

## Gennadii Andreevich Mesyats (on his 90th birthday)

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On the threshold of spring 2026, academician Gennadii Andreevich Mesyats, a distinguished Russian physicist and organizer of science, turned 90. He is a recognized world leader in the field of electrophysics, pulsed energetics, and electronics.

Gennadii Andreevich was born on February 29, 1936, in Kemerovo to a working-class family. He finished a high school with a silver medal in the city of Belovo, Kemerovo region. Academician G.A. Mesyats's scientific work began in 1957, when he was still a student at the Tomsk Polytechnic Institute (TPI). To study pulsed electric discharge in dielectrics, he designed a high-voltage nanosecond generator. In 1958, he defended his diploma thesis on this topic and entered the graduate course at TPI. G.A. Mesyats's first scientific publication was a 1959 paper in the journal *Radiotekhnika i Elektronika (Radio Engineering and Electronics)* on the study of strongly overvoltaged air gaps. Gennadii Andreevich published the results of his diploma thesis in the collective monograph “High-voltage Test Equipment and Measurements” (1960). In 1961, Gennadii Andreevich Mesyats defended his candidate thesis “Development and research of high-voltage nanosecond pulsed devices with spark gaps.” These results had a significant impact on the development of technique of high-power nanosecond pulses.

In 1962, G.A. Mesyats became a senior researcher and then head of the Electronics Laboratory at the Nuclear Physics Research Institute of TPI. He actively used high-voltage nanosecond pulse generators to study discharges in vacuum, liquids, gases, and solid dielectrics, to solve problems in quantum electronics, to design spark chambers, etc. Thanks to the work of Gennadii Andreevich and his colleagues, the technology of generating high-power nanosecond pulses became an independent scientific area. These works were summarized in his monograph “The technology of forming high-voltage nanosecond pulses” (the co-author G.A. Vorob'ev, 1963), and later in his doctoral thesis “Research on generation of high-power nanosecond pulses,” which he defended in 1966 at TPI. It should be noted that G.A. Mesyats's thesis contained three significant scientific fields. First, generation of high-power nanosecond pulses. Second, strong-current emission electronics and high-power electron beams based on the explosive electron emission (EEE) discovered by him. Third, gas electronics and pulsed gas lasers based on the high-pressure volume gas discharges (VGD) discovered by him. The discovery of EEE was the beginning of the area in strong-current electronics allowing exclusively high electron currents up to  $10^7$  A. In 1967, G.A. Mesyats's team created the first strong-current pulse-periodic nanosecond accelerator ‘Sinus.’



Gennadii Andreevich Mesyats

In 1969, G.A. Mesyats and a group of his colleagues moved to the Institute of Atmospheric Optics of the Siberian Branch (SB) of the USSR Academy of Science, where he organized the of strong-current electronics department and became its deputy director.

In 1979, G.A. Mesyats was elected a corresponding member and in 1984 a full member of the USSR Academy of Sciences (now the Russian Academy of Sciences — RAS).

In 1986, Mesyats became chairman of the Ural Research Center of the USSR Academy of Sciences and founded the Institute of Electrophysics (IEP) of the USSR Academy of Sciences in the city of Sverdlovsk, where he invited 25 scientists from Tomsk, Novosibirsk, and Moscow and was appointed director of this institute. At the Institute of Electrophysics, he and his colleagues discovered ectons — portions of electrons from plasma that arise under EEE. Ectons play a fundamental role in the cathode spot of a vacuum arc, in a unipolar arc, and in the transmission of a glow discharge to an arc. The phenomenon of a nanosecond interruption of superdense currents (SOS) in silicon semi-

conductors was discovered. Studies of runaway electrons were started. Superradiation of picosecond electron beams was discovered. Identification of minerals by nanosecond electron beams was worked out.

In 1987, the Ural Branch of the USSR Academy of Science was founded on the initiative of G.A. Mesyats. He was elected chairman of the Branch and vice president of the USSR Academy of Science. From 1998 to 2004, G.A. Mesyats was first vice president of RAS, while remaining the director of IEP. In 2004, Gennadii Andreevich was elected Director of P.N. Lebedev Physical Institute RAS (FIAN) and remained in this position till 2015. In FIAN, G.A. Mesyats continues research in high-current electronics and electrophysics, organizing and heading the fundamental research of RAS Presidium. Within the framework of this program, new results were obtained in EEE, relativistic electronics, plasma microwave electronics, X-pinch, Z-pinch, the ecton concept of the electric arc, the theory of the Tanberg effect, etc. During his tenure as director of FIAN, he published over 100 scientific papers.

