

In memory of Vladimir Yakovlevich Fainberg

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Vladimir Yakovlevich Fainberg, Professor, Corresponding Member of the Russian Academy of Sciences, outstanding theoretical physicist, died after a serious illness on 15 November 2010 at the age of 84.

Vladimir Yakovlevich belongs to the select group of brilliant scientists of which the P N Lebedev Physical Institute of the Russian Academy of Sciences (FIAN in *Russ. abbr.*) is understandably proud. He was a prominent specialist in the theory of elementary particles and fundamental interactions, and made outstanding contributions to a number of areas of quantum field theory. Many well-known theorists became enchanted by the beauty of quantum physics when attending his fiery lectures; many of them were his students or students of his students.

Vladimir Yakovlevich was born on 1 January 1926 in Moscow, and lost both parents early. His mother died in 1927 and his father and elder brother perished in the war with Nazi Germany. In his teenage years during the war he attended secondary school and in parallel worked as a hospital orderly at a Moscow evacuation center. In 1943, V Ya Fainberg enrolled in the Aircraft Construction Faculty of the Moscow Mechanical Institute, and in 1946 was transferred as a 3rd year student to the just organized Engineering Physics Faculty of the Institute, which later gave rise to the Moscow Engineering Physics Institute (MIFI in *Russ. abbr.*). Having graduated from MIFI with honors in 1949, he was assigned to a job at the FIAN Theoretical Department. Since that time his life was inextricably linked to the FIAN Theoretical Department, where he created the Section of the Theory of Elementary Particles. Vladimir Yakovlevich's teachers there were Igor' Evgen'evich Tamm and Vitaly Lazarevich Ginzburg, from whom he inherited his passion for theoretical physics.

The span of fields in which Vladimir Yakovlevich worked was amazingly broad. His work resulted in important contributions to developing a theory of particles with arbitrary spin, to dispersion relations, to the method of stochastic quantization, to the theory of nonlocal interactions, to the general theory of quantization of non-Abelian gauge fields, and to string theory. A special place among his first significant scientific results is occupied by the general expression for Green's function of particles with higher spins and the theory (jointly with I E Tamm and Yu A Gol'fand) of excited states of nucleons, i.e. of isobars, or resonances. This theory has been applied successfully to describing experiments on the scattering of π mesons on nucleons. At the same time, V Ya Fainberg (together with V P Silin) was working on the Tamm–Dankoff method, applying it to quantum mesodynamics.



Vladimir Yakovlevich Fainberg
(01.01.1926–15.11.2010)

Vladimir Yakovlevich obtained dispersion relations for nucleon–nucleon scattering, used in deriving the famous I Ya Pomeranchuk theorem on asymptotic equality of the scattering amplitudes of particles and antiparticles, studied the analytical properties of Green's functions, and suggested dynamic equations in axiomatic field theory starting from the principle of minimal singularity.

This was followed by his famous work on the analysis of various formulations of causality principle and the theory of nonlocal interactions of particles. For nonlocal theories of exponential growth, he proved (together with his disciples of different generations) the existence of the scattering matrix, established the CPT invariance and the relation between spin and statistics, obtained bounds on the growth of the total scattering cross section at high energies, and established their connection to string theory.

V Ya Fainberg found effective path integral representations for Green's functions of Dirac particles in external electromagnetic and gravitational fields and for the propagators of fermionic strings, and suggested a gauge-invariant formulation of stochastically quantized non-Abelian field theory. In his last papers, Vladimir Yakovlevich constructed

the scattering matrix and developed a renormalization scheme for gauge theories with a topological term in the Lagrangian, which describe the dynamics of anions and are related to condensed matter physics.

A fighter by nature, Vladimir Yakovlevich continued to work even when an incurable disease caught up with him. As in his younger days, he longed to return to his cherished institute, to his desk at which his mentor I E Tamm and Andrey Sakharov worked in the past.

From his youth, V Ya Fainberg chose to play an active social role and acted as a respectable representative of the Theoretical Department at FIAN's Communist Party Committee. The enormous strength of his character and a keen sense of justice made it possible for him to resist the ruling system from within and forced the bosses and functionaries at various levels to pay attention to his opinions. In the years that Andrey Sakharov was being harassed, V Ya Fainberg, along with V L Ginzburg (who headed the FIAN Theoretical Department at the time) and other leading members of Theoretical Department (B M Bolotovskiy, G F Zharkov, E L Feinberg, and E S Fradkin), did his utmost to maintain the atmosphere of amicability around Sakharov, thus resisting the very strong pressure from the District Committee of the CPSU. Through the firmness of V L Ginzburg and V Ya Fainberg, who took the brunt of pressure on themselves, the staff of the Theoretical Department were able to refuse the instruction to sign collective letters against Sakharov, so he officially continued to be a member of FIAN's Theoretical Department during all the years of exile in Gorky.

Vladimir Yakovlevich had the gift of attracting and inspiring talented young physicists. Starting in 1956, while doing his research at FIAN, he was also a lecturer at the Department of Physics of M V Lomonosov Moscow State University, where he was for many years Professor in the Chair of Quantum Theory and supervised his students to more than 30 PhD and 10 DSc degrees. His students include physicists from near and far abroad. Vladimir Yakovlevich's marvelous lectures were always focused on the most promising, 'breakthrough' directions of quantum theory. He was able to enjoy, as nobody else, the success and achievements of his students and colleagues. His readiness to discuss their findings, assist in their research work, and support them in difficult moments in their lives attracted both young scientists and physicists of older generations. He fought passionately and uncompromisingly to help his students and support their work — he fought for every one of them.

A man of inexhaustible energy, multifaceted interests and knowledge, and a witty interlocutor — that was Vladimir Yakovlevich. His brilliant talent, benevolence, and amazing zest for life were irresistible for those around him. It is very painful to realize that Vladimir Yakovlevich is no more. We are mourning his death together with his relatives and everyone who had the good fortune of knowing him well. As each time when we lose a friend or anyone about whom we are thankful to fate that it brought us together, we hear our inner selves repeat the lines from Vladimir A Zhukovsky's poem: "Don't say with grief that *they are gone*, but say with gratitude: *they were here*."

Vladimir Yakovlevich Fainberg's name will be forever engraved into the history of science of this country and the memory of him will live forever in our hearts.

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B B Govorkov, I M Dremine, R E Kallosh,
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