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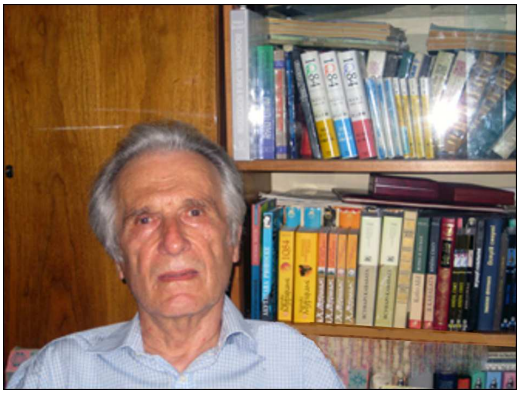
IVAN PETROVYCH DZYUB
(to the 90th anniversary of his birthday)



In March this year, the scientific community celebrates the 90th anniversary of the birth of Ivan Petrovych Dzyub, a well-known Ukrainian theoretical physicist, the first chairman of the Higher Attestation Commission of independent Ukraine, a diplomat, a well-known interpreter and public figure, a member of the National Union of Writers of Ukraine, the laureate of the State Prize of the Ukrainian SSR in science and engineering, the laureate of the Maksym Rylskyi Prize, and a knight of the Order of the Rising Sun, Gold Rays with Rosette (Japan).

Ivan Petrovych Dzyub was born in the village of Soposhyn (the Lviv region) in a peasant family. As Ivan Petrovych later recalled, his childhood years were spent here, in a multilingual environment of his friends of various nationalities. This circumstance probably provoked his lifelong interest in languages. But the interest in exact sciences prevailed, and, graduating from a school, he entered the Faculty of Physics at Ivan Franko State University of Lviv and successfully graduated in 1956. Then, after a year of postgraduate studies at this university, Ivan Dzyub received a recommendation to the postgraduate school at the Steklov Mathematical Institute in Moscow (Russia), where he studied for the next two years under the supervision of the brilliant mathematician and theoretical physicist Mykola Bogolyubov. As Ivan Petrovych recalls, "Those were two years of the best education, when famous scientists and young scientists were actively working together, made reports, were discussing various problems, and communicated. At that time, I used to visit almost all physical institutes in the city and attended seminars on theoretical physics at Lebedev Institute of Physics that were guided by Pyotr Kapitsa" (the famous so-called *Kapichnik*).

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The first scientific work of Ivan Dzyub was devoted to the renormalization of scalar electrodynamics, and it was published in *Fizychnyi Zbirnyk* (*Physical Transactions*) of Ivan Franko State University of Lviv [1]. In 1960 after completing his postgraduate studies, Ivan Dzyub returned to Ukraine, where he began to work as a scientific researcher at the Institute of Physics of the Academy of Sciences of the Ukrainian SSR. The same year, possessing an excellent mathematical training acquired during his student and postgraduate years, Ivan Petrovych published a paper on the application of the Green's function method in solid state theory [2], which initiated a new approach in this direction.

In the second half of the 20th century, the problems of solid-state and semiconductor physics were widely studied around the world and, in particular, in Ukraine. No wonder that they became the subject of further scientific interests of Ivan Dzyub. At the Institute of Physics, the spectral laboratory headed by a talented experimenter Antonina Prykhotko successfully operated at that time. It was one of the world's largest centers for low-temperature spectroscopy of non-metallic crystals. As a result of skillfully performed experiments carried out in this laboratory in the 1950s, the sets of bands sharply polarized along the crystallographic directions were found in the absorption spectra of naphthalene, anthracene, benzene, and other molecular crystals, which are absent in the spectra of free molecules. These experimental results were explained by the outstanding Ukrainian and Soviet theoretical physicist Oleksandr Davydov in the framework of the theory of excitons, which he developed together with his disciples. At that time, O. Davydov worked at the same Institute of Physics, where he headed the Department of Theoretical Physics. As long ago as in 1948, he was the first who extended the concept of exciton onto molecular crystals with a complicated structure and drew attention to their crucial role in light absorption processes. These were such important results that, in 1966, O. Davydov and A. Lubchenko became the laureates of the Lenin Prize for the theoretical study of excitons in crystals. Of course, Ivan Dzyub did not ignore this activity, and, in 1960, he published an article devoted to the theory of exciton states in semiconductors [3, 4]. At the same Institute, a fruitful collaboration started between Ivan Petrovych and Andrii Lubchenko, one of the closest O. Davydov's disciples.

