

## Yurii Alekseevich Trutnev (on his 80th birthday)

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Professor Yurii Alekseevich Trutnev, Full Member of the Russian Academy of Sciences (RAS), DSc in Technical Sciences, First Deputy of the Science Supervisor of the Russian Federal Nuclear Center – All-Russia Scientific Research Institute of Experimental Physics (RFNC – VNIIEF in Russ. abbr.), one of the founders and creators of thermonuclear and nuclear weapons in Russia, and outstanding Russian scientist, had his 80th birthday on 2 November 2007.

Yurii Alekseevich Trutnev was born in 1927 in Moscow into a family of students of the Timiryazev Academy of Agricultural Sciences.

In 1945, having graduated from high school No. 206 in Leningrad's Kuibyshev district, Yu A Trutnev enrolled in the Department of Chemistry of Leningrad State University. The vigorous and permanently busy student continued to search for his true calling. In 1947, after his second year of chemistry, Yu A Trutnev transferred to the Department of Physics and graduated from it in 1950.

In February 1951, Yu A Trutnev arrived at the VNIIEF. He had had outstanding physicists for teachers: N A Dmitriev and D A Frank-Kamenetsky. He was also greatly influenced as a scientist by Academicians Ya B Zel'dovich, A D Sakharov, and Yu B Khariton. Excellent training in theoretical subjects, profound knowledge of physics, wide horizons in scientific outlook, plus brilliant personal and organizational abilities — initiative and an outstanding capacity for work — allowed him to smoothly join the ranks of the leading developers of thermonuclear weapons. He is one of the coauthors of the most important invention — the principles of radiation-driven implosion — devised and honed by a collective effort of Ya B Zel'dovich, Yu A Trutnev, and A D Sakharov, and one of the principal creators of the first thermonuclear charge based on this new principle — the RDS-37. This charge was a prototype of practically all thermonuclear charges developed in the USSR. This work brought Yu A Trutnev the Order of Lenin in 1956. This achievement was a milestone comparable in its significance to the creation of the first atomic bomb, because it opened a realistic way of achieving thermonuclear parity with the USA.

At the same time, Yu A Trutnev, in collaboration with Yu N Babaev, formulated an idea on how to improve radiation implosion and implemented it in 1958 in the Project 49. This development constituted the most important basis for modernizing the thermonuclear potential of our country. For this work Yu A Trutnev and Yu N Babaev received the Lenin Prize (1959). In 1961, A D Sakharov and Yu A Trutnev supervised the development of the most powerful thermonuclear charge in the world (Project 602).



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The successful testing of this charge led to termination of the spiralling growth of nuclear stocks in the USA as furthering the nuclear weapons race became meaningless.

In 1958–1962, an entire spectrum of thermonuclear charges was designed under Yu A Trutnev's leadership, which built the foundation of our system of rocket and nuclear weapons. This work was rewarded in 1962 with the honor of Hero of Socialist Labor.

It is well known that the energy problems facing humankind may some day be solved by creations of the thermonuclear energy industry. One of the main lines of research in this field is inertial thermonuclear fusion, in which plasma is heated and confined using laser radiation, the energy of chemical explosives, or other means. This problem still awaits solution. However, a group of specialists headed by Yu A Trutnev pointed to the possibility of solving it, in principle, in 1962 by implementing the ignition and sustained burning of thermonuclear plasma in the process of implosion driven by the energy of atomic explosion.

In 1964, Yu A Trutnev was elected Corresponding Member of the USSR Academy of Sciences. In 1965, he succeeded the Academicians A D Sakharov and

Ya B Zel'dovich as head of the theoretical division of the VNIIEF and remained in this post until 1999. During these years, the team he led designed hundreds of nuclear and thermonuclear charges that formed the foundation of the nuclear potential of practically all branches of the Russian military forces.

In 1966, Yu A Trutnev became deputy to the VNIIEF Science Supervisor, Academician Yu B Khariton, and in 1978, his first deputy. Since 1999, Yuri Alekseevich has been First Deputy of the RFNC—VNIIEF Science Supervisor for perspective research projects.

Yu A Trutnev is an outstanding expert on the physics of high energy densities and on designing nuclear and thermonuclear charges. His work played the key role in the evolution of the fundamental ideas in this new field of knowledge, in the expansion of the theoretical basis, and in designing many specific models of weaponry.

