

---

### TO THE 75-TH ANNIVERSARY OF THE DOCTOR OF SCIENCE IN PHYSICS AND MATHEMATICS, PROFESSOR OF UZHGOROD NATIONAL UNIVERSITY IVAN VASYLYOVYCH KHMICH

---



Ivan Vasylyovych Khimich was born on June 25, 1935, at the village of Irshava, Zakarpattya region, Ukraine. In 1952, he left the secondary school at Irshava and, in 1958, graduated from the physical branch of the Physico-Mathematical Faculty of the Uzhgorod National University (UzhNU). Being appointed a teacher of a secondary school at Biletsk (Irshava district), Ivan Vasylyovych taught there physics and mathematics from September 1, 1958. In December 1958, he was taken on as an assistant at the Chair of substance structure and theoretical physics of the UzhNU. From 1960 to 1963, he was a postgraduate student at the Chair of theoretical physics

of the UzhNU. His scientific supervisor was Head of the Chair, senior lecturer Yu.M. Lomsadze.

In May 1966, Ivan Vasylyovych defended his Ph.D. dissertation entitled “Analytical Properties of a Partial amplitude in the Complex plane of the Coupling Constant” at the Institute of physics of the AS of Ukrainian SSR (Kyiv). He was awarded the scientific rank of senior lecturer in September 1968. From December 1966 to November 1970, I.V. Khimich worked as a senior lecturer at the Chair of theoretical physics of the UzhNU, and from December 1970 to July 1976, he was Head of this Chair. In 1976–1978, he was a postdoctoral student at the Chair of theoretical physics. In November 1983, Ivan Vasylyovych defended his doctoral dissertation entitled “Properties of Scattering Amplitudes of Polynomial and Nonpolynomial Growths in the Quantum Field Theory” at the Institute of physics of the AS of Belarus (Minsk), and he was conferred the degree of Doctor of Science in physics and mathematics. In March 1986, he earned the academic rank of Professor at the Chair of theoretical physics.

In September 1986, Professor I.V. Khimich was elected Head of the Chair of nuclear physics of the UzhNU, where he worked till January 2006. Later on, he was given the post of Professor at the branch of nuclear and elementary particle physics of the Chair of theoretical physics of the Uzhgorod National University, where he has been working till now.

I.V. Khimich is a physicist-theorist, who is well-known in the scientific community. In the scientific papers of Prof. I.V. Khimich and his disciples, the problem of generalization of Bogoliubov–Medvedev–Polivanov axiomatic approach onto a wide class of local quantum field theories with nonpolynomial growth of matrix elements in the momentum space had been formulated and successfully solved. It allowed a wide class of interactions that are not renormalized in a conventional sense – in

particular, weak interactions – to be included into the scope of the axiomatic approach. A new proof was proposed for an analog of the integral Jost–Lehmann–Dyson representation of the Fourier transform for a causal commutator with nonpolynomial growth. On the basis of this representation and in the framework of local quantum field theory, a proof was given for the dispersion relations for  $\Pi N$ -scattering and binary scattering processes caused by the weak interaction. In the framework of local theories, the analytical properties of the elastic dispersion amplitude were studied as functions of two Mandelstam variables,  $s$  and  $t$ . As a result of those researches, I.V. Khimich managed to prove the holomorphy of the elastic scattering amplitude with respect to the momentum transferred in the so-called Martin ellipse and to derive an analog of Froissart–Martin axiomatic restriction at high energies.

The researches carried out have a principal value from the viewpoint of applying the results of axiomatic quantum field theory to experimental verification of the fundamentals of relativistic quantum field theory which is the frontier of modern physics.

In I.V. Khimich's works, the properties of the scattering amplitude in the complex plane of the coupling constant (interaction intensity) in both nonrelativistic quantum theory of scattering and relativistic quantum field theory were also studied. Those researches allowed a new approach to be proposed for the theoretical description and calculation of the energy spectrum of coupled, virtual, and resonant states in definite atomic and nuclear dynamic systems. A number of scientific results obtained by I.V. Khimich in the co-authorship with his disciples and colleagues are well-known to experts; they are cited in and included into monographs written by outstanding scientists – e.g., R.G. Newton, *Scattering Theory of Waves and Particles* (McGraw Hill, New York, 1969); N.N. Bogoliubov, A.A. Logunov, A.I. Oksak, and I.T. Todorov, *General Principles of Quantum Field Theory* (Kluwer, Dordrecht, 1990) – which were published in the USA and Russia, and translated into a number of foreign languages.

