

Obituary

Yulii Khariton (1904–96)

Physicist, instrumental in developing Soviet nuclear weapons

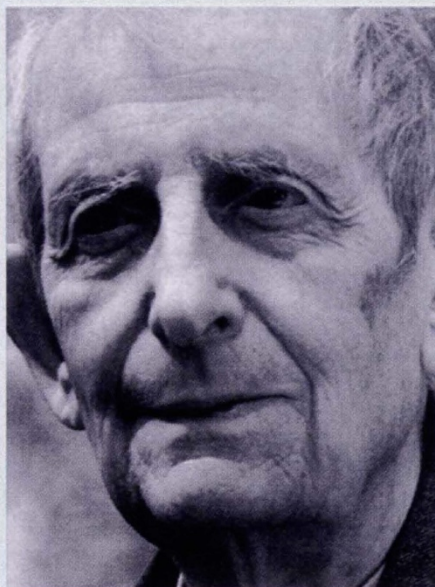
Yulii Borisovich Khariton, who died on 19 December last year at the age of 92, was a key figure in the Soviet nuclear weapons programme. For over 40 years he was scientific director of Arzamas-16, the Soviet equivalent of Los Alamos.

Khariton was born into a literary and artistic family in St Petersburg in 1904, and throughout his life retained the manners and interests of a Russian intellectual. He studied physics at the Polytechnical Institute, and was invited by Nikolai Semenov (who received the Nobel prize for chemistry in 1956 for his work on chemical chain reactions) to do research at the Leningrad Physicotechnical Institute, the leading Soviet centre of physics at the time. In 1926 he went to Cambridge, where he spent two years at the Cavendish Laboratory, working under Ernest Rutherford and James Chadwick on the sensitivity of the eye to weak impulses of light, and on alpha radiation. He received his PhD in 1928.

Many years later, Khariton commented on the coincidence that he and J. Robert Oppenheimer — his counterpart in the US nuclear weapons programme — had been born in the same year, had the same first name (Julius), and had mothers who instilled in them a love of music, art and poetry. Oppenheimer spent a short time at the Cavendish in 1926, but he and Khariton did not meet there.

On his way back to the Soviet Union Khariton visited Germany, where his mother was living. He decided, after seeing the dangerous political situation there, to do defence-related research. On his return to Leningrad he created a laboratory to study explosives, which soon became part of Semenov's new Institute of Chemical Physics.

After the discovery of nuclear fission at the end of 1938, Khariton's thoughts turned to the possibility of nuclear chain reactions. With Yakov Zeldovich he produced a series of classic papers in 1939–41 on the conditions under which a chain reaction would take place in uranium. The two physicists investigated both slow-neutron and fast-neutron reactions, and calculated that 10 kg of uranium-235 would be sufficient for an atomic bomb. Soviet nuclear research stopped when Hitler invaded the Soviet Union in June 1941. At the end of 1942, however, Stalin decided to



initiate a small Soviet project after receiving intelligence about British and American work on the atomic bomb. Igor Kurchatov, a friend and colleague of Khariton's since the 1920s, was made scientific director. Khariton took charge of the work on the bomb, but continued with his work on conventional munitions at the same time. Khariton was a member of the Soviet atomic mission sent to Germany in May 1945. The Soviet Union had little to learn from Germany about the bomb, and most of the leading German nuclear scientists had fled to the West. But Khariton and a colleague did track down over 100 tonnes of uranium oxide — an invaluable find for the Soviet project, which was very short of uranium.

After Hiroshima, Stalin turned the Soviet project into a crash programme. Khariton chose a site at Sarov, 400 kilometres east of Moscow, and assembled a group of very capable scientists and engineers to work on the bomb. Zeldovich was the first head of the theoretical department, and Andrei Sakharov worked there from 1950 until 1968. This heavily guarded, ultra-secret installation, known as Arzamas-16, was the only nuclear weapons institute until a second one was established in the Urals in 1955.

The first Soviet fission bomb was detonated successfully on 29 August 1949 at a special test site in Kazakhstan. This was a copy of the first US plutonium bomb; when it became public knowledge in the early 1990s that the Soviet Union had been able to use intelligence information to re-create the US design, Khariton defended that decision as the quickest way to build a Soviet bomb. A more effective Soviet

design was detonated in 1951. The first Soviet hydrogen bomb was tested in August 1953, and the first two-stage thermonuclear weapon in November 1955.

Khariton was in many ways a surprising choice as chief designer of nuclear weapons. His two years in the West made him politically suspect. So, too, did the fact that his parents lived abroad: his mother emigrated to Palestine from Germany in the 1930s; and his father, who lived in Riga before the war, was arrested and shot when the Red Army occupied the Baltic states in 1940. Yet Khariton remained untouched even by the anti-semitic campaign of the late 1940s. He met Stalin only once, but he had to work closely with Lavrentii Beria, the head of the secret police, whom he found efficient and correct in his dealings with scientists.

Khariton remained scientific director of Arzamas-16 until 1992. His approach to design and development was careful and thorough: "We have to know ten times more than we are doing" was his motto. He saw it as his duty to ensure that the Soviet leaders received sound technical advice on nuclear weapons issues.

Until the 1980s Khariton remained a very secret figure. When I met him in 1988, I was the first Westerner he had encountered since the Second World War. He was a quiet and courteous man, with a probing intelligence, similar in manner and outlook to other European physicists of his generation. In conversation he was unassuming about his own role in history. He gave the impression of being a man of great intellectual integrity, but one absorbed in his work rather than engaged in broad political issues. He was in this respect very different from Sakharov, whom he greatly admired.

Khariton was showered with honours by the Soviet government, but became a public figure at a time when the state he had served was disintegrating and the weapons he had helped to create were no longer needed on anything like the same scale. Yet he did not yearn for the past, and was conscious of the human and environmental costs of the nuclear weapons programme. When he was invited in 1995 to give the Oppenheimer memorial lecture at Los Alamos, he very much wanted to accept the invitation, but ill health prevented him from doing so. In the text of the lecture he sent to Los Alamos he expressed the hope that "those who come after us will find the way, will find in themselves the firmness of spirit and the decisiveness not to do harm in striving to do good". □

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