The main result of the studies performed by Ivan Dzyub at that time was the construction and development of the theory of emission, absorption, and reabsorption of γ-quanta and light in solid solutions [5, 6]. On December 29, 1962, at the Joint Scientific Council of the Institutes of Physics, Semiconductor Physics, and Metal Physics of the Academy of Sciences of the Ukrainian SSR, Ivan Dzyub defended his thesis for the Ph.D. degree in physics and mathematics entitled "Resonance emission, absorption, and scattering of γ-quanta by crystal nuclei" [7], which included the results of his research during his postgraduate years under the supervision of M. Bogolyubov and the results obtained already at the Institute of Physics.

In 1966, the Institute for Theoretical Physics of the Academy of Sciences of the Ukrainian SSR was established in Kyiv (now Bogolyubov Institute for Theoretical Physics of the National Academy of Sciences of Ukraine). Initially, the Institute included three scientific departments; namely, the Departments of Nuclear Theory, Mathematical Methods in Theoretical Physics, and Theory of Elementary Particles. The Department of Nuclear Theory, which was later renamed into the Department of the Theory of Multiparticle Systems owing to the expansion of its scientific topics, was headed by O. Davydov who moved there from the Institute of Physics. Ivan P. Dzyub, together with O. Davydov and some other researchers of the Institute of Physics, also transited in the same 1966 to the Institute for Theoretical Physics. There, I.P. Dzyub worked as a theoretical physicist till 1992. Nevertheless, his scientific activity, in the broad sense of this term, is continuing till now. At the Institute for Theoretical Physics, he continued his scientific research in the field of the theory of light scattering and absorption by impurities in non-ideal solid media started at the Institute of Physics and got engrossed in a new scope of problems, namely, the construction of the theory of slow-neutron scattering in gases, liquids, and periodic crystal lattices [8–10]. Shortly after, Ivan Petrovych involved his student V. Kochmarskyi in this activity [11, 12].

It is impossible to describe, even briefly, the scientific results obtained by Ivan Petrovych, but we will try anyway. One of the big challenges of theoretical physics is to predict phenomena that are later confirmed experimentally. This is what Ivan Petrovych

managed to do; perhaps, to a large extent, due to close relations not only with theorists, but also with experimenters. For instance, he predicted the effect of resonance damping of phonons and the displacement or break of phonon dispersion curves at the frequency of quasi-local oscillation [13]. Later, this prediction was experimentally confirmed in the laboratories of many countries throughout the world, including Denmark, Canada, Germany, the USSR, and the USA. Furthermore, it formed a basis for the development of the theory of spectra of impurity crystals obtained using the coherent scattering of slow neutrons, which was initiated in the already mentioned works by Ivan Petrovych [9, 10].

An important milestone in Ivan Dzyub's scientific legacy was the development of the theory of Mössbauer effect on impurity nuclei in solid media [14, 15]; those works are still cited and developed further in the works of many authors. These results formed the basis of the doctoral dissertation entitled "Dynamics of disordered crystals and inelastic scattering of slow neutrons", which Ivan Petrovych successfully defended at the Institute for Theoretical Physics in 1978. The important pioneering results were included into the series of works "Prediction, detection, and research of a new type of elementary excitations in impurity crystals" for which a group of Ukrainian physicists consisting of V.M. Loktev, I.P. Dzyub, M.O. Ivanov, Yu.G. Pogorelov, V.M. Naumenko, V.V. Pishka, Ye.G. Rudashevskyi, and A.S. Prokhorov were awarded the State Prize of the Ukrainian SSR in science and engineering in 1990.

The physics of magnetic systems is an integral part of solid-state physics. The natural curiosity of Ivan Petrovych and his deep knowledge of scientific literature (he visited the library almost every day) prompted him to join this scientific domain as well. He explained the doubling of the number of dispersion curves of spin excitations and their strong damping in mixed and dilute ferro- and antiferromagnets owing to system fluctuations at the nearest coordination spheres [16, 17]. This cluster theory of spin excitations demonstrates a high-accuracy agreement with experimental data obtained at the Canadian research center "Chalk River Nuclear Laboratories" making use of inelastic magnetic scattering of slow neutrons. The next important result was the calculation of the frequency and damping of elementary spin excitations in isotropic and non-isotropic ferromagnets using the method of variational derivatives, which was generalized to the case of spin systems [18]. This theory, as was shown by I.P. Dzyub, describes the experimental results obtained while studying various types of mixed magnetic systems, such as $Mn_{1-c}Zn_cF_2$, $Mn_cCo_{1-c}F_2$, and $KMn_cCo_{1-c}F_3$ [16, 17], as well as others, not only qualitatively, but also quantitatively.

