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COVER: The fastest laser in the world produces subpicosecond light bursts that are used to energize and study chemical reactions so fast that no other method can follow them. See p. 26. (Photo: Bell Labs)

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LETTERS

Soviet particle beam weapon

At the start of World War II Leo Szilard was unable to convince allied scientists that they should voluntarily refrain from publishing their work on uranium. Allied scientists "knew" that no one would really be able to build an atomic bomb. Either that or they were more concerned with getting credit for their work than with the outcome of the war.

At the end of World War II Japanese scientists also "knew" that the United States would not be able to build an atomic bomb and succeeded in convincing the Japanese government of this "fact." After the bomb we couldn't build incinerated Hiroshima, Japanese scientists argued that we could not possibly have built more than one atomic bomb. So much for Nagasaki.

A few months before the Soviet Union launched the first sputnik, the U.S. scientific establishment went to a good deal of trouble to convince this author that space flight was not really possible and I should stop encouraging science students to believe to the contrary.

In 1976, scientists in France and at Los Alamos (SN: 11/27/76, p. 340) discovered that highly focused laser photons act as if they have a shorter wavelength than they have when first emitted, a key to achieving laser-induced fusion (SN: 3/12/77, p. 166). This fact was actually discovered by a Canadian, Emilio Panarella, in 1972. But it is a fact that contradicts the opinion of leading U.S. physicists so Panarella was treated somewhat as if his name were Velikovsky. (For example, PHYSICAL REVIEW LETTERS avoided publishing papers on Panarella's work by editing all the favorable comments out of referee reports.) The solution to our urgent energy problem was thus set back by at least four years.

And now SCIENCE NEWS (5/21/77, p. 329) adds its voice voiced to those who pooh-pooh the Russian charged-particle beam. Ironically, the chief conclusion of the article by Douglas and Thomsen is that the purported Soviet beam is "poor strategy" because such a beam would be highly vulnerable to counter measures. But a weapons system is totally invulnerable if its existence is denied by those who might have a need to counter its effect. Thus, the article in SCIENCE NEWS becomes a self-fulfilling prophecy, and, since the Russians are aware of the historic tendency of scientists to deny what contradicts their opinions, a somewhat dangerous one.

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Several important points must be raised concerning the article "The Great Russian Death-Beam Flap." These include an error of fact and several of assumption.

Use of small atomic bombs. It is thought the Soviets are using pellets of fusible materials, detonated with electron beams, *not* standard fission bombs. Extremely small fission bombs without chemical explosive compression may be achieved, however, by the use of millimeter-size plutonium or U-235 pellets with a water or similar tamper, and driven to detonate with high efficiencies by the use of ablation/compression similar to attempts to initiate laser-induced fusion. Small fusion microexplosions are also possible in this manner, with yields about 0.002 kiloton.

Capacitor sizing. Garwin suggests any but ground-based capacitors would be impractical due to weight. This is false; inductive Marx storage is up to a factor of 200 less massive as the best capacitor storage.

Targeting the beam. The beams would be able to fire rapidly enough to blanket "windows" through which RV's (re-entry vehicles) must travel. The targets would not have to be the RV's; the MIRV bus is far more vulnerable and desirable a target.

Nuclear bombs to disrupt beam. It advertises the fact that you are about to launch your missile strike, and it also requires your own RV's to penetrate the nuclear environment you have created by detonating that bomb to disrupt the Soviets beam weapon.

Satellite vulnerability. If the Soviets orbited a beam weapon, they would not have to fear for its safety; the U.S. deactivated our antisatellite Thor IRBN's in 1964.

Rudakov. His information suggests the Soviets have the capability to detonate fusion pellets at breakeven.

B-1 and cruise missile. Both weapons systems would be vulnerable to beam weapons which have zero time-of-flight. The requirement would be to deploy many beam weapons around high-value targets; or perhaps at higher ground (mountains) with shoot down or shoot sideways capability.

A final thought: It may be possible to create a proton beam weapon as follows: Detonate a fusion pellet in a chamber filled with hydrogen; guide the resulting plasma down an accelerator and scavenge the electrons at the end. A guided beam of protons results, with much higher efficiency (and cheapness) than the Soviet scheme.

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