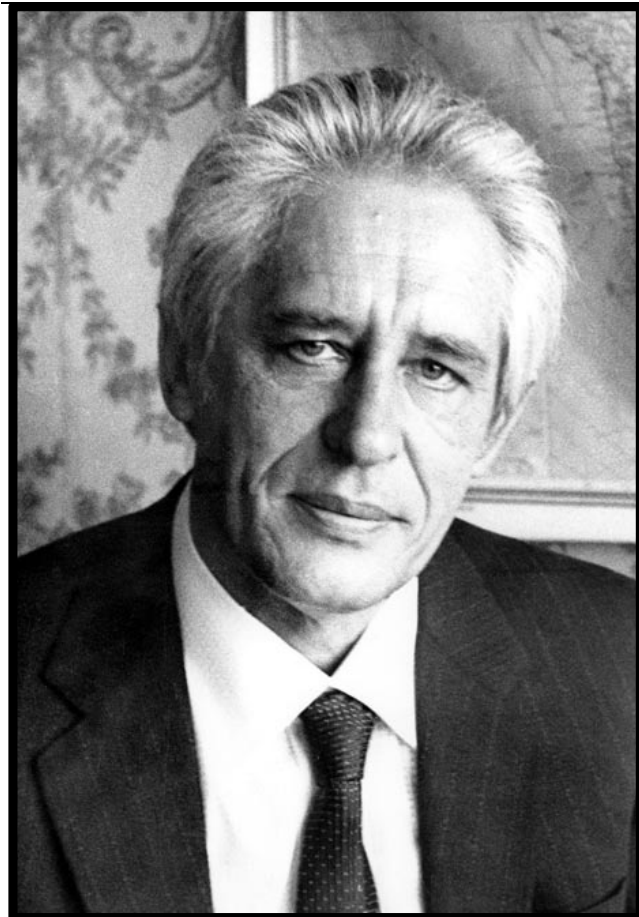


## In Memory of Lev Petrovich Feoktistov



Academician Lev Petrovich Feoktistov, a leading Russian scientist and one of the founders of Russian nuclear and thermonuclear weapons, Head of the Laser Thermonuclear Fusion Division in the Department of Quantum Radiophysics of the Lebedev Physics Institute, Russian Academy of Sciences, passed away suddenly on February 14, 2002.

Lev Petrovich Feoktistov was born on February 14, 1928 in the family of an employee. After graduating from the department of physics of the Moscow State University in 1951, he was assigned to work at the All-Russian Research Institute of Experimental Physics (Arzamas-16). From 1955, his scientific activity was continued at the All-Russian Research Institute of Technical Physics (Chelyabinsk-70). He worked for 27 years on theoretical and practical problems of nuclear and thermonuclear arms at these institutions of the Ministry of Medium Machine Building.

The very first works of Lev Petrovich were of considerable significance for the creation of the first version of the modern hydrogen bomb, which was tested and delivered to

the armoury of the Soviet Army in 1957. His subsequent theoretical investigations were aimed at the improvement and miniaturisation of nuclear and thermonuclear charges, which ultimately led to the creation of systems with separable warheads used in the military, and to the establishment of nuclear parity with the USA. Scientific investigations by L.P. Feoktistov also resulted in the creation of high-power small-size artillery nuclear warheads, which were subsequently used efficiently for extinguishing large-scale fires in oil wells.

While working at the All-Russian Research Institute of Experimental Physics, L.P. Feoktistov discovered the origin of the powerful electromagnetic pulse observed during the testing of nuclear weapon in air.

At the beginning of his research activity, Leonid Petrovich actively participated in thermonuclear detonation studies under the supervision of Ya.B. Zel'dovich and D.A. Frank-Kamenetskii. Using the fact that the energy of nuclear reactions (unlike chemical reactions) can be used for a significant compression of matter facing the burning front to a few hundredths, or even a few thousandths of its initial volume, L.P. Feoktistov found new constructive schemes of detonation. The results of his theoretical investigations were used for creating new types of nuclear warheads in which the radioactivity of the fission products was considerably reduced and which could be used for peaceful purposes.

Lev Petrovich paid special attention to the possibility of utilising the energy of nuclear explosions for scientific research. He was the initiator and participant of a number of physical experiments aimed at studying the properties of matter under extremal conditions, on the effect of the radiation emitted during nuclear explosions on materials, and on thermonuclear combustion and detonation.

