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## Interview: Gregory Canavan

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# SDI opponents' arguments contradict their own published reports

*Dr. Gregory Canavan of Los Alamos National Laboratory, New Mexico, was interviewed on Aug. 22 at the fifth scientific conference on nuclear war at Erice, Italy, by Ralf Schauerhammer of the Fusion Energy Foundation and Paolo Raimondi of EIR. (Cf. EIR's coverage of the conference itself, Vol. 12, No. 35, Sept. 6, 1985, pp. 40-41.)*

**FEF/EIR:** Recently, Hans Peter Dürr, one of the biggest opponents of the Strategic Defense Initiative program in Germany, wrote in the weekly *Der Spiegel* magazine what he considers to be the views of the supporters of the SDI. According to Dürr, SDI supporters are very stupid, because they want to move a large number of very heavy satellites into space, where they will only be easily destroyed by a potential offender using such simple means that it is the technical equivalent of throwing rocks.

You are, apparently, one of those "stupid" people who are in favor of the SDI. I would like to use the opportunity of this conference in Erice to ask you some questions. Why do you propose the SDI?

**Dr. Canavan:** First, I don't know Mr. Dürr and I am not familiar with the articles that he has written. I am, however, familiar with the arguments of the critics of strategic defense in the United States and I have been engaged in discussions with them ever since I participated in a study, called "The Defensive Technology Study," commissioned after the President's March 23, 1983 speech on strategic defense.

To my way of looking at it, the key issues associated with strategic defense fall into four main areas, of ascending order of difficulty both to understand and to quantify. The simplest level of discussion is the technical issue, the second is cost, the third is stability, and the fourth is morality.

The technical issue is the question: "Will it work?" The cost issue is: "Even if it works, is it affordable?" The third issue, stability, is: "Even if it works and is affordable, what would it imply for crisis stability, arms-race stability, or transitional stability, trying to move into a defensive world?" And then finally the issue of morality: "How would it change the morality of the strategic posture?"

Most of the debate in the United States has centered on the more mechanical issues—the first two issues, technical

feasibility and cost. It largely continues to center around them, although I believe that it is becoming increasingly clear to those who discussed the issues in the United States that these questions can be satisfactorily resolved in favor of strategic defense.

**FEF/EIR:** Can you explain to a European audience some facts about this debate, how it occurred? Who were the main opponents and proponents? What are the positions debated?

**Dr. Canavan:** There have been a large number of participants in the debate in the United States. The only participants who carried much weight on the first two issues, the technical feasibility and the cost issue, were groups called the Union of Concerned Scientists (UCS) and the Office of Technology Assessment (OTA).

About a year and a half ago, both of those groups produced reports very critical of strategic defense on a variety of issues, primarily, however, on technical feasibility and cost. The technical criticisms had to do with such things as the impossibility of scaling lasers to very high energy levels, the impossibility of producing particle beams of sufficiently high brightness, or the inability of communicating with the projectile systems to enable them to intercept successfully against fast-burn boosters.

There have been a number of discussions, debates, and correspondence back and forth, which were very lengthy and very intricate, but which have had the overall impact of satisfactorily answering the objections of the SDI opponents, to the point where they have shifted their arguments away from whether these concepts would work technically. If you listen to the chief spokesman for the Union of Concerned Scientists today, Dr. Hans Bethe, you will no longer see him arguing on the basis of simple physical arguments—such as the fact that the speed of light is finite or that the Earth is curved—that you can "prove" that strategic defense would not work. Now, he has shifted instead to the notion that perhaps the constellations of satellites would be so large as to be unattractive or cost too much.

**FEF/EIR:** Even there, some changes seem to be taking place in the assessments of these people.



*Dr. Hans Bethe: He no longer argues that the SDI won't work, but now merely maintains that it is too expensive.*

**Dr. Canavan:** There is a very interesting inconsistency which has developed in the discussions of these technical issues and cost issues. An example is the publication of a few months ago in the British science magazine *Nature*, of an article by Dr. Richard Garwin of IBM, who has been one of the prominent U.S. critics of strategic defense. In attempting to argue that strategic defense could be too complicated, Dr. Garwin actually demonstrated a number of factors which do not support his case.

Chief among them, I think, was that for the nominal conditions of performance goals of the Strategic Defense initiative within the U.S. Department of Defense—if one allows or assumes those performance parameters—that the constellation of defensive satellites required for strategic defense against a simultaneous launch of a very hardened, very advanced force of distributed missiles is not enormous. It is not in the hundreds of thousands. In Dr. Garwin's own calculations, the number of satellites required is under 80. . . .

