pavlovich Stakhanov, the eminent scientist and doctor of physicomathematical sciences, passed away on February 11, 1987.

He was born on June 3, 1928, in the town of Sapozhk of the Ryazan' region, where one of the streets bears the name of his father Pavel Petrovich Stakhanov, the county doctor and prominent member of the community. After graduating from high school in 1945, I. P. Stakhanov entered the geophysics department of the Moscow Mining and Exploration Institute. In 1948 he transferred to the physics department of the M. V. Lomonosov Moscow State University (MSU). In October of 1954, after completing university and graduate studies, he began working as a junior researcher in the MSU physics department.

Already in his student days Igor' Pavlovich embarked on his research activities. He studied the theory of relaxation processes in hydrodynamics and then performed computations of the thermodynamic properties of gases at high temperatures. These results were included in a monograph<sup>1</sup> that came to be widely used in practical applications, including those arising from the clearly stages of circumterrestrial space exploration.

After defending a dissertation for the Candidate of physicomathematical sciences degree (1955), Igor' Pavlovich began work at the Physics and Power Institute in the town of Obninsk. His research field was the direct transformation of nuclear energy into electricity. After completing a number of important research projects in the field of thermoemission transformers, Igor' Pavlovich quickly became a leading expert in the field which united the efforts of both theoretical and experimental scientists. This collaboration led to the construction of "Topaz", the first thermoemission transformer reactor in the world. Together with his colleagues and students I. P. Stakhanov authored several monographs<sup>2-4</sup> on thermoemission transformers.

In 1968, at the MSU physics department he defended a dissertation entitled "On the theory of gas discharge in low temperature plasma" for the Doctor of physicomathematical sciences degree. From 1969 onward I. P. Stakhanov worked at the Institute of Earth Magnetism, Ionosphere and Radiowave Propagation in the town of Troitsk. His research topics included difficult problems in the physics of nonlinear phenomena in the ionosphere and space plasma.

The range of problems related to plasma physics that occupied I. P. Stakhanov expanded even further after he was invited to Moscow to join the "Energy" scientific production facility (SPF) of the USSR Ministry of Energy (today, the USSR Ministry of Atomic Energy). There he began studying the problem of controlled thermonuclear fusion, which he considered sufficiently challenging "to occupy his remaining years". Once again, at the "Energy" SPF I. P. Stakhanov immediately became the unofficial scientific leader. Together with co-workers he developed the concept of an "active first wall" which absorbs and liberates the ac-



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tive gas (hydrogen)—in some cases this can significantly affect the thermal transport of heavy particles (ions and atoms) along the channel. In this connection the problem of hydrogen diffusion in solids was formulated and solved in the case of nonequilibrium, nonlinear and non-steady-state boundary conditions in a gas (plasma) atmosphere.

Igor' Pavlovich continued to work in this field after embarking on pedagogical activity, which had always attracted him: when working in Obninsk he taught theoretical physics at the local branch of Moscow Engineering Physics Institute for a number of years. The pedagogic skill, approachability, attention to students and great erudition of I. P. Stakhanov invariably attracted younger people. In recent years, serving as a professor in the department of higher and applied mathematics of the M. V. Lomonosov Institute of Fine Chemical Technology in Moscow, he applied his own, innovative methods to developing mathematics courses that took into account the professional orientation of his students. At the students' request he began teaching an additional departmental course which incorporated the results of his own recent scientific research into equations of mathematical physics with nonlinear boundary conditions, which often occurred in physical chemistry.

The pedagogic talents of I. P. Stakhanov also found an outlet in his numerous publications for the wider, nonspecialized audience. His popular scientific papers were published in such journals as *Nauka i Zhizn'* ("Science and Society"), *Znanie—Sila* ("Scientific Endeavor"), *Kvant* ("Quantum"), and in the collection "Contemporary Physics for High School Students". It bears mentioning that Igor' Pavlovich was a man of great scientific courage and independence. These qualities enabled him to delve into such a "trivial" and "compromising" subject as the study of ball lightning. Aware that a statistical analysis of the descriptions of ball lightning would be crucial to discerning its nature, I. P. Stakhanov devoted much time and effort to the collection of an enormous (probably the most complete in the world) body of observational material, which he accomplished by surveying the eyewitnesses of this phenomenon through the "Science and Society" journal. Based on this material I. P. Stakhanov wrote a book about ball lightning, in which he critically analyzed the numerous eyewitness accounts, processed them statistically, and presented his cluster model of this object. This book played an important role in that the problem of ball lightning claimed its rightful place in scientific research. At the same time it proved so interesting to the general reader that both editions<sup>5,6</sup> sold out immediately. At the behest and with the participation of I. P. Stakhanov a conference on the problem of ball lightning took place at the Yaroslavl' University in 1986.

Igor' Pavlovich was very much interested in the philosophical questions of scientific knowledge. His publications in the journal *Voprosy Filosofii* ("Problem of Philosophy") on the subject of scientific methodology are marked by a deep understanding of the question and convincing argumentation.

Igor' Pavlovich was a man of great integrity: he always spoke his mind and acted on his beliefs, regardless of the circumstances. Thus he lived a truly full life, rich in experience. His activities did not end with research: at the Scientist House in Troitsk he organized a literature and history club, serving as its permanent president. His democratic views, openness, and constructive approach fostered an atmosphere in which the younger club members could humanistically determine the place of scientific and technical accomplishments in world culture. Igor' Pavlovich Stakhanov was an optimistic, cheerful, and benevolent man, endowed with a fine sense of humor. He had known much and travelled widely. He loved nature, science, his friends and family.

Thus we knew him, thus we remember him, and thus he will remain in the hearts of all who knew him.

<sup>1</sup>A. S. Predvoditelev, E. V. Stupochenko, E. V. Samuilov, I. P. Stakhanov, A. S. Pleshonov, and I. B. Rozhdestvenskii, Handbook of thermodynamic functions of air at temperatures from 6000 to 12000 K and pressures from 0.001 to 1000 atmospheres (In Russian), Izd. AN SSSR, M., 1957.

<sup>2</sup>I. P. Stakhanov, A. S. Stepanov, V. P. Pashchenko, and Yu. K. Gus'kov, Plasma Thermoemissive Transformation of Energy (In Russian), Atomizdat, M., 1968.

<sup>3</sup>I. P. Stakhanov (editor), Physical Foundations of Thermoemissive Transformation of Energy (In Russian), Atomizdat, M., 1973.

<sup>4</sup>I. P. Stakhanov and V. E. Cherkovets, Physics of Thermoemission Transformers (In Russian), Energoizdat, M., 1985.

<sup>5</sup>I. P. Stakhanov, The Physical Nature of Ball Lightning (In Russian), Atomizdat, M., 1979.

<sup>6</sup>I. P. Stakhanov, On the Physical Nature of Ball Lightning (In Russian), Energoizdat, M., 1985.

Translated by A. Zaslavsky