On the whole, the results of investigations carried out by L.P. Feoktistov at the All-Russian Research Institute of Experimental Physics and at the All-Russian Research Institute of Technical Physics made a decisive contribution to the creation of a 'nuclear shield' which made the very survival of our country possible in those distant times, and ensures its existence even today.

At the end of 1970's, Lev Petrovich Feoktistov left his work on nuclear armaments due to personal convictions. In 1978, he joined the Kurchatov Institute of Atomic Energy where he began his studies on theoretical substantiation and development of a high-power chemical laser of basically new type. In this laser, the generated light flux itself initiates a chemical reaction ensuring the pumping of active atoms. In 2000, L.P. Feoktistov and his collaborators at the Physics Institute of the Russian Academy of Sciences built a self-initiated laser.

Another very important theoretical result obtained by L.P. Feoktistov at the Kurchatov Institute is the discovery of a stationary neutron-divider wave, which is now known as the Feoktistov wave.

In 1986, Lev Petrovich was the informal head of the research team engaged in finding the reasons behind the Chernobyl accident and developing measures aimed at liquidating the consequences of the catastrophe.

Beginning from 1988 and right until his death, L.P.Feoktistov was the head of the Laser Thermonuclear Fusion Division in the Department of Quantum Radiophysics of the Lebedev Physics Institute. Together with N.G.Basov, Lev Petrovich continued here his work on various nuclear and thermonuclear reactors, which was started at the All-Russian Research Institute of Technical Physics. These investigations led to the concept of a hybrid reactor, in which a subcritical reactor is exposed to thermonuclear neutrons obtained as a result of laser fusion. In particular, L.P.Feoktistov proposed a two-cascade version of the reactor consisting of a low-power fast reactor–accelerator and a high-power thermal reactor in which the thermonuclear energy can be amplified by a factor of 5000.

Another important field of his research activity in his last years was the investigation of electromagnetic radiation generated during fast transitions in systems having both electric and magnetic fields (ferromagnets, ferroelectrics, current-carrying superconductors, etc.). A new powerful source of high-energy pulsed electromagnetic radiation was developed on the basis of these investigations.

The entire scientific career of Lev Petrovich was marked by his desire to reduce the risks associated with the exploitation of nuclear power, and to create a nuclear reactor, which would be harmless from physical considerations. He made significant progress in this direction, and proposed several concepts of safe reactors. Moreover, he proposed several means of considerably reducing pollution of the environment due to the working of atomic power plants. In the last years of his life, he also worked actively on the problem of generating nuclear power that could not be harnessed for proliferation of nuclear weapons.

Despite his active participation in the research for nuclear warfare, L.P.Feoktistov always advocated for a radical reduction of nuclear weapons, and even for their complete eradication. He persistently worked in this direction, being a member of the governing body of the Russian Committee of the Pugwash movement of scientists.

The scientific-organisational activity of L.P.Feoktistov was diverse and multifaceted. He was the chairman of the council of experts in the Supreme Attestation Commission of the USSR, deputy chairman of the governing body of the All-Union society ‘Znaniye’, and a member of the Editorial Board of Quantum Electronics.

L.P.Feoktistov was the founder of the research school on the physics of high energy densities, and carried out active work on the training of highly qualified personnel for the research institutes in the country. Until the last days of his life, he headed a department at the Moscow Physical Engineering Institute.

The services rendered by L.P.Feoktistov to his Motherland received due recognition. He was a Hero of the Socialist Labour (1966), and a winner of the Lenin (1958) and State awards (1978). He was awarded two Orders of Lenin, two Orders of the Red Labour Banner, Order of the October Revolution, and the Order ‘for Services rendered to the Motherland’ IV category. He was elected a corresponding member of the USSR Academy of Sciences in 1966, and was elected a Member of the Russian Academy of Sciences in 2000. Lev Petrovich was also an honorary citizen of the city

of Snezhinsk (formerly Chelyabinsk-70), and a member of several international academies.

Lev Petrovich had an astonishingly multifaceted personality. He was fond of literature and himself was the author of many books. His modesty, delicacy and sense of humour drew people towards him. Meetings with him were always joyful events.

The name of Lev Petrovich Feoktistov, a great scientist of a great country, will remain inscribed forever in the history of Russia.

**E.N.Avrerin and O.N.Krokhin**