

# WASHINGTON REPORTS

## US and Russia Quarrel Over an Old Issue: Missile Defense, Now Dubbed 'Star Wars Lite'

After almost seven years of dilly-dallying, on 14 April the Russian Duma ratified the START II strategic arms control treaty that the US Senate signed off back in 1996. On 21 April, Russia's parliament, by an even larger majority, approved the Comprehensive Test Ban Treaty (CTBT) that had already been approved by 152 nations—though not by the US.

After the Senate refused to ratify the CTBT last October by an extremely narrow margin of two, Hans Bethe, who directed the team that designed the first nuclear bombs at Los Alamos, wrote in the *New York Review of Books* that while the vote against the CTBT was "a serious mistake" and "undermined the entire future of arms control," the START agreements are "far more important than the test ban" because they hold out "the prospect that the largest and most dangerous stocks of nuclear weapons will be reduced to the minimum necessary for deterrence."

Indeed, arms control treaties by themselves don't ensure nuclear peace. Still, disarmament treaties make the world safer to the extent that they embody and contribute to military and political comity. In 1990, the US and Soviet Union each had nearly 24 000 nuclear warheads. START I, signed the following year, reduced the nuclear arsenal by half for each side in 1994. By January 2000, the US had whittled the number of warheads to 7763, and Russia's totaled 6998, according to the State Department's Bureau of Arms Control. Under START II, Russia and the US are obligated to decrease deployments of strategic warheads to 3500 by the end of 2007.

In a political sense, Russia's ratification of START II shows that, despite disagreements over such contentious issues as Kosovo, Chechnya, Iraq, and enlarging NATO to include former Warsaw Pact nations, the two countries can still reach agreement on such a critical matter as a strategic arms race. It also shows that, in newly elected President

Vladimir Putin and the more centrist Duma, the US is dealing for the first time with a Russian government that can deliver on its promise to disengage militarily. And it shows that for all of their gripes about the loss of great-power status and the rise of US hegemony, Russia's current leaders are pragmatic enough to realize that nuclear weaponry is a dead end.

Ballistic Missile (ABM) treaty. It was the Strategic Defense Initiative (SDI), proposed by President Reagan in 1983, that led to the Helsinki accords with the Soviet leadership at the time, spurred the START process, and reinforced the ABM agreement.

While most of Reagan's closest advisers didn't share their boss's fantasy of protecting all 50 states from a missile attack by the "evil empire" and thus rendering nuclear weapons "impotent and obsolete," they began thinking of SDI as a bargaining chip to limit nuclear arsenals in the US and Russia. Then, in May 1998, nuclear tests by India and Pakistan made the world aware that other countries were prepared to join the nuclear club, which until then had only five members—the US, Russia, Britain, France, and China. Also, by developing long-range missiles, countries other than the Big Five could pose a threat to populations even half a world away.

This was apparent in July 1998, when a bipartisan panel headed by Donald Rumsfeld, Secretary of Defense during Gerald Ford's presidency, reported to Congress that "concerted efforts by a number of overtly or potentially hostile nations to acquire ballistic missiles with biological or nuclear payloads pose a growing threat to the US, its deployed forces, and its friends and allies." The panel identified North Korea, Iran, and Iraq as the most likely sources of the developing threat (see *PHYSICS TODAY*, September 1998, page 43). Congress and the Pentagon insisted that it was necessary to keep "rogue" states from hurling long-range missiles at other countries, particularly the US.