In the 1970s–1980s, the theory of soliton states in low-dimensional molecular systems was actively developed in the Department of the Theory of Multiparticle Systems at the Institute for Theoretical Physics. This theory was first proposed by Oleksandr Davydov and Mykola Kyslukha to explain the mechanism of storage of the energy of hydrolysis of adenosine triphosphate molecules and its transfer over macroscopic distances in biological systems [19]. By the way, recall that, in the last 2023 year, the Davydov soliton turned 50 years old (see [20]). Violent discussions of molecular solitons by his colleagues – not only at seminars, but also in hallways and backrooms – prompted Ivan Dzyub to analyze the existence of solitons in other low-dimensional systems, namely, in one- and two-dimensional ferromagnets and in anisotropic Heisenberg chains, in particular, in the presence of a magnetic field. To study spin waves in ideal and mixed magnetic crystals, he involved his graduate student Yurii Zerov [21, 22]. They showed that solitons in one-dimensional ferromagnets of the easy-plane type can induce the appearance of an additional peak in the inelastic neutron scattering spectra [23].

The discovery of high-temperature superconductivity in 1986 can be considered a revolutionary event. To a certain extent, it did not leave aside any experimenter or theorist. The unique characteristics of this phenomenon, which are not described in the framework of the conventional Bardeen–Cooper–Schrieffer (BCS) theory, stimulated theorists to search for new mechanisms of superconductivity. Ivan Petrovych also joined this activity. He began to develop the magnon mechanism of high-temperature superconductivity, which is based on the magnon-induced (cf. the phonon mechanism of the BCS theory) formation of Cooper pairs in doped quantum antiferromagnets [24]. However, those works were stopped for objective reasons: in 1992, Ivan Petrovych Dzyub was appointed the head of the Higher Attestation Commission (HAC) of Ukraine, the central

body of executive power, subordinated to the Cabinet of Ministers of Ukraine. Ivan Petrovych left the Institute for Theoretical Physics and moved to the civil service. He worked in the position of the first head of the HAC of independent Ukraine till 1996.

For many years, along with scientific research, Ivan Petrovych Dzyub was engaged in translation activity. He even taught Japanese, despite that he mastered this language without assistance (like other languages, except for German, which he studied at school, and English, which he studied at the University, because he realized even then that engaging in physics requires the knowledge of this language)! As was already mentioned above, Ivan Petrovych's passion for languages began in his early childhood, which was spent among the children of Ukrainians, Poles, Jews, Hungarians, and other nationalities, who easily found a common language. After English, he learned Spanish, Italian, and many other Romance and Germanic languages; he knew Hindi and Bengali. Once in library, he saw a book with hieroglyphs lying on the table. This book fascinated him. As it turned out, it was a textbook of the Japanese language. This was the moment owing to which Ukraine received the famous Ukrainian Japanist Ivan Dzyub. In one of his interviews, Ivan Dzyub said, "I have literally been living in the Japanese language for the past decades. I have reread and translated a lot of texts. I can read fluently in many European languages. The knowledge of languages helped me a lot in my work and at scientific conferences". And (let us add ourselves) in his professional career, as well. After all, it was also due to his knowledge of languages that, in 2001–2003, Ivan Petrovych was an Advisor for Science and Education at the Embassy of Ukraine in Japan. At that time, he was already a well-known interpreter from Japanese.

In fact, the literary activity of I.P. Dzyub went in parallel to his research work as a theoretical physicist. It began in 1965, when he published in the *Vsesvit* (*Universe*) magazine a thorough review of the translation of *The Decameron* by Giovanni Boccaccio made by Mykola Lukash. For this purpose, Ivan Dzyub has read *The Decameron* in the original. Afterward, there was a period of professional translation activity. As Ivan Petrovych recalled, after his return from Moscow to Kyiv, "the wave of renaissance in the 1960s led me to translation".

