

Some physicists speak out in favor of Star Wars research

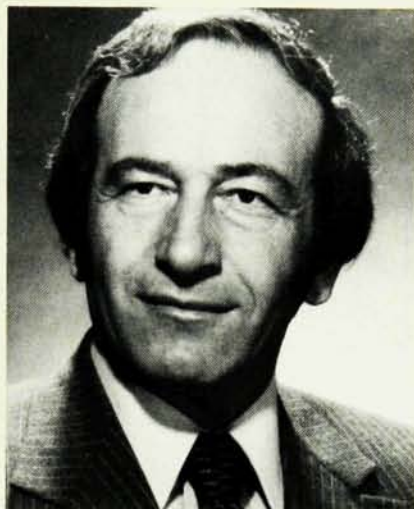
The physicists who wrote and are circulating petitions opposing Star Wars have sometimes made the claim that it is hard to find any physicist willing to defend the general concept of a leakproof missile-defense system. While the claim sounds implausible, the anti-SDI petitioners are not alone in advancing it. Physicist and science writer Jeremy Bernstein, reviewing William J. Broad's book *Star Warriors* in the *New York Times Book Review* recently claimed that Broad was "not able to find a single scientist" who would say that a leakproof nuclear umbrella could be built.

At another extreme, Lieutenant General James A. Abrahamson, the chief of the SDI program, has claimed that opposition to Star Wars among scientists is confined to "a few diehards." Roughly 2500 members of science faculties had signed petitions opposing Star Wars by the beginning of November, but Administration officials sometimes argue that the anti-SDI petitioners have no real involvement in SDI work and that their opposition is therefore shallow and irrelevant.

Whatever one may say, it was at least clear by the end of 1985 that some scientists were willing to speak up in favor of pursuing research vigorously within the framework of the SDI program.

Software issue. Last fall, when some computer scientists claimed that it would be intrinsically impossible to construct a workable data-processing system for missile defenses, Charles Seitz of Caltech, Solomon Buchsbaum of AT&T Bell Labs and Danny Cohen of the University of Southern California, among others, made strong public statements to the contrary.

In testimony to a Senate Armed Services subcommittee on 3 December, Buchsbaum said that a large system could compensate for errors. "The network as a whole is more reliable than its individual components," Buchsbaum said, alluding to experience with the telephone system. Buchsbaum is executive vice president, customer planning, at AT&T Bell Labs,



BUCHSBAUM

and is chairman of the White House Science Council. He also is on the SDI advisory committee and is a senior consultant to the Defense Science Board.

Buchsbaum does not claim that a perfectly leakproof missile-defense system can be built or that offensive missiles can be rendered "impotent and obsolete," as the President put it in his March 1983 speech. (Neither, for that matter, do SDI officials claim a leakproof defense can be had.) But Buchsbaum does think it will be possible to design a system that would be "reliable, robust and resilient." In his Senate testimony, Buchsbaum said he recognized that SDI "faces enormous challenges and problems which I do not minimize. However, a vision of the world in which the two superpowers have agreed to constrain their respective nuclear forces to levels much lower than today's and, at the same time, have also agreed to protect themselves and their allies against nuclear attack with defensive systems—a protective shield—of reasonable effectiveness is an attractive one."

On the specific question of whether one could build an error-free control system containing tens of millions of lines of software, Buchsbaum said that

"this is the wrong question." By compartmentalizing crucial functions and by building redundancy into the system, one could design a system that would be—like the telecommunications network—much more reliable than its components, Buchsbaum said.

Danny Cohen, a computer scientist who headed a 1985 panel that evaluated potential software for SDI, said at the same hearings: "There are those who claim they cannot produce adequate software. We agree that they cannot. There are experts who claim they can. We agree with them." Cohen argued that an adequate system could be designed by relying on autonomous redundant subsystems with different program codes.

Charles Seitz, a computer scientist who also served on the SDI software panel, told *PHYSICS TODAY* that he considers most scientific objections to Star Wars ill-founded. In particular, he thinks that most computer scientists do not agree with David Lorge Parnas of the University of Victoria in Victoria, British Columbia, who resigned from the software panel last summer, claiming that it would be impossible to design and build adequate software for a Star Wars system.

Seitz may be typical of many scientists who evaluate individual SDI components on their merits and who take a wait-and-see attitude toward missile-defense systems. He would not sign a petition either opposing or favoring Star Wars, he told *PHYSICS TODAY*, but he would sign a statement saying that adequate computer software could be designed for such a system.