The answer to the threat came in the form of a limited National Missile Defense (NMD). With few hearings on the proposed system, Congress overwhelmingly voted last year to deploy NMD when it becomes "technologically feasible." Its feasibility, said the Pentagon, depended on the success of many tests that were likened to hitting a bullet with another bullet. The

"WE CHANGE THAT \$60 BILLION INTO NICKELS AND QUARTERS, FIRE THEM OFF, AND WE'RE BOUND TO HIT ANYTHING THAT'S UP THERE"



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Certainly, progress in arms control is by no means ensured. Heated debates are likely to take place in the US and Russia over START III, which would require deeper cuts in the strategic arsenals to a maximum of 2500 each. Putin has proposed a ceiling of 1500 warheads, not least because aging arrays of weapons are expensive to maintain. Nonetheless, Putin and the Duma have indicated their intention to hold further cuts hostage if the US deploys a ballistic missile defense, which Russia contends is prohibited by the 1972 Anti-

system under consideration by the Clinton administration is much more modest than SDI, which was familiarly known as "Star Wars." Because the planned system relied on land-based missiles and radar stations and didn't use x ray lasers, "brilliant pebbles," and other exotic technologies in space, some journalists covering the Pentagon cynically called NMD "Star Wars Lite."

So far, only two attempts have been made to knock out a missile in space. The first, last October, was initially hailed a success, but in February a report by Philip E. Coyle III, the Pentagon's director of operational testing and evaluation, revealed that the interceptor may not have hit the mock warhead if it hadn't mistakenly steered toward the target by locking in error on a decoy balloon. A more serious setback came in January when a missile fired from Kwajalein Atoll in the Marshall Islands came only within 100 feet of colliding with a dummy warhead launched from Vandenberg Air Force Base, 4300 miles away in California. The problem was tracked to a leak in the cooling system of infrared sensors that guide the kill vehicle in the final six seconds of its trajectory. If that test had succeeded, the Pentagon would have met its own minimum standard for advising the president that the technology was feasible and could be deployed by 2005.

Coyle's report contends that the Department of Defense (DOD) faces undue pressure to meet an "artificial decision point in the development process" and to disregard scientific evidence in recommending whether to go ahead with the NMD. He warned that "this pattern has historically resulted in a negative effect on virtually every troubled DOD development program."

The report supports the view of several European allies and a bipartisan group in Congress that Clinton should delay his decision on deploying NMD. The president has already postponed his decision from June to September and is increasingly hearing suggestions that the judgment should be left for the next president and Congress to make next year. "This may be one of the most serious decisions a president may make in modern times, and if the technology isn't there to examine all the options, then the deci-

sion should be deferred," said Senator Chuck Hagel, a Nebraska Republican.

On 28 April, the council of the American Physical Society (APS) passed a resolution faulting the Pentagon's NMD tests for being "far short of those required to provide confidence in the technical feasibility called for in last year's NMD deployment legislation." The US should make no decision, the APS stated, unless the system is shown—through analysis and through intercept tests—"to be effective against the types of offensive countermeasures that an attacker could reasonably be expected to deploy with its long-range missiles," the statement added. "The planned NMD system is intended to defend US territory against tens of long-range ballistic missiles carrying biological, chemical, or nuclear weapons. The ability of the NMD system to deal with countermeasures is a key factor in determining whether the system will be able to defend against the threats it is intended to meet."

Concern about countermeasures was raised earlier that month when a study by the Union of Concerned Scientists (UCS) and MIT's Security Studies Program concluded that any country capable of deploying long-range missiles would also be able to "take simple steps," known as coun-

termeasures, to thwart a missile defense.

