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# Soviet Physicist Drops a Bomb

*Blackboard revelations on fusion surprise audience of U.S. scientists.*

By Ernest Volkman

Newsday National Correspondent

U.S. officials have put strict security wraps over a lecture by a leading Russian physicist—including seizure of the blackboard on which he wrote equations—given to an audience of American scientists that revealed significant Soviet breakthroughs in top-secret fusion research, U.S. intelligence sources say.

The physicist's revelations, which came during a talk last summer at a leading U.S. nuclear weapons research laboratory, astonished his scientific audience because, the sources say, they showed what appeared to be great advances in thermonuclear fusion by the Soviets.

According to Pentagon experts, the disclosures caused concern that the Soviets are nearing a breakthrough in developing thermonuclear weapons 100 times more powerful than the largest current weapon. One possibility, they said, is a Soviet attempt to build a "gigaton" hydrogen bomb, whose explosive power would be equal to 1 billion tons of TNT. (The power of the atomic bomb dropped on Hiroshima equalled 15,000 tons.)

Additionally, thermonuclear fusion has important domestic implications, since a fusion reactor—it may take decades to develop one—would produce infinitely more energy than it would use. Current energy producers, such as oil or standard nuclear power plants, consume huge amounts of fuel to produce relatively small amounts of energy, such as electricity.

It is unclear why the physicist, Leonid I. Rudakov, revealed sensitive portions of Soviet research efforts. U.S. officials believe the disclosure was deliberate, since Rudakov, as an administrator at the Kurchatov Laboratory near Moscow, a major center for nuclear weapons design, was perfectly aware of the significance of his remarks. The Soviets, the officials believe, probably wanted to warn the Americans of what weapons they were prepared to develop if the U.S. failed to reach a strategic arms limitation agreement with Moscow.

The security clampdown, the sources said, has led to renewed tension between U.S. scientists and security agencies over what scientific information should be classified. Generally, many scientists have argued that much top-secret scientific military research material is unnecessarily classified, since other scientists in the international scientific community know of the developments anyway. Classifying Rudakov's talk appears to make no sense, the sources say, since the usual rationale for classifying material is to prevent the Soviets from finding out

"I don't know who made the decision," said one U.S. intelligence official, "but it seems to have a kind of Alice in Wonderland atmosphere about it. The idea is to keep our secrets from the Russians, not the other way around. The idea of classifying the blackboard really seems out of line. What did they expect, somebody would stick it under his arm and walk home with it?"

None of the scientists or government officials involved in the incident will discuss the case. One scientist familiar with the Soviet physicist's talk said he could not even discuss how the decision to classify the talk came about, since the classification guidelines themselves are classified. Soviet officials would not discuss the case.

Other sources, however, gave this account:

Last July, Rudakov came to the United States as part of a scientific exchange program to discuss Soviet research developments in talks before American scientists.

As part of the itinerary, Rudakov appeared at the Lawrence Livermore Laboratory in California, one of the leading American centers for nuclear weapons research. In a talk outlining his ideas, Rudakov gave a detailed analysis of how the Soviets had mastered conversion of electron-beam energy into forms suitable for making target pellets of fissionable material, a significant step in the solution of the massive problem of harnessing fusion power. In the process, Rudakov filled a blackboard with diagrams and equations.

According to one source, "Mouths dropped open all over the room" as nearly 100 American scientists

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listened, for Rudakov was outlining top-secret developments in the Soviet program and revealing the direction of future Soviet thermonuclear weapons designs. Immediately after his talk, sources said, security officials advised the Americans in the audience that the talk was classified, including Rudakov's blackboard notations, and seized the blackboard. Subsequently, the sources said, security officials sent telegrams to Livermore and three other U.S. nuclear research laboratories advising them to "play dumb" if asked about Rudakov's talk.

Essentially, fusion is the formation of a heavier nucleus from two lighter ones, a process that releases a tremendous amount of energy. This differs from fission, which is the splitting of a heavy nucleus into two approximately equal parts, which releases a large amount of energy. Fission is the process that underlies an atomic bomb, while fusion was used to make the hydrogen bomb, so called because hydrogen isotopes are used.

The problem with fusion is that it takes very hot temperatures to begin the process. In the hydrogen bomb, a fission bomb is first exploded to cause the heat that begins the fusion process. However, fusion is difficult to control and is now impractical for energy use. Once the process is controlled, the scientists eventually could even build a so-called doomsday bomb that would release awesome amounts of energy, and, theoretically, destroy the world in one blast.