Vitaliĭ Lazarevich Ginzburg (on his seventieth birthday)

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Academician Vitaliĭ Lazarevich Ginzburg, an outstanding Soviet theoretical physicist, is celebrating his seventieth birthday on October 4, 1986.

V. L. Ginzburg belongs to the small number of the vanishing breed of physicists-universalists. His scientific interests include practically all areas of physics and astronomy, and his ideas and results had a major influence on the development of many of those areas. The following enumeration can give some idea about the most significant achievements of V. L. Ginzburg, which brought him world fame and which are used in many hundreds of papers.[1]

The research in the area of optics of condensed media carried out by V. L. Ginzburg embraces studies of the Cherenkov effect (M. V. Lomonosov award of the Academy of Sciences of the USSR, 1962), including the quantum theory of this effect, radiation in anisotropic and inhomogeneous media, theory of generation of radiowaves by a charge in periodic motion, realized in the "undulator" device, etc. Together with I. M. Frank, V. L. Ginzburg predicted and described a new phenomenon—transition radiation, which has received wide practical application (see the monograph of V. L. Ginzburg and V. N. Tsitovich "Transition radiation and transition scattering", 1984). To the same group belong the papers by V. L. Ginzburg on crystal optics and electrodynamics of media with a spatial dispersion, summarized in a monograph of V. L. Ginzburg and V. M. Agranovich "Crystal optics including spatial dispersion, and the theory of excitons" (1965, 1979).

In the area of solid state physics V. L. Ginzburg developed a phenomenological theory of ferroelectrics (L. I. Mandel'shtam award of the Academy of Sciences of the USSR, 1947), has found the applicability criterion for the Landau theory of phase transitions (the Ginzburg criterion, the Ginzsurg number), developed the theory of light scattering near the phase transition points, investigated the possibility of an anomalous diamagnetism in systems with spontaneous currents, etc.

A special place in the activity of V. L. Ginzburg in the area of the condensed state is occupied by his studies of the theory of superconductivity, covering a large class of phenomena, from thermoelectric effects in superconductors to manifestation of superconductivity in the Universe. The most significant achievement in this area is, unquestionably, the creation of the semiphenomenological Ginzburg-Landau theory of superconductivity, the significance of which not only has not diminished after the creation of the microscopic theory, but, on the contrary, continues to grow, extending far beyond the area of solid state physics (Lenin prize, 1966). V. L. Ginzburg belongs to the group of the most ardent supporters of research in the area of high-temperature superconductivity, considering it to be one of the most important modern scientific and technical problems. The contribution of V. L. Ginzburg and the group of researchers under his leadership to this problem is described in the monograph "Problems of high-temperature superconductivity" (1977).

VITALIĬ LAZAREVICH GINZBURG

The results of V. L. Ginzburg in the theory of superfluids also cover a wide spectrum of problems; in particular, one must mention the development of the semiphenomenological theory (the Ginzburg-Pitaevskiĭ theory), an improved version of which he is actively continuing to develop.

V. L. Ginzburg's research in the area of plasma physics

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had an extraorodinary influence on the development of the theory of propagation of radiowaves in plasmas, the ionosphere of the Earth, and the corona of the Sun (see the monograph "The Propagation of Electromagnetic Waves in Plasmas," 1960, 1967, and also the monograph written together with A. A. Rukhadze "Waves in magnitoactive plasmas", 1970, 1975). His article (together with A. V. Gurevich, 1960) on the theory of nonlinear phenomena in plasmas had a major influence on the research in propagation of high-power radiowaves in the ionosphere.

V. I. Ginzburg is one of the founders of modern radioastronomy; already forty years ago he predicted the existence of radiowave emission of high intensity from the external corona of the Sun. His subsequent contribution to this science consisted both in purely theoretical works (the theory of wave propagation in the solar corona, the theory of spontaneous and brehmsstrahlung solar radiation, etc.) and in pointing out important new methods of research in radioastronomy.

V. L. Ginzburg is also one of the founders of the modern theory of the origin of cosmic rays. He provided the basis for the galactic model of their origin, which includes the extended halo, which has predetermined the development of the theory for almost the next thirty years. He developed the diffusion model of the origin and distribution of cosmic rays in the Galaxy, which is based on the relationship also discovered by him between the properties of cosmic rays and the magnetic brehmstrahlung at radio frequencies generated by them. The results of activity of V. L. Ginzburg in this area are summarized in the monograph "The origin of cosmic rays" (together with S. I. Syrovatskiĭ, 1963), and in subsequent review articles.

In the area of gamma- and x-ray astronomy V. L. Ginzburg suggested the tests for determining the concentration of cosmic rays in intergalactic space, indicated the young shells of Supernovas as a source of gamma- and proton radiation, etc. These studies are summarized in a monograph written by V. L. Ginzburg and a group of his colleagues "The astrophysics of cosmic rays" (1984).

