

PERSONALIA

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Viktor Dmitrievich Selemir (on his 70th birthday)

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October 29, 2018 marked the 70th birthday of Corresponding Member of the Russian Academy of Sciences (RAS) Viktor Dmitrievich Selemir — an outstanding scientist in the field of high-current electrophysics. The main areas of his scientific research are relativistic microwave electronics, the physics and technology of electron accelerators, magnetic cumulation, and modeling the effect of nuclear explosions on military equipment. He is the author of more than 500 scientific publications.

V D Selemir was born in the village of Kolenkovtsy in Bukovina (Chernovtsy region). In 1966, he entered the Faculty of Physics and Technology at Kharkov State University. Since 1972, he has been working at the All-Union Scientific Research Institute of Experimental Physics (VNIIEF in *Russ. abbr.*, now the Russian Federal Nuclear Center RFNC–VNIIEF, Sarov, Nizhny Novgorod region). The young specialist was invited by Academician A I Pavlovsky.

V D Selemir took an active part in the work of the team designing pulsed electron linear induction accelerators (LIAs) and was engaged in calculation techniques and methods of measuring high-current electron beams. The original LIA-10 setup with record output parameters had been designed by 1977 with his active creative participation. The construction of an LIA accelerating channel proposed by Viktor Dmitrievich allowed a radical improvement in the electron beam quality and achieving stable operation of the accelerator. For his active participation in developing the LIA-10 multitask accelerating system and the injection system for it based on high-current magnetically isolated diodes, V D Selemir was awarded the "Order of the Badge of Honor" in 1982.

Work on the laboratory modeling of the effect of gamma radiation on military equipment began on LIA-10 in 1978. Several years later, the irradiation facility, which has no equivalent anywhere in the world, was created at VNIIEF on the basis of LIA-10 and a pulsed nuclear reactor. Viktor Dmitrievich took an active part in its development. The team of creators of this facility, with V D Selemir among them, was awarded the Prize of the Russian Federation Government (2005).

In the late 1980s, V D Selemir proposed founding and then headed a new scientific direction — powerful relativistic microwave electronics. Already in 1990, the *Proceedings of the USSR Academy of Sciences* presented a paper about the first experiment in the world on conversion of explosive energy stored in magnetic cumulation generator (MCG) into high-power microwave radiation. The experiment was carried out at VNIIEF together with the Institute of Radioengineering and Electronics (IRE) of RAS. The basic technologies were worked out and superpower microwave generators were created for carrying out different applied studies, for which V D Selemir received the Prize of the Russian Federation Government in 1999.

Viktor Dmitrievich Selemir

In 1993, after the death of Academician A I Pavlovsky, V D Selemir became the Head of his department. The development of pulsed uncored betatrons was continued under his guidance. The betatrons were implicated to underlie a radiographic base of the science industry to investigate fast hydrodynamic processes.

V D Selemir's team managed to obtain some distinguished results in magnetic cumulation. An ultrahigh magnetic field generator with a record value of 28 MG was designed, and the equations of state of different substances were examined in such fields under their isentropic compression and deep freezing.

At the same time, the conception was developed and successful tests were undertaken of a high-current source of high-temperature plasma to obtain a powerful X-ray yield of more than 2 MJ with the employment of an MCG. (An EMIR

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setup with a yield of ~ 10 MJ is planned). MCGs also underlie transportable electromagnetic lightning pulse simulators with the current amplitude of ~ 100 kA.

V D Selemir's work and his team research activity in the areas of plasma physics, laser physics, and gas discharge physics are well known. Under his guidance, scientists from RFNC–VNIIEF and Tolyatti State University conducted experimental and theoretical studies on the mechanisms of the occurrence and the effect of quasi-constant geoinduced currents on electrical power networks. Both technogeneous and natural processes were shown to excite such currents in electrical networks. Their impact on the power supply can be extremely negative. This made it possible to formulate the electrical network vulnerability criterion, in particular, to hypothesize that the prime cause of the Sayano-Shushenskaya power station accident was not associated with a malfunction of the power equipment, the protection and control systems, or the improper actions of the personnel.

In the difficult years of Perestroika in the mid-1990s, on V D Selemir's initiative an independent subdivision for electrophysical work was organized, which rightly is considered to be one of the leading institutes in the world in this sphere. Within a rather short period, eight of his colleagues became Doctors of Sciences. In 2006, V D Selemir became Deputy Research Supervisor of RFNC–VNIIEF and Head of the Electrophysical Center.

V D Selemir devotes great attention to constructing technologies intended to solve special defense-technology problems and to develop promising new prototypes for medical facilities.

The medical ozonator, which is better in most parameters than the world's best models, was designed and brought into commercial practice under the guidance of V D Selemir. Medical institutions are also extremely interested in the earlier clinical application of the apparatus for inhalation therapy using nitric oxide. Inhalation is used in the treatment of deteriorations in pulmonary hemodynamics. The apparatus realizing NO synthesis in a gas discharge directly in the air during therapy was designed under the guidance and with the direct participation of V D Selemir. The apparatus has no analogues elsewhere in the world.

Viktor Dmitrievich's international activity is quite multifarious as well. RFNC–VNIIEF traditionally took part in organizing the International Megagauss Conferences on Magnetic Cumulation. In 1992, Academician A I Pavlovsky suggested that such a conference be held for the first time in the closed town of Sarov. The Megagauss-7 Conference under the chairmanship of V D Selemir was successfully held in Sarov in 1996.

V D Selemir was also chairman at the 2002 Megagauss-9 Conference. The Megagauss-16 Conference was held in Tokyo in 2018. V D Selemir is a member of the permanently acting International Program Committee of these Conferences. On the initiative of V D Selemir, seconded by the authorities of RFNC–VNIIEF, for advances in magnetic cumulation phenomenon, one Russian and one foreign scientist has been awarded at each Megagauss Conference since 2012 the Prize instituted in commemoration of Academician A I Pavlovsky.

In 1992, researchers from Los Alamos were for the first time invited to an experiment with an ultrahigh magnetic field generator. A similar joint experiment was performed at Los Alamos National Laboratory (LANL) in 1993. In 1995 and 1996, the scientific experimental series Dirac — experiments alternating with scientific talks — were conducted at LANL. An analogous series named after Kapitza has been held in Sarov since 1997 (annually, 7 series altogether).

For his scientific and technical achievements in strengthening national security, V D Selemir was awarded the "Order For Merit to the Fatherland, 4th Class" in 2009. In 2016, Viktor Dmitrievich was elected a Corresponding Member of RAS, Physical Sciences Division, Nuclear Physics Section.

Viktor Dmitrievich shares his knowledge and experience with youth. For many years, he has delivered a course of lectures to students at the Sarov Physics and Technology Institute (SarFTI) where he is Professor of the Experimental Physics Subfaculty. Several postgraduate students have defended their theses under his guidance.

V D Selemir is a Member of the Scientific and Technical Council (STC) of the Nuclear Weapons Complex (NWC) of the State Corporation (SC) Rosatom (STC NWC SC Rosatom), Vice Chairman of the STC MIC working group, a member of three dissertation councils, and a member of the Specialized Expert Council of the Higher Attestation Commission (SEC HAC).

We heartily wish you, dear Viktor Dmitrievich, new creative achievements in your work for the benefit of our Fatherland!

We wish you happiness and all the best to you and your family!

S G Garanin, R I Ilkaev, P V Logachev,
A G Litvak, V P Neznamov, V A Rubakov,
V P Smirnov, Yu A Trutnev, V E Fortov,
A K Chernyshev, A G Chuchalin, I A Shcherbakov