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PETRO MYKHAILOVYCH TOMCHUK (to the 90th anniversary of his birth)



The beginning of January 2024 marks the 90th anniversary of the birth of Petro Mykhailovych Tomchuk – the outstanding Ukrainian theoretical physicist, Doctor of Science in physics and mathematics, Professor, the Corresponding Member of the National

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Academy of Sciences of Ukraine (NASU), Honored Worker of science and technology of Ukraine, laureate of the State Prizes of Ukraine in science and technology, and a long-term member of the editorial board of the Ukrainian Journal of Physics.

Petro Tomchuk was born on January 2, 1934, in the village of Kotsyubyntsi (the Kopychyntsi district of Ternopil province). In 1941, Petro entered the first grade of the Kotsyubyntsi seven-year school. Having survived World War II and the occupation, in 1949, Petro entered the eighth grade of the Kotsyubyntsi secondary school. Having graduated from the secondary school in 1952, he entered, in the same year, the first course of the Physical department of the Faculty of physics and mathematics of the Chernivtsi State University. Petro Tomchuk graduated cum laude from the University in 1957 and was recommended by the Academic Council of the University for postgraduate studies. In the fifth year of the University, he wrote his diploma thesis under the supervision of Arnold Markovych Kosevych, who taught a course on electrodynamics.

In the same year 1957, Petro Tomchuk entered the postgraduate course at the Institute of Physics in Kyiv, to the Department of Theoretical Physics. It is with the Institute of Physics that the whole subsequent scientific life of Petro Mykhailovych was connected. At the beginning of his graduate studies, his formal supervisor was Solomon Isakovych Pekar, at that time, the Head of the Department of theoretical physics. Later, S.I. Pekar entrusted

the supervision of the graduate student to Isaak Markovych Dykman. After graduating from the post-graduate course, in 1962, Petro Tomchuk defended his PhD thesis “Aspects of the theory of hot electrons in atomic semiconductors” in physics and mathematics and stayed to work at the Institute of Physics. He was enrolled in the Department of Physical Electronics, which was headed by Petro Grygorovych Borzyak (by that time, the whole Department of Theoretical Physics headed by S.I. Peekar, where Petro Mykhailovych was a graduate student, was transferred to a newly created Institute of Semiconductor Physics). A few years later, Oleksandr Serhiyovych Davydov came to the Institute of Physics, the theoretical department was restored, and Petro Tomchuk was transferred to this department, where he is still working. In 1964, Petro Mykhailovych Tomchuk was awarded the rank of senior researcher.

In 1972, at the age of 38, Petro Tomchuk defended his doctoral thesis “Research in the theory of transfer phenomena and collective processes in non-equilibrium semiconductor plasma” in the specialty “theoretical and mathematical physics”. It occurred when Academician O.S. Davydov ceased to head the Department of Theoretical Physics due to his transfer to the newly created Institute of Theoretical Physics, and he recommended P.M. Tomchuk as his successor. The Scientific Council of the institute unanimously supported this recommendation, and, in 1973, Petro Mykhailovych was appointed the Head of the Department of Theoretical Physics of the Institute of Physics (for two years before this appointment, Petro Mykhailovych had been the head of this department in charge). In the same year, Petro Tomchuk married Leonida Vasylivna Levchuk, a researcher associate at the Institute for Nuclear Research. In 1974, they had a son Bogdan; Petro Mykhailovych was forced to bring him up without assistance from the age of six, because his wife Leonida died in 1980 after a serious illness.