V. L. Ginzburg made an important contribution to the class of problems including the general theory of relativity, cosmology, extragalactic astronomy, pointing out, in particular, the disappearance of a magnetic field during the collapse of a star, the high temperature and degree of ionization of the intergalactic gas, etc.

The published works of V. L. Ginzburg (they consist of approximately four hundred articles and two dozen books) are not limited to publications on specific physical subjects. He wrote a large number of articles on popular science, and also articles on the history and methodology of science. The most important of them were included in his books "On physics and astrophysics" and "On relativity theory" (1979).

V. L. Ginzburg's articles in the popular press, devoted to problems of organization of science, are aimed towards an increase in the productivity of science, and towards overcoming indolence and bureaucracy (not only in science).

V. L. Ginzburg devoted a lot of his time and strength to the organizational activity in the field of science; as a member of the executive of the Division of General Physics and Astronomy of the Academy of Sciences of the USSR, he is responsible for conducting monthly sessions of the Division, he is also a member of many scientific and academic councils. He is a member of editorial boards of many Soviet and foreign scientific and popular science journals, including the journal "Uspekhi Fizicheskikh Nauk", he is the editor-in-chief of the journal "Izvestiya vuzov. Seriya Radiofizika". In his organization-of-science activity, V. L. Ginzburg is also exceptionally responsible, active and enthusiastic.

A special mention must be made of his relations with young people. They are not limited only to the formation of several scientific schools in solid-state physics and space physics in Moscow and Gor'kiĭ, to holding the chairs in Gor'kiĭ University (in the 40s and 50s) and at the Moscow Physico-Technical Institute (since 1968 until the present time), or to the current work with undergraduate and graduate students. Within the range of his scientific activity there are constantly dozens of young (and not particularly young) people, with whom he generously shares his amazing erudition in most varied areas of physics and other related sciences, as well as his deepest physical intuition, which allows him to see the real substance of things and the interrelation of events beyong the intricacies of formulas and theoretical speculations. Many of V. L. Ginzburg's students (and among them there are dozens of Doctors of Science and several members of the Academy of Sciences) were becoming mature scientists so rapidly and were choosing for themselves independent areas of research, and he limited their initiatives so little, that he often experienced difficulties because of the lack of people with whom he could collaborate directly. However, even in their independent work, V. L. Ginzburg's students continue constantly to learn from him, bringing their results to his judgement, even when these results are quite far removed from the area of his immediate scientific interests at any given time. The feelings with which they repay their teacher for his heartfelt generosity were expressed best of all by Goethe: "The only way to surpass a man who is above you is to love him".

The most important element of V. L. Ginzburg's work with young people is the famous Moscow "Ginzburg seminar". It has existed already for thirty years (several years ago there was a festive celebration of its 1000th meeting) and every week brings together on the average about two hundred, and sometimes more than four hundred, participants, mainly young people. The success of the seminar is explained by many reasons. One of them is the attitude of its leader, who is trying to introduce many young physicists to the joy of learning a real modern science. It is also the direct participation of V. L. Ginzburg in lectures and reports on the literature, his comments and remarks, which show the physical substance of the material presented, thus making it clear for listeners (and sometimes even for the lecturer), and so making the seminar an excellent school of physics. It is also the carefully thought out selection of the subjects discussed at the seminar: they cover practically everything new and interesting that is taking place in physics and related

sciences. And all this, in combination with a friendly and amicable atmosphere at the seminar, makes these meetings a real celebration of science...

If one tries to bring together all that was said above about the activity of V. L. Ginzburg, it will seem improbable that one person can handle such a load. More than that; one gets the impression that all this is done easily and, so to speak, effortlessly, although logic says that one only sees the surface of the result of a combination of hard work, of the highest level of organization, and of great professional and worldly experience. There is this seeming easiness, which so impresses one in works of a real master, be it of art, sport, or practical activity.

The personality of Vitaliĭ Lazarevich Ginzburg as a scientist and a person is so distinctive and unusual that it seems inappropriate to end this article by a tranditional listing of all his awards, memberships in foreign academies, etc. That is why we, members of the Department of theoretical physics, which V. L. Ginzburg headed after I. E. Tamm, congratulate Vitaliĭ Lazarevich from the bottom of our hearts.

[1)]The limited extent of this article does not allow us to describe the achievements of V. L. Ginzburg in the areas of quantum field theory and the theory of elementary particles, acoustics, spectroscopy, fission, etc., and to characterize in greater detail the results listed below. We refer the reader to the book "Vitaliĭ Lazarevich Ginzburg: Materials on the biobibliography of Soviet scientists. Ser. "Physics". Vol. 21, Nauka, Moscow, 1978", and also to the anniversary article written ten years ago (Usp. Fiz. Nauk **120**, 323 (1976) [Sov. Phys. Usp. **19**, 872 (1976)] which describes in greater detail his publications prior to 1976.

Translated by Andrew Petelin