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Evgeniĭ L'vovich Feĭnberg (on his ninetieth birthday)

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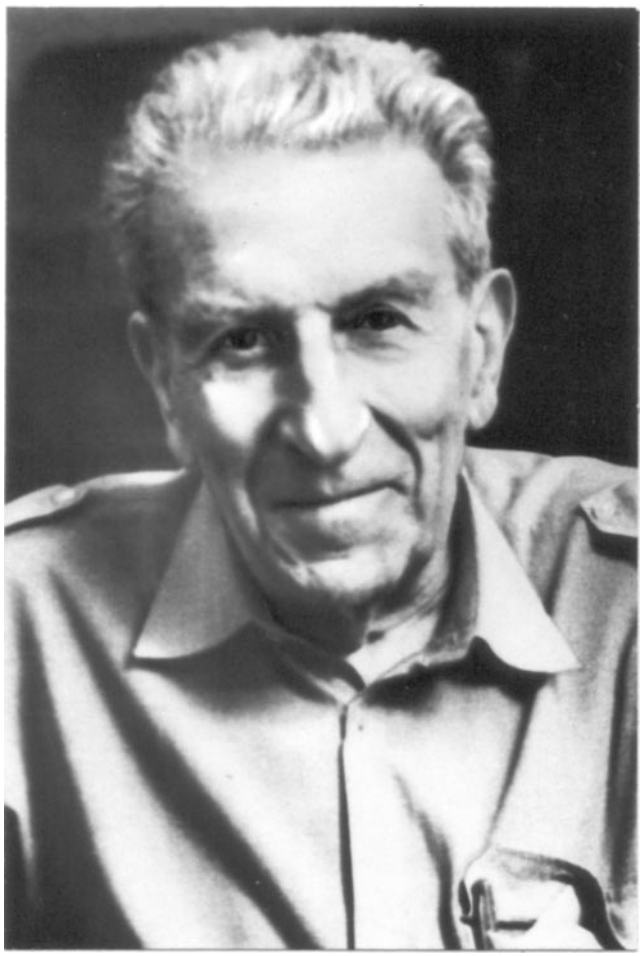
Evgeniĭ L'vovich Feĭnberg is an internationally known physicist whose name is associated with an unquenchable and lively interest in a wide range of physics problems, with a clarity of thinking physics based on profound knowledge, and an ability to foresee the evolution of science. Browsing through his publications, one will find the formulations and solutions of critically important theoretical problems, hypotheses on new physical phenomena, calculations of specific physical effects and studies of purely applications-oriented nature. Throughout these papers, one perceives a harmonic combination of logical and intuitive components that characterizes the highest level of professionalism and intelligence.

Evgeniĭ L'vovich Feĭnberg is the doyen, the elder of the Theoretical Division of the P N Lebedev Physics Institute (FIAN). This is not merely a statement of his age but recognition of his venerable wisdom and beautiful human qualities. His 90th anniversary will soon be followed by the 70th anniversary of his life in science. He has published numerous papers and founded new fields of research but no less important was his contribution to the purity of scientific and ethical principles, to sustaining the creative atmosphere that was a hallmark of the Mandelstam – Tamm school in which Evgeniĭ L'vovich grew.

Evgeniĭ L'vovich Feĭnberg was born on June 27, 1912 in Baku, in the family of a doctor. In 1918 the family moved to Moscow. In 1935 Evgeniĭ L'vovich graduated from the Physics Department of Moscow University and three years later, having completed his postgraduate course at Moscow University, he started working in the theoretical division of FIAN.

The fields that attracted E L Feĭnberg had already crystallized in his PhD thesis (1939) where he formulated the theory of ionization of atoms in the beta decay of the nucleus. The guiding idea was that the atom is ionized as a result of an instantaneous perturbation (a 'shake-up') of atomic electrons when the charge of the nucleus undergoes an abrupt change in response to the beta decay. This work led to a chain of theoretical and experimental studies. This interest in nuclear physics and high-energy physics remained active all his life. However, it did not set the boundaries on his scientific activities.

It deserves special emphasis that during the Second World War E L Feĭnberg actively worked on radiophysics problems that were directly tied to the military potential of the country. He worked out novel approaches and developed new methods in the theory of radio wave propagation along the surface of the globe, which were drastically different from the then dominant Sommerfeld-Weyl approach. As a result, E L Feĭnberg was able to solve a practically important problem that resisted solution for 23 years despite the efforts of very well known physicists. The results of this and consequent work were summarized in the monograph *Propagation of Radio Waves along the Earth's Surface* (1961) which was recently reprinted (1999). This research brought E L Feĭnberg the L I Mandelstam Prize in radiophysics (1951).



Evgeniĭ L'vovich Feĭnberg

In 1943 Feĭnberg created a principally novel for the time correlation theory of objective (without human participation) recognition of an acoustic signal in the presence of high-level disturbance (noise-proof target bearing), proposed and verified a practical circuit diagram based on this theory and then, together with S G Gershman, designed a system that was later widely used by the Navy.

