Physics – Uspekhi **67** (4) 425 – 426 (2024)

PERSONALIA

PACS number: **01.60.+q**

Vasilii Petrovich Neznamov (on his 80th birthday)

DOI: https://doi.org/10.3367/UFNe.2024.03.039670

February 26, 2024 was the 80th birthday of Academician of the Russian Academy of Sciences (RAS) Vasilii Petrovich Neznamov — an outstanding scientist engaged in nuclear-weapon activities and in the fields of theoretical physics related to the development of quantum mechanics and quantum field theory in flat and curved space–time. He is the author of more than 400 scientific works.

V P Neznamov was born in the village of Petrovka, Abdulinsk region of Orenburg region. In 1968, he graduated from the Moscow Institute of Physics Engineering (MIFI, now National Research Nuclear University Moscow Engineering Physics Institute — MEPhI) as an engineer physicist with the major Theoretical Nuclear Physics.

Since 1968, he has been working at the All-Union Scientific Research Institute of Experimental Physics (VNIIEF, now the Russian Federal Nuclear Center, RFNC-VNIIEF, Sarov, Nizhny Novgorod region). Academicians Yu A Trutnev, V N Mikhailov, and R I Il'kaev were the first mentors of the young specialist.

V P Neznamov is a leading specialist in theoretical and experimental physics related to the development of nuclear and thermonuclear weapons, ensuring their efficiency, reliability, and safety.

The scientific approach used by Vasilii Petrovich's is a remarkable combination of theoretical research and physical experiments with the outcome unique results extreme on the behavior of extreme conditions.

V P Neznamov is one of the main developers of special products. Nine primary pits that have been tested and used in 108 full-scale field experiments were designed with the creative involvement of V P Neznamov. These pits have been and are being used in specialized products.

One of the products designed with his participation was used more than 20 times in the scientific program for the peaceful use of nuclear explosions for the seismic sounding of Earth's crust.

Vasilii Petrovich Neznamov took part in 10 underground nuclear tests at different sites in our country.

On the basis of his theory of special product operation, V P Neznamov formulated physical notions of the most important operational reliability criteria for these products. The practical result of V P Neznamov's work was the development and introduction of standards of operational reliability and stability criteria for special products, which allows scientific substantiation and technical implementation of high reliability.

Vasilii Petrovich Neznamov is an outstanding theoretical physicist working successfully in the field of physical experiment. In particular, he is the author of the computational and theoretical substantiation of applicability of the spatial image method for studying the central zone of high-density plasma based on physical and mathematical simulation. This method was first successfully applied and realized in field experiments of primary pits developed with his creative involvement.

Vasilii Petrovich Neznamov

Along with work related to nuclear weapons, V P Neznamov carried out a number of studies in theoretical physics and obtained new fundamental scientific results.

V P Neznamov proposed the version of quantum electrodynamics (QED) with an empty fermion vacuum. Such QED versions were developed in the Foldy–Wouthuysen representation, in the representation with Klein–Gordon type spinor equations, and in the standard Dirac representation.

According to these versions, the 'broth' of spontaneously produced and annihilating electron-positron pairs is not present in the physical vacuum, and thus the Schwinger effect is absent. This enables to experimentally verify such QED versions at the future installations of XCELS and NICA type, and other.

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Translated by A N Tsaplin

V P Neznamov, together with M V Gorbatenko, proved the unicity and self-conjugation of Dirac Hamiltonians in arbitrary gravitational fields. As a result, a method for obtaining Dirac self-conjugated Hamiltonians in arbitrary gravitational fields was proposed, the unicity of the Dirac theory in curved and flat space–time was proved, and equivalence and the Hermitian nature of Dirac Hamiltonians in the gravitational Kerr field were proved.

Turning to classical black holes and to stationary states of scalar particles, fermions, and photons, V P Neznamov, together with M V Gorbatenko, showed the existence in all types of black holes of a regime of 'particle fall' onto external event horizons, which is inadmissible for quantum mechanics.

V P Neznamov and his co-authors discovered degenerate stationary states of second-order equations for fermions in Schwarzschild, Reissner–Nordstrom, and Kerr–Newman gravitational fields, and in an external Coulomb field. Such states were proposed as dark matter particles.

Using the Pruffer transformation, V P Neznamov, along with I I Safronov, derived equations for fermion phase functions in arbitrary gravitational fields. Solutions to these equations were realized in the time-saving program code. In particular, using this code, the eigenvalues of the Chandrasekhar–Page angular equations were calculated.

In recent years, V P Neznamov and his co-authors have turned their attention to quantum black holes. A regular quantum model of rotating charged and uncharged collapsars with event horizons (black holes) and without event horizons (with rotating quantum cores) was proposed. Based on this model, V P Neznamov proposed for discussion a quantum model of electrons.

As Director of the Institute for Theoretical and Mathematical Physics, First Deputy Director of RFNC-VNIIEF, Vasilii Petrovich made a major contribution to shape the modern image of RFNC-VNIIEF.

For scientific and technical achievements in strengthening national security, V P Neznamov was awarded the Order of the Red Banner of Labor (1990) and the Order For Services to the Fatherland, IVth degree (2009). In 1981, he received the State Prize of the USSR, and in 2003 the State Prize of the Russian Federation. In 2006, V P Neznamov received the gratitude of the President of Russia, and in 2000 he was conferred the rank of Meritorious Scientist of the Russian Federation.

At the present time, V P Neznamov is the First Deputy Scientific Director for fundamental research, the head of the RFNC-VNIIEF scientific seminar, the chair of the specialized dissertation board of RFNC-VNIIEF, a member of two dissertation boards of RFNC-VNIIEF, a member of the scientific and technical council of RFNC-VNIIEF, a member of the Academic Council of the MSU branch in Sarov, and the chair of the Academic Council of the Sarov State Institute of Physics and Technology NRNU MEPhI, which is the basic university for training specialists for RFNC-VNIIEF.

At any forum, V P Neznamov takes an active civic position, sometimes not coincident with the opinion of the majority. In our opinion, this is a necessary feature and the essence of a researcher.

V P Neznamov is an academic secretary of the expert commission under the Division of Physical Sciences of RAS for awarding the A D Sakharov Gold Medal of RAS.

Dear Vasilii Petrovich, we sincerely wish you sound health and new creative success in your activities for the benefit of our Fatherland!

Happiness and prosperity for you and your family!

E E Boos, S G Garanin, N V Zavyalov,
R I Il'kaev, D I Kazakov, V V Kveder,
V A Matveev, Yu Ts Oganesyan, V D Selemir,
A M Sergeev, V P Solov'ev, A K Chernyshev, P M Shagaliev