

PERSONALIA

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Yuriĭ Moiseevich Kagan (on his seventieth birthday)

Professor and full member of the Academy of Sciences, Yuriĭ Moiseevich Kagan, one of the outstanding physics theorists of the post-war generation, was 70 on July 6, 1998.

Kagan's 50 years of brilliant and fruitful research have brought him well deserved recognition. Among the honours conferred on him are the Lenin and State Prizes, the M V Lomonosov Prize of the Academy of Sciences, the Karpinsky Prize and the *honoris causa* of the Munich Technical University and Uppsala University; he was also elected Honorary van der Waals Professor of Amsterdam University and member of the European Academy. A prominent feature of Kagan's approach to physics is his exceptionally wide scope of fields of interest, his brilliant physical intuition in posing original and unconventional problems, and his never-ebbing urge to attack the most pressing problems challenging experimental physics.

Yuriĭ Moiseevich Kagan was born in Moscow in 1928. His early life fell on the hard war period and equally hard immediate post-war years. During the war he worked at a factory by day and attended a young workers school at night. At the age of 16, he entered the Moscow Engineering Physics Institute and graduated from it with honors in 1950. In his student years, Kagan was able to pass the famous Lev Landau 'teorminimum' examination, and ever since his life in science has been closely tied to the Lev Landau school.

Kagan was forced to start his scientific career not as Landau's postgraduate, though Landau had invited him to do, but at one of the 'closed' (classified) centers of the Atomic Project. In a short time he was able to develop the general theory of the separation of isotopic gas mixtures in porous media, covering the entire pressure range from the Knudsen to the hydrodynamic flow mode. He introduced the original and elegant idea of replacing a porous medium by an infinitely heavy 'wall' gas. The results generated by his theory proved to be very efficient in the calculations required for the separation of uranium isotopes.

In 1956 Kagan was invited to work at the Institute of Atomic Energy. In the 1960s he developed the kinetic theory of molecular gas with rotational degrees of freedom. In addition to the velocity vector, the theory introduced the rotational momentum of a molecule, which radically changed the entire structure of the classical theory of gases. The new vector, playing a crucial role, was composed of the velocity and rotational momentum vectors; it is known in the literature as the Kagan vector. A general theory of the transfer phenomena in external magnetic and electric fields was constructed, which was able to explain the Zenftleben effect known since the 1930s (changes in the kinetic coefficients of molecular gases induced by a magnetic field). This theory spawned an extensive family of experimental investigations both in Russia and abroad.

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At the same time Kagan started an active research in solid state physics. He developed a consistent theory of the Mössbauer effect in regular and irregular crystals. He predicted the existence of quasi-local phonon levels in crystals with heavy impurities and also sharp anomalies in the temperature dependence of thermodynamic and kinetic quantities in defect-containing crystals.

Kagan made an important contribution into developing the microscopic theory of metals. A series of papers constructed a consistent many-body theory of the electron and phonon properties of non-transition metals. The nature of unpaired covalent forces in metals was understood, the problem of the dynamic and static compressibility was solved, and new features were discovered in the phonon

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