According to description 27 of fund 526 "Documents of Ukrainian writers and literary critics" at the Central State Archive-Museum of Literature and Art of Ukraine [25], the first literary translation made by Ivan Dzyub in 1965 was a translation from Spanish of the story *A Girl Under Three Flags* by Flora Basulto. Then it was a translation from Italian of the collection of novels and short stories *The Planet of the Christmas Trees* by Gianni Rodari (in 1967) and *Erica* by Elio Vittorini (in 1969). Perhaps, the most significant contribution to the translation activity of Ivan Dzyub is his translations from Japanese. As S.V. Kapranov wrote in his article about Japanese studies in Ukraine, "The pioneer in the translation of Japanese literature is Ivan Dzyub who presented the works by Kōbō Abe, Ryūnosuke Akutagawa, Natsume Sōseki, Morio Kita, Takehiko Fukunaga, and Otohiko Kaga to the Ukrainian reader" [26]. Here, the matter concerns the fact that Ivan Dziub became the first professional interpreter of Japanese literature into the Ukrainian language precisely from Japanese originals rather than their foreign translations. And all this occurred in spite of the fact that, let us recall, he learned the Japanese language and hieroglyphs without any assistance. His first translation from Japanese was the short story *The Beast* by Kenzaburō Ōe, which was published in the *Vsesvit* magazine in 1967. It was one of the first translations in the Soviet Union of the works written by the future Nobel laureate. Then it was the translation of the novel *The Ruined Map* of the famous Japanese modernist writer Kōbō Abe (in 1969), and many others. In 2005, Ivan Dzyub became the laureate of the Maxim Rylskyi Prize for his translations from Japanese of the works by Yasunari Kawabata, Kenzaburō Ōe, Kōbō Abe, Natsume Sōseki, Ryūnosuke Akutagawa, Takehiko Fukunaga, Saotome Katsumoto, and others. His next literary award was the Order of the Rising Sun, Gold Rays with Rosette, which he was awarded in 2006 for popularizing Japanese culture in Ukraine. By the way, he was the first laureate of this award among our compatriots.

In the second half of the 1990s, Ivan Dzyub became interested in translating economic literature from English. He translated five monographs, including *Public Policy Analysis: An Introduction* by Leslie A. Pal (in 1999) and *Economic Theory in Retrospect* by Mark Blaug (in 2001); on the latter, he worked for more than a year.

In the interview given to Yana Dubynyanska and published in *Dzerkalo Tyzhnya* (*Mirror of the Week*)

[27], Ivan Dzyub recalled: "From 1967 to 1987, I was not allowed to travel to capitalist countries, because I had the imprudence to sign a letter of the Ukrainian intelligentsia to Brezhnev in defense of Chornovil, Ginsburg... Fortunately, the son of Shelest [1] worked at our institute as a deputy director, so it was easier to bear the consequences. Nevertheless, the travels abroad became impossible for me despite scientific invitations to America, Switzerland... The authorities only let me go to Poland or Czechoslovakia. The circumstance that there were always guests from Japan at the Institute helped a lot." Nevertheless, Ivan Dzyub obtained a chance to visit far-abroad countries. After returning from his first ten-day trip to Japan, he shared his impressions with his colleagues at the Institute for Theoretical Physics and said that it was a trip to another millennium, to another reality. In the same interview, he said: "Morio Kita made the biggest impression on me. I translated his novel *The House of Nire*. We spent an evening together; there was an interesting conversation. He said that my translation helped him enter the American market. Because he could say: 'The novel has already been published in the Soviet Union. You Americans are lagging behind!"' Notice, the first translation of the novel was published in Ukraine(!), like many other translations from Japanese made by Ivan Dzyub.

Nowadays, Ivan Petrovych is full of new creative plans; he continues to work actively. Ukrainian translation, made by Ivan Dzyub, of the third volume of "The tale of Genji" written by Murasaki Shikibu at the turn of the X-XI centuries, one of the most outstanding works of the Japan literature, was published early this year (the first two volumes were published in 2021). With his achievements and selfless work Ivan Dzyub glorifies independent Ukraine even now, under the conditions of Russia's full-scale war against Ukraine, freedom, and democracy.

Dear Ivan Petrovych! Your rich life experience, long-term creative career, hard work, versatile talent, and inspiration are an excellent example for the scientists of independent Ukraine. Happy anniversary to you! Many happy returns of the day!!!

[1] Petro Yukhymovych Shelest (14 February 1908–22 January 1996) was a Ukrainian Soviet politician who served as First Secretary of the Ukrainian Communist Party from 1965 till his removal in 1972 (Wikipedia).