Yu A Trutnev is one of the authors of the main ideas that even now form the starting point for designing thermonuclear charges in this country. He led the design work on nuclear and thermonuclear charges of various types required in most branches of the military forces. Yu A Trutnev's initiative of fostering new 'nontraditional' areas of research in the organization that he led, which ultimately allowed starting work on charges based on new physical principles, appears to be of exceptional importance.

On Yu A Trutnev's initiative, industrial production was organized of explosive charges for important applications in the national economy. Some of them were used for solving specific problems, such as creating water reservoirs, extinguishing gas flares, and intensifying gas and oil deposits. An ideological offshoot of this work was the research into the safety of industrial nuclear energy conducted at the RFNC—VNIIEF under Yu A Trutnev's guidance.

In the 1960s–1980s, Yu A Trutnev, in his capacity as head of computational and theoretical work at the VNIIEF and one of the creators of the VNIIEF Computations Center applied huge effort to support further expansion of the research, technical, and financial potential of the center.

Yu A Trutnev's brilliant traits are his wonderful intuition in science and his unbelievable capacity for work. Now, on the eve of his 80th birthday, he continues to work vigorously (together with a team of much younger people) on the development of new physical methods for maintaining the operational capability of nuclear weapons under the conditions of the Comprehensive Test Ban Treaty (CTBT), on the development of original modern nonnuclear weapons and systems for surmounting anti-missile defenses, on increasing the capabilities of strategic submarines, and on many other major problems that have an impact on assuring the security of Russia. He is also excited about a number of civil projects that are important for the economic health of our country, such as hydrogen energetics.

Another important activity of Yu A Trutnev was devoted to maintaining the nuclear status of Russia during the period of disintegration of the USSR. He was one of the initiators of the well-known proposal to terminate the permanent aiming of Russia's strategic nuclear arsenal at targets on the territory of the USA. This initiative was implemented by President B N Yeltsin.

Yu A Trutnev is an active member of the RAS (Full Member of the RAS since 1991) and enjoys high standing among fellow academicians. In 2003, he received the RAS I V Kurchatov Gold Medal on the occasion of the 100th

anniversary of the birthday of the great founder of nuclear science and technology in the USSR. He was personally acquainted with I V Kurchatov who, never deviating from his principles, supported the new promising projects of his young colleague.

Yu A Trutnev's activity in his capacity as member of Scientific Advisory Committee attached to the Council of Directors of the International Science and Technology Center (MNTTs in *Russ. abbr.*) is very important. Great effort has been devoted to select and evaluate hundreds of projects to be financed through the MNTTs. This activity of Yu A Trutnev facilitates international scientific and technical collaboration and helps sustain the professional potential of the staff of defence-oriented branches of Russian industry.

Measures undertaken by Yu A Trutnev to raise the professional level of specialists working at the VNIIEF have played an important role: working with CSc and DSc competitors, organizing lectures for students at the Moscow Engineering Physics Institute (MIFI in *Russ. abbr.*), and organizing an affiliate of the MIFI chair of theoretical nuclear physics at the VNIIEF. He is a member of the Bureau of the Physical Sciences Division of the RAS. For a long time Yu A Trutnev was member of a number of science and technology committees of the Ministry of Medium Machine Building and of the RFNC—VNIIEF, a member of Academic Councils for Conferring DSc and CSc degrees, and an editor and member of the editorial board of the journal *Voprosy Atomnoi Nauki i Tehniki* (Problems of Nuclear Science and Technology).

Yu A Trutnev received a number of governmental awards: 1956—Order of Lenin; 1959—Lenin Prize; 1962—Hero of Socialist Labor, Order of Lenin, Golden Hammer and Sickle Medal; 1970—Medal for Labor Valor (on the occasion of Lenin's 100th birthday); 1971—Order of the October Revolution; 1975—Order of the Red Banner of Labor; 1984—State Prize; 1987—Order of the Red Banner of Labor; 1997—Medal for 850th Anniversary of Moscow; 1998—Order of Merit for the Fatherland, Third Class; 2003—Order of Merit for the Fatherland, Second Class.

In 1997, Academician Yu A Trutnev became Honorary Citizen of the Nizhny Novgorod region.

Yuri Alekseevich is a highly responsible person passionately devoted to his science, single-minded when necessary, with a tremendous capacity for work. These qualities are combined in him with innate intelligence, kindness, warmth, and an attentive attitude when dealing with people.

Yuri Alekseevich's colleagues, friends, and disciples are happy for him on this grand occasion and wish him good health, happiness and well-being, fresh ideas, and new achievements that will benefit Russia.

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