

## Yurii Alekseevich Trutnev (on his 90th birthday)

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The outstanding Russian scientist, one of the founders and creators of Russian thermonuclear and nuclear weapons, the First Deputy Scientific Supervisor for perspective developments of the Russian Federal Nuclear Center ‘All-Russian Research Institute of Experimental Physics’ (Russian acronym RFNC–VNIIEF), Full Member of the Russian Academy of Sciences (RAS), Doctor of Technical Sciences, Professor Yurii Alekseevich Trutnev, was born on November 2, 1927 in Moscow into a family of students of the Timiryazev Academy of Agricultural Sciences.

In February 1951, having graduated from the Faculty of Physics of Leningrad State University, Yu A Trutnev was assigned to a job in secret laboratory known as the Design Bureau No. 11 (KB-11, later renamed to VNIIEF). His teachers were the outstanding scientists D A Frank-Kamenetskii and N A Dmitriev. Academicians Ya B Zel’dovich, A D Sakharov, and Yu B Khariton had a great influence on his formation as a scientist. Already in 1954, Yu A Trutnev became one of the co-inventors of the most important and fruitful principle of radiation implosion, formulated as a result of collective work (A D Sakharov, Ya B Zel’dovich, and Yu A Trutnev), and one of the main creators of the first thermonuclear charge on the basis of this new principle — RDS-37. This charge served as a prototype for practically all the thermonuclear charges designed in the USSR. For this work, Yu A Trutnev was decorated with an Order of Lenin in 1956. The work on developing RDS-37 was a milestone comparable in its significance to the creation of the first atomic bomb, because it paved the way for the achievement of thermonuclear parity with the USA.

In 1955, Yu A Trutnev, together with Yu N Babaev, proposed a “new principle of constructing thermonuclear charges” (an advanced radiation implosion), which they realized in 1958 in ‘Project 49’. This achievement laid the most important basis for perfection of the thermonuclear arsenal in our country. For this work, Yu A Trutnev and Yu N Babaev were awarded the Lenin Prize 1959.

On the initiative and with the participation of Yu A Trutnev, the most powerful thermonuclear charge in the world (‘Project 602’) was created in 1961, which was then tested on the proposal of A D Sakharov at half the capacity of 50 Mt of TNT equivalent. A successful test of this charge led to the cessation of the buildup of thermonuclear potential in the USA, and the race in this field became senseless.

A whole spectrum of thermonuclear charges which were the basis of the Soviet system of nuclear-missile armament was elaborated in 1958–1962 under the guidance and with the direct participation of Yu A Trutnev. For this work, he received the title of Hero of Socialist Labor in 1962.

Under the supervision of Yu A Trutnev, the fundamental problem of igniting thermonuclear fuel under radiation



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implosion was solved in 1962, which became the prototype of the setup of explosive thermonuclear power engineering of the future.

In 1964, Yu A Trutnev was elected a Corresponding Member of the USSR Academy of Sciences. In 1965, he became a successor of A D Sakharov and Ya B Zel’dovich and headed the Joint Theoretical Sector of VNIIEF till 1999.

During this time, the team of researchers guided by him designed hundreds of nuclear and thermonuclear charges that laid the basis of nuclear armory of almost all the various armed forces of the USSR and Russia.

In 1966, Yu A Trutnev became VNIIEF Deputy Scientific Supervisor Academician Yu B Khariton and, in 1978, his First Deputy. Since 1999, Yurii Alekseevich has been the RFNC–VNIIEF First Deputy Scientific Supervisor for advanced research.

Exceptionally valuable are Yu A Trutnev’s initiatives on the development of new nontraditional spheres of work that allowed the team of researchers headed by him to start developing charges based on new physical principles and to conceive other significant projects. Yu A Trutnev is an outstanding expert in high energy density physics and in developing nuclear and thermonuclear charges. His work has played a decisive role in the formation of basic ideas in

these new fields of knowledge, in the development of computational–theoretical base for such work, and in designing many particular types of armaments.

Organized on the initiative and with the participation of Yu A Trutnev in many projects was the creation of industrial charges playing a prominent part in the national economics. Some of them were applied to solve practical national-economic problems (for example, for the creation of water reservoirs, gas-flame quenching, intensification of gas and oil pools). An ideological continuation of this work is the study and work in the field of nuclear energy security conducted at RFNC–VNIIEF under the guidance of Yu A Trutnev.