Pro-SDI petition. To date, probably the strongest statement favoring Star Wars was adopted at an SDI seminar held in Washington on 9–10 November under the sponsorship of the Global Foundation. The statement was signed by several nonphysicists and the following physicists: Peter Auer (Cornell), R. V. Jones (University of Aberdeen, Scotland), Behram N. Kursunoglu (president and chairman of the board, Global Foundation Inc, and professor and director of the Center for Theoretic-

cal Studies at the University of Miami), Carlo Salvetti (University of Milan), S. Fred Singer (George Mason University), Joseph Weber (University of Maryland), Alvin M. Weinberg (Institute for Energy Analysis, Oak Ridge) and Eugene P. Wigner (Princeton). The statement read in part:

We accept the concept of a strategic defense against nuclear missiles. We, therefore, support research to establish the feasibility of such a strategic defense....

Defense, if sufficiently effective, could reduce the likelihood of a nuclear attack directed against strategic missiles and against cities and populations....

We find defense morally preferable to the current strategy of naked offensive confrontation....

The danger of the offensive standoff grows as increasing missile accuracy makes possible precise strikes against retaliatory forces, as nations other than the two superpowers acquire nuclear arms and as the possibility of an accidental launch increases. In our view, a successful defensive system could contribute greatly to nuclear stability.

The Global Foundation is based in Coral Gables, Florida, and is a nonprofit organization that describes itself as interested in global issues and frontier problems in science, such as the impact of physics on forefront medicine. Kunsunoglu says that the views expressed in the Star Wars statement do not necessarily reflect the opinions of the trustees of the Global Foundation.

—WILLIAM SWEET

OSA's Washington headquarters



OSA's headquarters building at 1816 Jefferson Place, NW, in Washington, D.C., is shown on the photo. The headquarters consists of the two adjoining townhouses at the center and center-left of the photograph. As of 20 January, the Optical Society of America will have taken over all the space in the building, which coincidentally is now fully paid for. OSA is occupying space previously used by the American Astronomical Society, which is moving to offices in the headquarters of the American Geophysical Union at 2000 Florida Avenue, NW, Washington, DC 20009. OSA will use its added space for expanded communications operations, including *Optics News* and public information services, and for technical activities, especially in education (PHYSICS TODAY, October 1985, page 104). The Astronomical Society's move to the AGU building will provide AAS with added office space and enable it coordinate more activities with AGU, which has many members with a strong interest in planetary science.

Spielberg funds search for ETs by Harvard-Smithsonian

A radio scanning antenna designed to search the universe for signs of extraterrestrial intelligence has come into operation at Harvard with funding from the filmmaker Steven Spielberg, whose movies include *E.T.* and *Close Encounters of the Third Kind*.

The idea for the scanner came from physicist Paul Horowitz and colleagues at Harvard, who thought of making a powerful computerized scanner out of a radio telescope that had been mothballed at the Harvard-Smithsonian Oak Ridge Observatory in Harvard, Massachusetts, a small town northwest of Boston.

Horowitz interested the Planetary Society in the idea three years ago, and around the same time, Carl Sagan—president of the Planetary Society—met with Steven Spielberg in Los Angeles. After Sagan briefed Spielberg on the search for extraterrestrial intelli-

gence, Sagan's wife, Ann Druyan, observed that significant things could be done in the field at very modest expense by current standards in science. Spielberg volunteered to contribute \$100 000, and Sagan realized that this was just about the amount needed to convert the Harvard-Smithsonian instrument into a megachannel scanner.

The radio scanner was dedicated this fall and is now fully operational. Horowitz says that it is capable of scanning 8.4 million channels simultaneously, which makes it the largest such observational system running. The basic idea of the instrument, Horowitz says, is to monitor a large enough number of channels that "you can't miss a transmission if the transmitter is sending a signal at a guessable frequency and in a guessable frame of reference."

The search for extraterrestrial intelligence at Harvard-Smithsonian is pre-

dictated on the notion that a transmitting civilization would try hard to make its signals noticeable and receivable. Horowitz's instrument scans the radio spectrum in the vicinity of selected prominent frequencies such as 1420 MHz, the 21-cm hyperfine emission line of hydrogen. To compensate for Doppler effects between the sender and the receiver, the instrument automatically corrects for the effects arising from Earth's spin and its orbit around the Sun. In addition, it corrects to two other rest frames that the transmitting civilization might choose: the galactic barycenter and the local frame in which the cosmic 3-K radiation is isotropic. Uncertainties in the velocities of these frames dictate a receiver bandwidth of at least 300 kHz; the new antenna achieves a width of 400 kHz at 0.05-Hz resolution.

Horowitz's instrument is called the