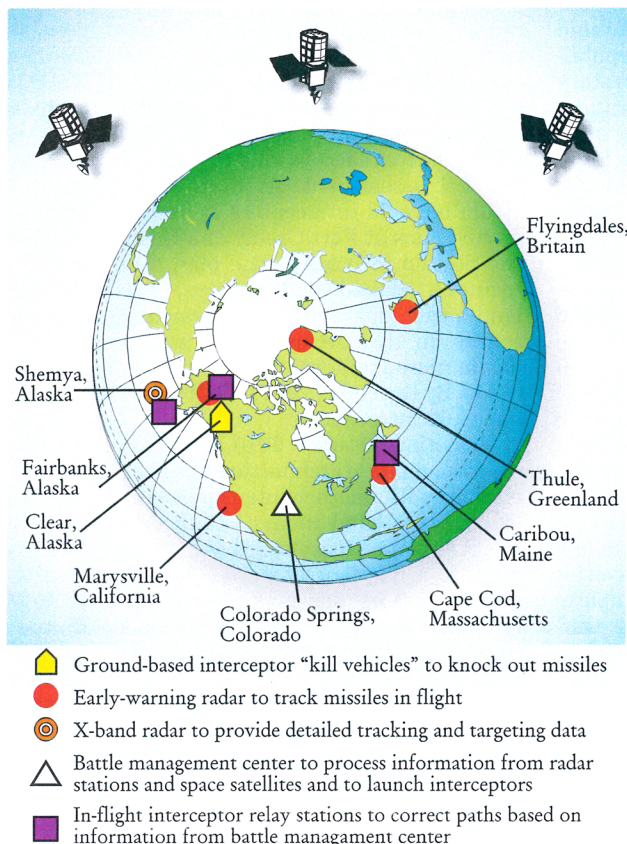
The report noted that missile warheads carrying biological or chemical toxins can be separated into a barrage of "bomblets" that would overwhelm an NMD defense with dozens of targets. Warheads also could be deployed inside mylar balloons along with many empty balloons as decoys, "presenting the defense with an unwinnable shell game," according to the report. In another deceptive tactic, nuclear weapons might be enveloped in a shroud cooled to very low temperatures, thereby preventing the heat-seeking interceptor from homing on the target.

In its study, the UCS-MIT group, which included scientists from Lawrence Berkeley Laboratory, Cornell University, the University of California at Los Angeles, and the University of Pennsylvania, as well as senior defense consultants to government agencies and nuclear weapons labs, examined 20 tests of exoatmospheric hit-to-kill inter-

cepts since 1983, almost all of them failures, and analyzed the planned NMD system. "This so-called missile defense system won't do the job," said the study's chairman, Andrew Sessler, former director of the Lawrence Berkeley Laboratory and past president of APS. The US should "shelve its NMD plans and rethink its options for countering missile threats," he said. "A defense that doesn't work is no defense at all."

Despite \$60 billion spent on research since Reagan launched his quest for a missile shield, the ability to achieve even the Clinton administration's limited goal remains unproved. To meet a deployment deadline of 2005 for the first stage of NMD, Clinton must make his decision to go ahead no later than early November, virtually assuring that missile defense will be an issue by Election Day. "Politics will greatly influence the administration's decision on missile defense, but it is not clear how the decision will influence politics," said Barry M. Blechman, president of Defense Forecasts, a Washington consulting firm.

Prominent Democrats and Republicans have urged Clinton not to rush a decision. Though many Republicans had insisted on a decision by this summer, the politics of the issue have changed. Senator Joseph Biden, a



Delaware Democrat on the Foreign Relations Committee, joined Republicans like Hagel and former Secretary of State Henry Kissinger in arguing that the decision be left for the next president. Building a missile defense against North Korea at the cost of a new nuclear arms race with Russia makes little sense, Biden cautioned.

Until now, DOD had projected the cost of building and operating a single site of 100 interceptors at \$25.6 billion through 2015. A new estimate by the nonpartisan Congressional Budget Office raises the projection of the first phase by nearly \$4 billion to \$29.5 billion. But when the CBO includes the cost of upgrading the first site and building and running a second site, the price would rise to \$48.8 billion. Add another \$10.6 billion to build and operate 24 low-orbit infrared satellites that would be able to discriminate between incoming warheads and decoys intended to confuse the system, and the total cost would be \$59.4 billion, according to CBO.