Another group of scientific results obtained by I.V. Khimich is connected with the researches of group properties of the scattering amplitude which are associated with the inhomogeneous de Sitter group and its small subgroups. A partial wave analysis of the binary scattering amplitude in terms of matrix elements of irreducible unitary representations of the homogeneous de Sitter group has been proposed.

At the Chair of nuclear physics and under the scientific supervision of Prof. I.V. Khimich, a cycle of experi-

mental and theoretical researches have been executed on experimental accelerator-based installations – a B-25 betatron and an M-10 microtrone – concerning the energy dependence of effective cross-sections and isomeric yield ratios for both short- (the milli- and microsecond lifetime ranges) and long-lived isomeric states for a series of relevant nuclei that are excited in photonuclear reactions. In the energy dependence of the effective cross-section for  $^{115}\text{In}(\gamma, \gamma')^{115m}\text{In}$  reaction, the existence of two maxima, i.e. a new structure of the effective cross-section, has been discovered for the first time. The data obtained are important for elucidating the excitation mechanism of nuclear isomeric states. They will enrich the database of isomeric states in nuclear physics and can find application as nuclear constants at the development of gamma-ray lasers.

In 1986–1990, fulfilling the governmental decree, the collaborators of the Chair of nuclear physics headed by I.V. Khimich carried out researches of radiation stability of electronic elements and devices in the framework of the corresponding program of space researches.

In the scientific works of I.V. Khimich and his disciples, a new adiabatic three-particle model of nucleus was proposed. This model made it possible to give a correct theoretical description, in the potential approach, of the effects of nucleon pairing which lead to the so-called superfluid states of nuclei. His is an author and a co-author of more than 150 scientific papers; he takes part in training the scientific and pedagogical staff by means of postgraduate study. Among his disciples, there are four Ph.D.'s and two Dr.Sci.'s in physics and mathematics. In the past, Prof. I.V. Khimich took direct part in the organization and holding of eight all-Union conferences on the quantum field theory and the theory of elementary particles, as well as a number of republican and international conferences on challenging problems in nuclear physics. The staff of the Chair of nuclear physics has grown up to the leading educational and scientific center of Ukraine.

The fruitful and vigorous activity of Professor I.V. Khimich as a scientist and a former head of one of three (after Kharkiv and Kyiv) nuclear centers in Ukraine promoted the opening of a new speciality, nuclear and elementary particle physics, at the physical faculty of the UzhNU in the 2004–2005 academic year.

The main affair in I.V. Khimich's life has been the scientific and pedagogic activity, to which he has devoted his best 52 years. During his work at the physical faculty of the UzhNU, Prof. I.V. Khimich provided lecturing for

many general and special courses on modern theoretical and nuclear physics. When holding various lecturer positions, he developed a lot of programs and courses, organized the corresponding laboratory workshops in both the general disciplines and specialized courses, and permanently was interested in a methodological support of the courses.

Time and again, I.V. Khimich took direct part in and provided management for performing important scientific programs adopted by the Ministry of Education of the USSR and the governmental decrees of the USSR and Ukraine. He also was a member of the specialized academic council on Ph.D. dissertations at the Physical Faculty of the UzhNU. Now, Ivan Vasylyovych is a member of the Council of Western scientific center of the AS of Higher Education (ASHE) of Ukraine and a member of the editorial board of the journal "Scientific Bulletin of Uzhgorod University, Series Physics".

In 1995, for his considerable personal contribution to the training of highly skilled experts and his long-term scientific and pedagogical activity, Prof. I.V. Khimich was given the title "Honored worker of national education of Ukraine". The same year, he was elected Academician of the ASHE of Ukraine and, some later, a member of the Presidium of the ASHE of Ukraine.

The editorial board of the Ukrainian Journal of Physics, the colleagues and disciples congratulate Ivan Vasylyovych on the anniversary of his birthday. They wish him sound health, family happiness, inexhaustible creative enthusiasm, and successes in his work aimed at the development of independent Ukraine.

*Dean of the Physical Faculty of UzhNU  
Dr.Sci. in physics and mathematics  
Prof. V.Yu. Lazur*