New 'SDI' initiative could salvage Russian science

Technological breakthroughs are still being made in the U.S. and Russian "Strategic Defense Initiative." Paul Gallagher reports on the urgent need to expand cooperation.

Evidence continues to come from Russia of an intense and high-level debate among scientists and industrial groups about the Russian offer to the United States this past April for "joint plasma weapons experiments" against nuclear missiles—and about the decision of the Clinton administration instead to scale back the remaining scientific work of the American Strategic Defense Initiative (SDI), which was launched in 1983 by President Ronald Reagan at the urging of Lyndon LaRouche.

A recent article in the widely circulated Moscow daily *Nezavisimaya Gazeta* argues that President Clinton and Defense Secretary Les Aspin's move against SDI will help break up the scientific capabilities of Russia (see *EIR*, July 16, page 43). The newspaper says that if the United States had accepted the Russian offer of expanded joint scientific work for anti-missile defense, this would have helped scientific progress and Russia's internal political and economic stability.

The following example of existing, small, underfunded exchanges of American-Russian scientific work, shows what could be dramatically expanded if the U.S. government decided to engage the Russian scientific academies in real, advanced cooperative work with the goal of a global shield against nuclear missile attack. This account by Los Alamos National Laboratory, of joint work with Russia's Arzamas-16 nuclear weapons complex, concerns a non-military program. But the breakthroughs in engineering of superhigh magnetic fields and the use of plasma gas-magnetic interactions which can produce microwaves, fall in exactly the areas which the Russian "plasma weapons" proposal of April 2, 1993 wanted to concentrate on.

Joint 'pulsed power experiments'

The release from Los Alamos, also from April, says that "Los Alamos scientists will travel to the All-Russian Institute of Experimental Physics in August to conduct a joint experiment on the production of intense pulses of electrical current and ultrahigh magnetic fields. The collaboration—the first formal joint venture for the two weapons laboratories—will generate experimental results that could be applied to such diverse fields as plasma physics, high-pressure chemistry, microwave generation, astrophysics, advanced electronics, and other novel materials and even the long-sought goal of fusion power."

Dr. Steven Younger, director of the division of high energy-density physics at Los Alamos, responded to a question by *EIR* that this work is not related to the Russian anti-missile defense proposal called "Trust," for joint experiments using high-power bursts of microwaves to create moving plasmas in the upper atmosphere. Younger said that the Los Alamos-Arzamas experiments will not produce and focus microwave bursts, and will not have military applications.

However, the U.S. Air Force has already used much smaller-power versions of the technology, which uses explosives to compress electric currents and produce super-intense magnetic fields, as a microwave weapon.

"Los Alamos scientists," said the release, "in August will help assemble and test a superhigh-current electromagnetic disk generator perfected by Vladimir Chernyshev of Arzamas-16. Los Alamos will provide sophisticated diagnostics that should permit comparisons of theoretical models with experimental results.

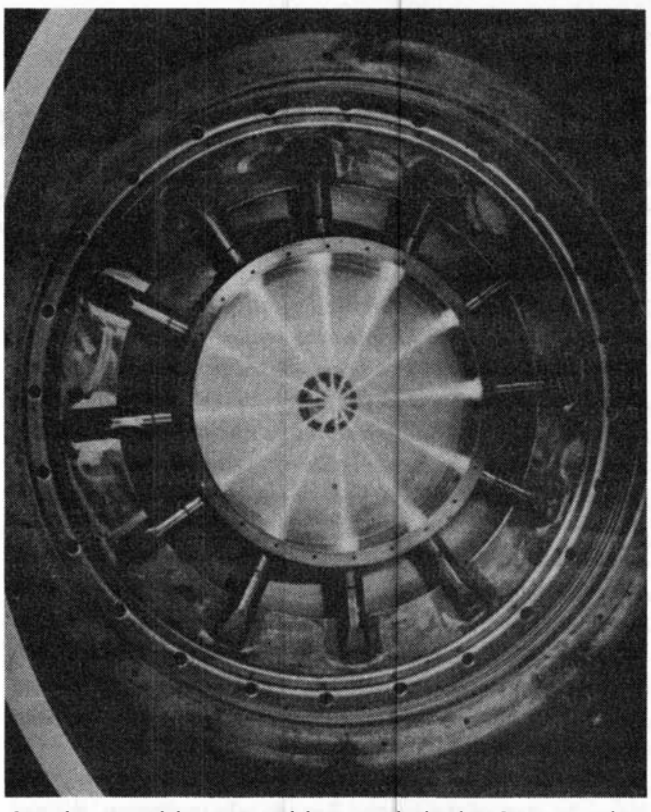
"The unique machine uses high explosives to compress magnetic fields and thus generate incredibly intense pulses of electomagnetic energy—pulses greater, for a few billionths of a second, than the electrical generating capacity of the entire planet.