1. R.P. Gaida, I.P. Dzyub. Renormalization of scalar electrodynamics. *Fiz. Zbirn.* **2**, 71 (I. Franko State University of Lviv, 1959) (in Ukrainian).
2. I.P. Dzyub. An application of the method of Green's functions in solid-state theory. *Sov. Phys. Dokl.* **5**, 125 (1960).
3. I.P. Dzyub. On the theory of excitonic states in semiconductors. *Zh. Èksp. Teor. Fiz.* **39**, 610 (1960) (in Russian).
4. I.P. Dzyub. Sum rules in the theory of exciton absorption of light. *Fiz. Tverd. Tela* **5**, 1577 (1963) (in Russian).
5. I.P. Dzyub, A.F. Lubchenko. Resonant scattering of γ-quanta by nuclei located in a solid. *Izv. Akad. Nauk SSSR Ser. Fiz.* **25**, 901 (1961) (in Russian).
6. I.P. Dzyub. On the theory of absorption of infrared rays by non-ideal ionic crystals. *Ukr. Fiz. Zh.* **11**, 752 (1966) (in Russian).
7. I.P. Dzyub. *Resonance Emission, Absorption, and Scattering of γ-Quanta by Crystal Nuclei. Ph.D. thesis* (United Scientific Council of Institutes of Physics, Semiconductor Physics, and Metal Physics of the Academy of Sciences of the Ukrainian SSR, Kyiv, 1962) (in Russian).
8. I.P. Dzyub. Inelastic incoherent scattering of slow neutrons by disordered solid solutions. *Fiz. Tverd. Tela* **6**, 1866 (1964) (in Russian).
9. I.P. Dzyub. Inelastic scattering of slow neutrons by non-ideal ferromagnets. *Ukr. Fiz. Zh.* **12**, 707 (1967) (in Ukrainian).
10. I.P. Dzyub. Temperature dependence of inelastic scattering of slow neutrons by non-ideal ferromagnets. *Ukr. Fiz. Zh.* **13**, 1677 (1968) (in Ukrainian).
11. I.P. Dzyub, V.Z. Kochmarskyi. On the theory of inelastic scattering of slow neutrons by impurity crystals. *Ukr. Fiz. Zh.* **16**, 1985 (1971) (in Ukrainian).
12. I.P. Dzyub, V.Z. Kochmarskyi. Inelastic scattering of slow neutrons at local vibrations of interstitial atoms. *Fiz. Tverd. Tela* **14**, 3 (1972) (in Russian).
13. I.P. Dzyub. Resonant scattering of phonons by impurity atoms and single-phonon coherent scattering of slow neutrons. *Fiz. Tverd. Tela* **6**, 3691 (1964) (in Russian).
14. I.P. Dzyub, A.F. Lubchenko. On the theory of the Mössbauer effect. *Sov. Phys. Dokl.* **6**, 33 (1961).
15. I.P. Dzyub. On the theory of the Mösbauer effect in non-ideal crystals. *Fiz. Tverd. Tela* **7**, 372 (1965) (in Russian).
16. I.P. Dzyub. Cluster theory of a dilute antiferromagnet. Application to the $Mn_{1-c}Zn_cF_2$ system. *Phys. Status Solidi B* **61**, 383 (1974).
17. I.P. Dzyub. Cluster theory of spin excitations of mixed antiferromagnets. Application to $Mn_cCo_{1-c}F_2$ and $KMn_cCo_{1-c}F_3$. *Phys. Status Solidi B* **66**, 339 (1974).
18. I.P. Dzyub, V.A. Nikolaev. Method of variational derivatives in the theory of spin waves at low temperatures. *Theor. Math. Phys.* **32**, 713 (1977).
19. A.S. Davydov, N.I. Kislukha. Solitary excitons in one-dimensional chains. *Phys. Status Solidi B* **59**, 465 (1973).

20. L.S. Bryzyk. Fifty years of Davydov's soliton. *Visn. Nats. Akad. Nauk Ukr.* No. 3, 102 (2024) (in Ukrainian).
21. I.P. Dzyub, Yu.E. Zerov. Solitons and two-magnon bound states in the anisotropic Heisenberg chain: Dynamic form factor. *Phys. Lett. A* **99**, 350 (1983).
22. I.P. Dzyub, Yu.E. Zerov. Dynamical solitons of the one-dimensional ferromagnet $CsNiF_3$ in the longitudinal magnetic field. In: *Nonlinear and Turbulent Processes in Physics* (Harwood Academic Publishers, 1984), vol. 2, p. 753.
23. I.P. Dzyub, Yu.E. Zerov. Structural factor of two-parameter solitons in an anisotropic one-dimensional spin chain in a magnetic field. *Fiz. Nizk. Temp.* **9**, 608 (1983) (in Russian).
24. I.P. Dzyub, Yu.E. Zerov. On the magnon-induced Cooper pairing in doped quantum antiferromagnets. *Phys. Lett. A* **176**, 270 (1993).
25. https://old-csam.archives.gov.ua/uploads/opisy.
26. S. Kapranov. Japanese studies in Ukraine: Main stages of development before 1991. *Magisterium* No. 26, 43 (National University "Kyiv-Mohyla Academy", 2007); https://ekmair.ukma.edu.ua (in Ukrainian).
27. *Dzerkalo Tyzhnya* No. 48 (627) 16–22 December 2006 (in Ukrainian).

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