If Clinton approves of NMD this fall, the first stage could be completed by 2005. It would include an X-band

radar perched on the remote, wind-swept island of Shemya at the outer edge of the Aleutian chain to provide precise target tracking information for an interceptor, to help distinguish warheads from decoys, and to perform the kill assessment. At first, NMD would have 20 interceptors in underground silos at Fort Greely and Clear Air Station in Alaska. The plan also includes space-based sensors, five land-based upgraded early warning radars on the US perimeter, and a battle management center in Colorado. By the end of 2007, NMD would have 100 interceptors.

Sometime between 2010 and 2012, the second-phase architecture would be in place with another interceptor site, four more X-band radars, and a new constellation of space-based sensors to counter "a few tens of warheads with complex penetration aids" that might be launched aggressively by a renegade country or terrorist group or accidentally from a nuclear power.

As Clinton and Putin prepared for a summit conference in Moscow on 4 June, the *Bulletin of the Atomic Scientists* obtained a draft US document

proposing to amend the 1972 ABM treaty so that Russia would allow the NMD system to be deployed. In exchange, the details reveal, the US is prepared to negotiate a critical change in nuclear strategy. Russia would maintain its entire nuclear force under START II of about 3000 missiles on constant alert (to permit launch on warning) as a way of reducing Moscow's anxiety over weakening the nation's deterrent after NMD begins operating. The US system is designed to counter no more than a tiny fraction of Russia's force and, therefore, is incapable of threatening Russia's capability to survive a first strike and to respond with its arsenal.

"Deployment of NMD will make the US less secure, not more secure," said Kurt Gottfried of Cornell University and a member of the UCS-MIT study. If the US is telling Russia that retaining a large arsenal for the indefinite future is its hedge against NMD, then Washington cannot credibly argue that it is also taking steps toward the elimination of nuclear weapons."

IRWIN GOODWIN

## As Term Nears End, Clinton Names Dresselhaus to Strengthen Support for DOE Science Research

At the dawn of his presidency in 1801, Thomas Jefferson wrote: "There is nothing I am so anxious about as good nominations, conscious that the merit as well as the reputation of an administration depends as much on that as on its measures." Jefferson's standards were attained many times over the centuries and once again were met on 13 April when President Clinton nominated Mildred S. Dresselhaus, a prominent solid-state physicist at MIT, to serve as the next director of the Department of Energy's Office of Science.

The choice pleased but puzzled many scientists. Why would Dresselhaus, one of MIT's 12 active Institute Professors, agree to take a position in an administration that is in its last year? Even if Dresselhaus's nomination is quickly confirmed by the Senate, her appointment would run only seven months at most before she has to resign, no matter who became the next US president. By tradition, every government executive appointed by the president and confirmed by the Senate is required to submit a letter of resignation before any new administration takes

office. Of course, it's possible that if Vice President Al Gore is elected president, Dresselhaus may be asked to stay on, but it's highly unlikely that she would stay on if the White House changed political parties.

The last director of the science research office to test the tradition was President Bush's appointee, William Happer, the Princeton University physicist who held on for a few months into the Clinton administration before being sacked for daring to question

Gore's position on the potentially harmful effects of ozone depletion and greenhouse gases on the Earth's environment and human health (see *PHYSICS TODAY*, June 1993, page 89).

Happer was replaced by Martha Krebs, who held a PhD in theoretical physics, but had worked mainly in political or administrative positions connected with DOE. She had been staff director of the House subcommittee on energy development and applications and, then, associate director for planning and development at Lawrence Berkeley Laboratory, the first woman to hold such a high position in the DOE laboratory system (see *PHYSICS TODAY*, November 1999, page 53).

In November, a month before Krebs left, Energy Secretary Bill Richardson asked Dresselhaus to have breakfast with him in Boston. "I had no idea what he wanted to talk about," she recalled. "I thought it might be related to an article I just published in the journal *Science* on carbon nanotubes. But that didn't seem right." During breakfast, he told her she had been recommended for the DOE job by sev-



DRESSELHAUS: Science and music have been good to her.