In 1980, P.M. Tomchuk was awarded the rank of Professor in the specialty “theoretical and mathematical physics”, and, in 1997, the honorary title “Honored Worker of Science and Engineering of Ukraine”. In 2000, P.M. Tomchuk was elected a Corresponding Member of the NASU in the specialty “theoretical and computational physics”. P.M. Tomchuk is a laureate of the State Prizes in science and technology: in 1986

(as a co-author for the series of works “Size effects in small solid particles”) and in 1995 (for the work “Physical mechanisms of degradation and ways of increasing the reliability of optoelectronic devices”); and a winner of the Antonina Fedorivna Pryhotko Prize of the Department of Physics and Astronomy of the NASU (in 2008, for the series of works “Hot electrons and new optical phenomena in multivalley semiconductors and nanoparticles”). P.M. Tomchuk was also elected an Honorary Doctor of the Yu. Fedkovych National University of Chernivtsi (in 2009) and the M.M. Bogolyubov Institute for Theoretical Physics of the NASU (in 2013).

Petro Mykhailovych Tomchuk was the Head of the Department of Theoretical Physics of the Institute of Physics for the long 50 years of his life, till September 2021. After handing over the managerial work of the Head of the department to younger colleagues, Petro Mykhailovych continues to work in the department as a chief researcher.

Petro Mykhailovych Tomchuk is undoubtedly an outstanding theoretical physicist. He worked in various directions of condensed matter physics such as semiconductors, metals, liquid crystals, and biological molecular structures. According to Petro Mykhailovych himself, among the most important results, the following ones should be pointed out first of all:

1. The theory of hot electrons with a dominant role of electron-electron interaction and a complicated structure of energy bands was developed, and the non-trivial field dependences of kinetic coefficients were predicted and later confirmed. The theory of superlattices on hot electrons in semiconductors and the theory of physical degradation mechanisms of optoelectronic devices were developed.

2. The theory of field-induced luminescence in island metal films and the theory of electron and photon emissions from island films under a laser or current heating of electrons were constructed. The latter was widely accepted and confirmed in many experiments.

P.M. Tomchuk is the co-author of two books [1, 2] and the author or the co-author of about 300 scientific publications [3]. Among his most cited works, the following ones should be pointed out: the review article on the electron and light emissions from island metal films and the generation of hot electrons in nanoparticles, which was published in *Physics Reports* [4]; the papers on the interaction of foreign macrodroplets in

a nematic liquid crystal and induced supramolecular structures [5] and on the symmetry breaking and the interaction of colloidal particles in nematic liquid crystals [6], which were published in *Physical Review E*; the articles published in *Physical Review B* on the particle-size and particle-shape effects on the energy absorption by small metal particles [7] and on the optical and transport properties of spheroidal metal nanoparticles with allowance for surface effects [8]; and the paper in *Surface Science* on the electron-phonon interaction and hot electrons in small metal islands [9]. It should be noted that P.M. Tomchuk always supported the Ukrainian science and, during the long years of his fruitful scientific activity, published 65 scientific articles in the *Ukrainian Journal of Physics*. Among his latest publications, we mention a series of works on metal nanoparticles and island films [10–15], as well as a series of works on the polarization dependence of the radiation emission by hot charge carriers [16–18].

Along with his scientific work, P.M. Tomchuk contributed to the scientific development of many physicists-theorists. Under his supervision, 8 doctoral theses and 19 PhD theses were defended. Among Petro Mykhailovych's disciples, there are the Academician of the NASU B.I. Lev (currently, the Head of the Department of Synergetics at the M.M. Bogolyubov Institute for Theoretical Physics of the NASU), and Dr.Sci.'s in physics and mathematics V.A. Shenderovskiy and O.O. Chumak (recognized physicists-theorists who are still working at the Department of Theoretical Physics of the Institute of Physics of the NASU).

Petro Mykhailovych Tomchuk exemplifies a person who devoted his whole life to science. He is a person of the highest decency. He is always friendly to people and colleagues, open to communication, a democrat by nature, thorough, attentive, and tolerant. His characteristic feature is, and always had been, a perfectly developed sense of humor; just this sense often helped him to pass the milestones (not always easy) of his life and overcome circumstances.

Petro Mykhailovych has met his 90th birthday during the second great war in his life. He spent the stormy days of February and spring 2022 in Kyiv, did not leave anywhere, and he continues to stay there till now. We sincerely wish him to be well and healthy, and to achieve the victory as soon as possible!

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