

## Yuriĭ Borisovich Rumer (Obituary)

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The eminent theoretical physicist, Doctor of physico-mathematical sciences, Professor Yuriĭ Borisovich Rumer died on 1 February 1985.

Yu. B. Rumer was born on 28 April 1901 in Moscow into a family well-known for its cultural traditions. In 1917 he entered the Mathematics Faculty of the Petrograd University, and in 1918 he transferred to the Moscow University. In 1919–1921 he was an enlisted man in the Red Army, an interpreter for the Soviet mission in Persia. After graduating from the Moscow University in 1924 Rumer worked as a teacher of mathematics in several workers' faculties in Moscow and for approximately a year as a statistician in Gosstrakh (State Insurance Agency).

In 1927 Rumer went to Germany to continue his education and to specialize in the field of theoretical physics. In 1929–1932 he worked as an assistant to Max Born in one of the centers of the new quantum physics in Göttingen. In 1932 Rumer returned to Moscow and on the recommendations of Einstein, Born, Ehrenfest, and Schrödinger he was invited to become a professor at the Moscow University, where he worked until 1937. Since 1935 Rumer simultaneously served as a senior scientist at the Physics Institute of the Academy of Sciences of the USSR. There were difficult years in Rumer's life, but even then he succeeded in applying his knowledge to the solution of technical problems. The last decades of his life were associated with Siberia. At the end of the 1940's he taught at the Eniseĭ Pedagogical Institute, and then transferred to Novosibirsk, where in 1957 he headed the Institute of Radiophysics and Electronics of the Western-Siberian Branch of the Academy of Sciences of the USSR created by himself, which for a number of years was the only academic institute with physics specialization in Novosibirsk. Due to Rumer's efforts a strong school of theoretical physicists was formed in this Institute. From 1967 until the end of his life Yu. B. Rumer was in charge of the theoretical sector in the Institute for Nuclear Physics of the Siberian Branch of the Academy of Sciences of the USSR.

The beginning of Rumer's scientific activity coincided with the years of establishment of quantum mechanics. During these years he carried out pioneering work on the application of the methods of quantum mechanics and group theory to chemistry. In the first paper of this series Rumer proposed the method of finding the correct initial basis of the valence states of complex molecules which later was named the theory of resonance structures. Using this method he calculated the spectra of the benzene molecule and other



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ring molecules. At present Rumer's theorem and diagrams have been universally recognized and are presented in textbooks on quantum chemistry.

In 1937 Rumer's fruitful collaboration with L. D. Landau began. During a short period (approximately a year and a half) they obtained important results in the physics of cosmic rays and in solid state theory. In papers on the theory of cosmic ray showers the idea of a shower as a sequence of cascades of bremsstrahlung and electron-positron pairs produced by it was given a strict mathematical interpretation. Rumer's mathematical talent and penetrating mind were prominently displayed here. These papers led to the development of an entire field in the investigation of cosmic rays.

In solid-state theory the Landau-Rumer formula for the absorption of high-frequency sound in dielectrics is well known. The processes of decay and fusion of waves investi-

gated for the first time by Landau and Rumer play, as is well known, an important role in the physics of wave phenomena.

During these same years Rumer and Landau wrote a popular-science book "What is relativity theory?". Published twenty years later it evoked lively interest among the readers and underwent numerous editions in more than 20 languages of the world.

Rumer was always attracted to problems in statistical physics. He devoted much time to the investigation of such a difficult problem in statistical mechanics as the Ising-Onsager problem. By introducing fermion operators he succeeded in presenting Onsager's unique solution in a new mathematical form and in obtaining the spin correlation functions. The simplification of the structure of the Onsager solution made this problem accessible to a wide circle of investigators.

Another one of Rumer's important contributions to statistical physics is the elegant and effective method proposed by him for calculating partition functions for quantum Bose and Fermi ideal gases in a magnetic field. This method enabled him to investigate the behavior of the magnetic susceptibility of an electron gas subjected to arbitrary magnetic fields and temperatures. Rumer called attention to the existence of model systems that cannot be heated to a temperature above a certain limiting temperature. His work on Bose-condensation, in which he showed that the nature of the transition changes in an essential manner when an external field is applied, belongs to the same set of problems.

In the period of the 1940s–1950s Rumer under difficult conditions with great determination developed the idea of the unification of quantum mechanics, electrodynamics and the general theory of relativity by going outside the framework of the four-dimensional Einstein space. He named his theory 5-optics, having in mind Hamilton's optico-mechanical analogy. A long series of papers published in the JETP during 1949–1953 and the monograph "Research on 5-Optics" (1956) were devoted to 5-optics. On the whole the idea of going out into multidimensional space turned out to be fruitful, and, decades later, it is again popular in quantum field theory.

Rumer's circle of scientific interests was extremely broad. In hydrodynamics to him belong the solutions of the problem of the submerged jet of finite radius and of the problem of convective diffusion in a submerged jet. In biology, starting from group-theoretic considerations, Rumer proposed an original method of classifying the genetic code. Turning in the period of 1938–1948 to problems of applied mechanics he carried out a number of investigations on the oscillations of complex mechanical systems.

In recent years Rumer worked on the application of group-theoretic methods to problems of quantum mechanics and field theory.

Rumer's unquenchable youthful interest in science dominated his entire life. This interest brought him to Göttingen during the "Sturm und Drang" period of the youthful quantum physics. The same interest in science attracted young scientists to him half a century later. Rumer had the talent of a brilliant lecturer. A deep knowledge of modern physics enabled him for many decades to give courses of lectures on all the divisions of theoretical physics. During the 1930's in the period of rapid development of theoretical physics in our country Rumer's lectures at the Moscow University were a significant event in the scientific life of the capital. Published in the form of monographs "Introduction to Wave Mechanics" (1935) and "Spinor Analysis" (1936) they became widely known. During almost two decades Rumer's pedagogical activity was associated with Novosibirsk University. His lectures were constantly popular not only among students, but also among the young scientists of the Akademgorodok. Published as textbooks his lectures on thermodynamics, statistical physics, and kinetics, due to the original treatment of the fundamental concepts, laid a solid "thermodynamical foundation" for several generations of young physicists.

Rumer was an outstanding multifaceted person. He knew and loved poetry and literature, possessed outstanding linguistic abilities, and had a good knowledge of many modern and ancient languages. His interests embraced philosophy, biology, chemistry, history of science, and of literature. His interest in people was boundless. It is not surprising that Rumer was surrounded by friends under whatever conditions to which he was subjected by fate. Having the native gift of friendship "direct, unhyprocritical", he attracted to himself people of the most varied natures and interests. Numbered among his friends were R. L. Bartini, V. Weisskopf, W. Heitler, S. P. Korolev, L. D. Landau, M. A. Leontovich, L. A. Lyusternik, B. S. Stechkin and I. G. Érenburg. Also among them were very young people for whom friendship with Yuriï Borisovich determined their life's path.

A passionate and temperamental man Yuriï Borisovich was not indifferent to anyone. His sympathies and antipathies were remarkably stable. His devotion to friends, his thoughtfulness and good will knew no bounds.

He lived with faith in beauty and goodness and he will so remain in memory of the people who knew him.

Translated by G. M. Volkoff