In the 1970s–1980s, Yu A Trutnev made a significant contribution to the organization of work in our country on investigating the survivability of the cosmic rocket technique (CRT) and designing the protective means against the damaging factors of nuclear explosion (DFNE). He participated in the solution to the problem of increasing the CRT survivability under DFNE.

Yurii Alekseevich was a participant in and in many cases the head of more than 50 nuclear tests and unique underground physical experiments on the investigation of military hardware survivability and the effects of damaging factors of antimissile defense (AMD).

An important role was played by the measures undertaken by Yu A Trutnev on the advanced training of VNIIEF research workers: candidates and doctors of science, the delivery of lectures to students at the Moscow Engineering Physics Institute (MEPhI), organization at MEPhI of the Chair of Applied Physics and Mathematics, organization at VNIIEF of a branch of the MEPhI Chair of Theoretical Nuclear Physics.

For a long time, Yu A Trutnev had been member of a number of Scientific and Technical Councils of the Ministry and RFNC–VNIIEF, a member of academic councils on the defense of candidate and doctor of science theses, and an editor and member of the editorial board of the journal *Voprosy Atomnoi Nauki i Tekhniki*.

In the 1960s–1980s, when head of computational–theoretical work at VNIIEF and one of the founders of the VNIIEF computational center, Yu A Trutnev applied great effort for the further development of the research, technical, and financial basis of the center. These measures laid the foundation of the Institute of Theoretical and Mathematical Physics affiliated with RFNC–VNIIEF.

An important part was played by the activity of Yu A Trutnev devoted to maintaining the nuclear status of Russia during the disintegration of the USSR.

Yu A Trutnev is an active member of RAS (a Full Member of the Academy since 1991); he enjoys high standing in the academic community and is a member of the Bureau of the Physical Sciences Division of RAS. In 2003, Yu A Trutnev was awarded the RAS I V Kurchatov Gold Medal for a series of classified studies playing an important military-strategic and national-economic role and providing a secure nuclear shield for the country. Yurii Alekseevich was personally acquainted with I V Kurchatov who, following his principles, supported the new promising projects of his young colleague.

Yu A Trutnev's activity in the 1990s as member of the Scientific Advisory Committee attached to the Council of Directors of the International Science and Technology Center (Russian acronym MNTTs) was significant.

Yu A Trutnev's remarkable scientific intuition and fantastic capacity for work are surprising. Now, on the eve of his 90th birthday, he goes on working hard (together with a team of young people) developing new physical methods (proton radiography) to maintain the performance ability of nuclear weapons under the conditions of the Comprehensive Test Ban Treaty (CTBT), designing modern original types of nonnuclear weapons and systems for surmounting anti-missile defenses, increasing the capabilities of strategic submarines, and considering many other serious problems to assure the security of Russia.

Yurii Alekseevich Trutnev was steeped in a purely applied science full of nontraditional content, where the main thing is the skill to solve a problem with a required precision up to significant figures and to attain fail-safe functioning of a system.

Yu A Trutnev belongs to those rare talents who, at the beginning of their way, found themselves at one level with outstanding leaders. He has taken the relay baton and continues the important work of providing national security for Russia.

Yu A Trutnev's talent in determining the path of development responsible for the national security of the state and his consistency and uncompromising position in upholding essential issues are a gauge for new generations of specialists of the nuclear-weapon complex. The entire creative scientific life (over 66 years) of Yu A Trutnev is an example of boundless loyalty to the Fatherland. Yurii Alekseevich is one of those obsessed people for whom the fate of their country always remains the main and undeniable priority.

Here is the brief list of Yu A Trutnev's awards: Hero of Socialist Labor (1962), two Orders of Lenin (1956 and 1962), two Orders of the Red Banner of Labor (1975 and 1987), the Order of the October Revolution (1971), the Medal for Labor Valor (1970), Orders of Merit for the Fatherland, IId, IIId, and IVth classes (2003, 1998, and 2012), RAS I V Kurchatov Gold Medal (2003), laureate of Lenin (1959) and State (1984) Prizes, and the Prize of the RF Government in the field of science and technology (2016).

Dear Yurii Alekseevich, all the best on your birthday! Thank you and a profound bow for everything you have done. We wish you new remarkable achievements for the benefit of our Fatherland! Prosperity to you and your loved ones.

*S S Gershtein, S V Ivanov, R I Il'kaev,  
A S Koroteev, A G Litvak, V P Neznamov,  
Yu Ts Oganessian, V A Rubakov, G N Rykovanov,  
A M Sergeev, I D Spasskii, I A Shcherbakov*