Overall, during this time, a number of important scientific and organizational problems were solved at FIAN. Participation in the work at CERN was significantly expanded, a new class of proton accelerators for treatment of oncological diseases was elaborated, and the RadioAstron and Tesis observatories were launched onto the Earth orbit. X-pinch installations for photography with subnanosecond exposure of high-density plasma formations were implemented in the form of compact devices. A large backlog was done for the creation of the V.L. Ginzburg Center of high-temperature superconductivity. A unique combined visible-range multi-terawatt-power laser was created. A laser cooling of atoms project was also launched at FIAN. G.A. Mesyats actively developed innovative works at FIAN and throughout RAS. A technology park, one of the top-10 technoparks in Russia was created at FIAN's site in Troitsk. In 2004, thanks to Gennadii Andreevich, FIAN became a co-founder of the journal *Uspekhi Fizicheskikh Nauk (Usp. Fiz. Nauk)*. The continued support of G.A. Mesyats and FIAN greatly contributed to preservation of the journal, its activity, and further development.

G.A. Mesyats published over 700 scientific papers (including 20 reviews in *Usp. Fiz. Nauk*, cited 1185 times by March, 2026) and 23 monographs. These are such well-known monographs as “Technique of forming high-voltage nanosecond pulses” (1963), “Generation of powerful nanosecond pulses” (1974), “Powerful nanosecond X-ray pulses” (1983), “Pulsed electric discharge in vacuum” (1984), “Pulsed gas lasers” (1991), “Physics of pulsed breakdown of gases” (1991), “Ectons” (three volumes, 1993–1994), “Ectons in vacuum discharge: breakdown, spark, arc” (2000), “Pulsed energetics and electronics” (2004), “Introduction to pulsed energetics and electronics” (2009) “Explosive electron emission” (2011), etc.

G.A. Mesyats pays special attention to young scientists. Many of his students became candidates and doctors of sciences, were elected academicians and corresponding members of RAS, and were awarded international prizes, USSR and RF State prizes and Prizes from the USSR and RF Council of Ministers, and also Lenin Komsomol prizes. G.A. Mesyats founded the Plasma Physics Department at Tomsk State University and the Electrophysics Department at the Ural Polytechnic Institute. For long years he was chairman of the Board of Trustees at Tomsk Polytechnic

University. He founded the Department of Electrophysics at the Moscow Institute of Physics and Technology (MIPT).

G.A. Mesyats was actively involved in public activities of national importance. He was chairman of the Council of Young Scientists of the Central Committee of VLKSM, a deputy of the Sverdlovsk Regional Council of People's Deputies, chairman of the Board of Directors of Sverdlovsk Research Institutes, chairman of the Board of Directors of RAS institutes, member of the Council for Science and High Technologies under RF President, Chairman of the Council for Science of the Committee on Science and Education of the State Duma, a member of several commissions and councils under the RF Government, and also a chairman of the Board of Trustees of Demidov Research Foundation founded on his initiative in 1992. From 1998 to 2005, G.A. Mesyats headed the Higher Certification Commission of RF.

G.A. Mesyats takes an active part in international scientific activities. He worked in the physical education committee IUPAP, participated in the work of UNESCO General Assembly, headed the Russian-American commission for dual-purpose technologies, many times headed Russian delegations at international scientific conferences, and repeatedly delivered lectures at different scientific institutions of the world. He was a member of organizing committees of many international conferences, a member of editorial boards of several journals and scientific communities, a foreign member of the American Academy of Engineering Sciences, a member of New York Academy of Sciences, National Academies of Sciences of several states of CIS, and also a member of the American Physical Society, American Optical Society, International Society of Optoelectronic Engineers, and an honored professor of several world and Russian universities.

G.A. Mesyats received many domestic and international awards. He is a full Cavalier of the Order “For Merit to the Fatherland.” He was awarded the Order of Lenin, the Order of the Red Banner of Labor, the Order of the Badge of Honor, the Order of Honor, the Order “Danaker” (Kyrgyzstan), and the Order of the Legion of Honor (France). He is an honorary citizen of Tomsk Region, the city of Tomsk, and the city of Ekaterinburg.

G.A. Mesyats is a laureate of the Lenin Komsomol Prize, the USSR and RF State Prizes, the Demidov Prize, the “Global Energy” International Prize, the W. Dyke Prize, the E. Marx Prize, and Maria Sklodowska-Curie Prize. He was awarded the A.G. Stoletov Prize, the N.N. Moiseev Gold Medal, the academician S.V. Vonsovsky Gold Medal, the academician M.A. Lavrentyev Gold Medal, and the S.I. Vavilov Gold Medal of RAS.

With all our hearts we wish Gennadii Andreevich health, strength, optimism, talented students and good meetings!

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