Among his earlier results in nuclear physics field we select the prediction of coherent inelastic processes in the meson-nucleus interaction (1941) and of diffractional dissociation of hadrons (together with I Ya Pomeranchuk, 1953). Later the work on these typically quantum processes grew into a broad field of research and E L Feĭnberg won the USSR State Prize (1983) and the I Ya Pomeranchuk Prize (2000) for his results.

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Ideologically close to that work are E L Feĭnberg's papers in which he formulated for the first time and solved in principle the problem of existence and observability of the electron in a nonequilibrium state, when the electron has partly lost its electromagnetic field. He expanded the conclusions to hadrons, which led to the concept of nonequilibrium hadrons whose properties can be studied via their repeated interactions with nucleons inside the nucleus. The solution of this problem is closely connected with the evolution, in which E L Feĭnberg played an active role, of the understanding of the important role of interference phenomena and of the concept of the process formation time when a particle travels through matter.

E L Feĭnberg paid special attention to the mechanism of inelastic processes in high-energy interactions of hadrons. Already in 1951 – 1953 he emphasized the importance of peripheral processes of hadronic interactions. The model of one-meson exchange that was later developed by his students formed the foundation of the multiperipheral system of inelastic processes.

Evgeniĭ L'vovich predicted the direct generation of leptons and photons in hot hadron plasma (1959 – 1961) and quark-gluon plasma (1976), as well as hadron generation with high transverse momenta as a result of leaking at early stages of plasma expansion (1967). Hundreds of physicists are occupied studying these effects now. We shall also point to his calculation, later confirmed experimentally, of deuterium, tritium and helium antinuclei production cross sections (1967) and to the ideas and papers of the last ten years on clarifying the role of constituent quarks in extreme states of nuclear matter.

E L Feĭnberg's contribution to cosmic ray physics has also been considerable.

His work on the theory of the uranium-graphite reactor and neutron deceleration (1944 – 1949) must also be mentioned; among other things, E L Feĭnberg discovered the effect of monochromatization of neutrons in the course of their slowdown and suggested (together with L E Lazareva and F L Shapiro) a method of neutron spectrometry by deceleration time, which became very widespread.

Very typical of E L Feĭnberg are his close ties with experimental studies. It is no coincidence that in 1988 he was awarded the S I Vavilov Gold Medal of the USSR Academy of Sciences.

In 1966 E L Feĭnberg was elected a Corresponding Member of the USSR Academy of Sciences and in 1997 a Full Member of Russian Academy of Sciences (RAN). In 1953 he received the Badge of Honor and in 1972 and 1975 — the Order of the Labor Red Banner. His work was selected for a special mention of gratitude of the President of Russia (1999). At present E L Feĭnberg continues to carry out his science-management functions with enviable vigor.

It would obviously be impossible for a brief note to even list all the publications and all the results of E L Feĭnberg. Moreover, even the compete list would fail to reflect the scope of Evgeniĭ L'vovich's interests which include, in addition to science, also fiction, music and art studies. He discussed in detail the problems of interrelationships of science and art, of the logical and illogical in his book *Cybernetics, logic, art* (1981) which summarized his many years of thinking on the philosophy of science and art. The book was translated into English as *Art in the Science Dominated World* (1987) and then, greatly expanded, was published as *Two Cultures* (translated as *Zwei Kulturen*, 1988).

Evgeniĭ L'vovich also wrote essays devoted to Niels Bohr, Leonid Mandelstam, Igor Tamm, Lev Landau, Sergeĭ Vavilov and others, which were collected into the joint essay *The epoch and the personality* (1999) where he traced the path of the protagonist in science against the background of his epoch. With his qualities of a brilliant lecturer and teacher, Evgeniĭ L'vovich has the gift of presenting the subject with ultimate clarity and precision. He taught from 1944 to 1954 at Gorkii (now Nizhniĭ Novgorod) University and the Moscow Institute of Engineering Physics (MIFI).

It can be said that the most salient feature of the personality of Evgeniĭ L'vovich is the purity of his moral principles, his utmost responsibility for each of his actions. This dictates his active position as a citizen, his engagement in propagating the truly scientific view of the world and in revealing pseudosciences and superstitions for what they are. His deep involvement in the fate of his fellow citizens was shown most vividly in his activities to support A D Sakharov during Sakharov's exile to Gorkii. Combined with his enormous charm, this characteristic attracts numerous people towards him.

Evgeniĭ L'vovich Feĭnberg's friends, colleagues and students wish him health, further achievements and many years of active life.

I V Andreev, V L Ginzburg, A V Gurevich,
I M Dremin, N S Kardashev, L V Keldysh,
O N Krokhin, V I Ritus, I I Roĭzen,
M L Ter-Mikhaelyan, V Ya Faĭnberg, D S Chernavskiĭ