"In October, the Russians will send four smaller generators to Los Alamos, where researchers will use the ultrahigh magnetic fields generated by the machines to study the properties of high-temperature superconductors."

High magnetic fields can stop the superconducting properties of many materials, and superhigh fields presumably can be used to diagnose exactly why and under what conditions materials cross the threshold that separates superconducting from ordinary characteristics.

"The experiments at Los Alamos could provide new insights into how magnetic fields affect electronic devices at the atomic level," Younger said. "The collaboration could lead to breakthroughs in condensed matter physics and possibly such industrial applications as new materials, advanced ceramics, or techniques for the large-scale production of industrial diamonds.

"As you vary the magnetic field, you can monitor changes in the atomic structure in an electronic material," he explained.



One objective of the joint work between the leading Russian and American nuclear laboratories Los Alamos and Arzamas-16 would improve the chances of laser and particle beam fusion, shown above, by generating superhigh magnetic pulses around the central fuel element in the fusion reaction.

Originated by Sakharov

Younger, in the Los Alamos release, said that Andrei Sakharov, the Soviet weapons designer, dissident, and Nobel Prize winner, "was a pioneer in the field of pulsed power and, through his influence, the Russians have developed superb experimental capabilities and achieved record levels of power."

"Western scientists for 20 years have concentrated on two approaches to generating fusion energy. The first is magnetic fusion, in which a gas is heated sufficiently to strip its atoms of their electrons, and the resulting plasma is confined by a magnetic field as it is heated further to create a fusion reaction. In the other method, inertial confinement fusion, a powerful laser compresses a fuel pellet with so much force that the heat ignites the fusion process in the pellet.

"A third idea, developed by the Russians, is magnetized target fusion."

In fusion energy research, there have been efforts in the United States and elsewhere to magnetize the tiny pellets of fuel used in laser fusion devices, to enable them to ignite and burn with the impact of laser power upon the pellets. But such experiments have never before been done, Dr. Younger said, with the extraordinary compact device, uniquely developed by the Russians to create ultra-high magnetic fields.

"The tool of this trade, the disk generator, measures about 6 feet long and from 18 inches to more than 3 feet in diameter," said the Los Alamos account. "But it's the equivalent [in the intensity of the magnetic field it generates] of a warehouse-sized machine that nobody in the West even knows how to build using electrical capacitors. The disk generator for the August experiments should put out about 30 million amperes of power, but the Russians previously succeeded in generating more than 200 million amps with a larger version.

"The Russians have solved the problem of generating these fast pulses of incredibly high electromagnetic power," says Los Alamos. "Now the challenge is to focus this energy to useful experiments."

We note that the Air Force microwave weapon, which was used against Iraqi electronics in the Gulf War, is based on devices generating pulses of only a few million amps, while the Russian "disk generators" have already produced 200 million amp pulses. And the Russian laboratory with which Los Alamos is working, "Arzamas-16," appears to have been the point of origin for the Russian offer in April of a new "SDI," starting with joint plasma weapons experiments.