## Lev Petrovich Gor'kov (On his sixtieth birthday)

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Academician Lev Petrovich Gor'kov, an eminent theoretical physicist and a laureate of the Lenin Prize and the L. D. Landau Prize, celebrated his sixtieth birthday on June 14.

L. P. Gor'kov was born in Moscow. He belongs to the group of remarkable physicists known world-wide as the Landau school. On graduating in 1953 from the Engineering Physics Faculty of the Moscow Mechanical Institute (now known as MIFI-Moscow Engineering Physics Institute) Gor'kov was assigned to the Institute of Physics Problems where he worked for approximately 10 years. His first papers (together with I. M. Khalatnikov) were published in 1955. In them the quantum electrodynamics of spinless particles was investigated. In 1956 Gor'kov defended his candidate's dissertation.

The year 1957, in which the BCS theory of superconductivity was published, was in many respects a decisive one for the formation of subsequent scientific interests of Lev Petrovich. The new theory of superconductivity attracted many theoreticians, but Gor'kov succeeded in making a most important contribution: In 1958 only a few months after the appearance of the BCS article a paper was published in which Gor'kov developed a new powerful method of describing superconductivity. The paper contains only five pages, but in the importance of the results obtained this paper goes far beyond the framework of the theory of superconductivity and is numbered among the most significant achievements of modern statistical physics. In essence the entire modern theory of superconductivity is based on the "Gor'kov equations" obtained in that paper. A major achievement of L. P. Gor'kov in the theory of superconductivity is the series of papers published in 1959 devoted to the microscopic foundation of the phenomenological Ginzburg-Landau equations. Due to the papers by L. P. Gor'kov this theory acquired a new life and universal acknowledgment as the simplest apparatus for studying the magnetic properties of superconductors. In 1958-1960 L. P. Gor'kov together with A. A. Abrikosov developed the theory of superconducting alloys. In these papers the diagram technique was developed which enabled them to simplify the calculations significantly bringing them to the automation stage. L. P. Gor'kov (together with A. A. Abrikosov) in 1960 predicted also the phenomenon of gapless superconductivity using the example of superconductors with magnetic impurities. For a series of investigations on the theory of superconducting alloys L. P. Gor'kov together with V. L. Ginzburg and A. A. Abrikosov were in 1966 awarded the Lenin Prize. These classical results are included in the GLAG (Ginzburg-Landau-Abrikosov-Gor'kov) theory of superconductivity.



## LEV PETROVICH GOR'KOV

During the 1960's L. P. Gor'kov while continuing work on superconductivity also worked on problems of the theory of solid state and quantum statistics. In 1961 Lev Petrovich defended his doctoral dissertation. In 1962 the famous "green" book "Methods of Quantum Field Theory in Statistical Physics" was published. It was written by L. P. Gor'kov with coauthors A. A. Abrikosov and I. E. Dzyaloshinskiĭ in which the method of Feynman diagrams as applied to quantum statistics was presented. This method made it possible to utilize field theory methods for studying the physics of the condensed state. This book became a handy reference book for theoretical physicists in the entire world and was awarded the L. D. Landau Prize in 1989.

At the end of the 1960's - beginning of the 1970's Gor'kov worked on the problem of non-steady-state and nonequilibrium superconductivity. The investigations carried out by him together with G. M. Éliashberg provided the foundation for the theory of non-steady-state phenomena in superconductors and stimulated the expansion of many experimental investigations in this field. With the aid of the theory developed in these papers a large number of specific problems were studied associated with the behavior of superconductors in variable fields, —such as nonlinear phenomena, dynamics of vortices, etc.

Towards the end of the 1970's L. P. Gor'kov worked on the theory of superconductors with the A-15 structure. He called attention to the relationship between superconductivity and the structural instability in these compounds. At the same time Lev Petrovich began working on the theory of organic (one-dimensional) conductors. L. P. Gor'kov predicted the main features of the competition between structural instability, superconductivity and the metallic state in organic metals and developed a theory of localization in these compounds which made it possible to determine frequency and temperature dependences of the conductivity. He gave an explanation of the mechanism of generating coherent oscillations observed in the course of propagation of a charge-density wave.

At the beginning of the 1980's L. P. Gor'kov occupied himself with superconductors with "heavy fermions." He developed a method of experimental diagnostics of nontrivial superconductivity in such superconductors, and also gave a classification of the possible types of superconducting pairing in them, and also gave a classification of the possible types of superconducting pairing in these compounds. As soon as high-temperature superconductivity was discovered Lev Petrovich turned to active participation in the study of this problem and became an acknowledged expert in this field.

Since 1966 L. P. Gor'kov was a corresponding member, and in 1987 was elected as a full member of the Academy of Sciences of the USSR. L. P. Gor'kov has been awarded the Order of "Badge of Honor."

The range of scientific interests of L. P. Gor'kov is very broad. What has been said above by no means enumerates all

the scientific results of L. P. Gor'kov. He also authored important papers on hydrodynamics, the theory of semiconductors, etc. Gor'kov's capacity for working combined with invariable thoroughness and deeply felt responsibility in carrying out any task are very impressive, and this in spite of the tremendous load of all kinds of duties. L. P. Gor'kov for more than twenty years headed the department of "Problems of Theoretical Physics" of the Moscow Physico-technical Institute. Every year during the April competitive examination the department selects the best students of the Moscow Physico-technical Institute who then undergo training at the Institute of Theoretical Physics of the Academy of Sciences of the USSR. L. P. Gor'kov devotes much attention to students, candidates for diplomas and graduate students of the department becoming involved in all their problems -- from getting assigned to a student residence to getting assigned to a job on graduation.

L. P. Gor'kov has devoted much energy to the Institute of Theoretical Physics of the Academy of Sciences of the USSR where he has been working from the time of its foundation in 1965. L. P. Gor'kov has played a major role in the establishment and development of the Institute of Theoretical Physics which soon acquired world-wide recognition and a high reputation as a community of scientists occupying key positions in theoretical physics. L. P. Gor'kov has exhibited considerable concern in attracting able young theoreticians into the Institute of Theoretical Physics. More than a third of the members of the Institute of Theoretical Physics from the youngest ones to the principal leaders are graduates of Gor'kov's department.

Lev Petrovich is full of energy and new creative ideas. We wish him good health, happiness and further successes.

Translated by G. M. Volkoff