A key issue in all of the argumentation over the last year on the extrapolations of the performance of the SDI to very hardened threats, had to do with how the constellation of defensive satellites scales with the number of missiles, or the way in which they burn out. The other report which I mentioned, the one by the Office of Technology Assessment, asserted flatly that the constellation size scales linearly to the threat.

It is amusing that Dr. Garwin's calculations scale in a

much more realistic way, roughly to the 0.6 power of the threat. This is much closer to the 0.5 or square root scaling that Los Alamos had produced in its initial comments on the OTA report at the time it came out last year. This is one of the inconsistencies that I was talking about, in which the critics of the SDI have now actually generally produced a large number of numerical results and estimates which support the favorable scaling of the SDI and contradict the statements of other critics of the SDI.

The most senior spokesman against the Strategic Defense Initiative in the United States is Dr. Hans Bethe. In reviewing a number of my reports over the last few months, he has now gone through calculations which corroborate the scaling that I had indicated as appropriate last year. Indeed, they show that had Dr. Bethe used a constellation altitude appropriate to the distributed threat of missiles, he would have gotten almost exactly the so-called square-root scaling that I put forward as appropriate for that case last year. The amusing thing is that now the principal spokesmen for the Union of Concerned Scientists have now produced results which broadly contradict those results which were defended by the Office of Technology Assessment of the U.S. Congress. These, amusingly enough, also contradict all the published reports of the Union of Concerned Scientists itself. . . .

**FEF/EIR:** Technological development will probably even improve the situation for defense. I was impressed by one of the presentations here in Erice, in which Dr. William Barletta from the Lawrence Livermore Laboratory explained how the free electron laser very rapidly developed from an exotic technology to one of the main candidates for the SDI. Is this a unique case, or can we expect more developments of this kind in the near term?

**Dr. Canavan:** I think that people are used now to the rapid pace of technology development. That some developments have caught people by surprise, is perhaps because not all this is discussed widely in the open literature. There have been some very impressive results.

There is a Lord Solly Zuckerman of Britain, who in a meeting a while back said to me that the thing that is wrong with strategic defense is that there is no new technology in it. As I was writing my letter to him after the meeting, I sat down and thought about the different technologies: lasers, particle beams, kinetic energy interceptors. I realized that all the technologies that we are talking about today—space chemical lasers, the ground-based lasers, the excimer and free electron lasers, the x-ray laser, neutral and charged particle beams and all of these non-nuclear-kill kinetic energy interceptors that are based on advanced sensors and computers—none of them had been really thought of at the time of the most recent debate on strategic defense in the United States, which was only 15 years ago. Everything that is subject to debate today has been invented in just the last 15 years.



NSIPS/Stuart Lewis

*Dr. Richard Garwin: His own research demonstrates that his conclusions are wrong.*

The free electron laser has made orders of magnitude of progress in just the last one or two years. The neutral particle beam, which is worked on at Los Alamos, has developed lately as a potential intercept platform and a discrimination platform, that is, a way of finding out which objects are real weapons and which are just balloons or surrogate targets, which has been a problem of classical difficulty. The most difficult problem in strategic defense has always been in eliminating non-serious targets, so that you do not waste your interceptors.

Tremendous strides have been made on discrimination with particle beams of impulse lasers. This also has happened in just the last two years. Since the "Defensive Technology Study," there are not only new technologies but also new insights on how to use these new technologies to solve traditional problems.

**FEF/EIR:** How does this technological progress reflect back to the economic effects of an SDI program?

**Dr. Canavan:** I think you have to break the economic effects down into two parts: the near-term and the long-term issues. The near term has to do with research; the long term with a possible deployment, which is being discussed, but is not now approved.

The near-term discussion over the SDI budget is very intense, but the amounts involved are not significant for a healthy economy. The budget of a few billion dollars a year

is large, but small compared to the defense budget of the United States, and does not have a direct, significant impact on the American economy. There is an indirect impact, and that is probably positive. Historically, the Department of Defense has been a very effective developer of technology, and it is to be anticipated that this would continue, and that the developments of new types of lasers, of particle generators, and, in particular, of computers, would have an enormous positive impact on the commercial economy.

As to the longer-term discussion about deployment, were it positive, we still do not have a major economic impact. If you take figures of the size that we have been talking about, even those estimated by the adversaries of strategic defense, you get numbers that appear to be only a few tens to hundreds of billions of dollars, which are figures less than, or at least comparative to, what would be spent over that period of a decade or so on alternative strategic concepts. I don't think that the dominant issue is economic, as long as reasonable cost goals for the strategic defensive concepts are met, as it now appears they could be.

**FEF/EIR:** There are several arguments brought up against the SDI, such as that it is immoral to build new weapons, or that one should not invest in new weapons while people are starving on Earth. Do you think that some of these arguments are valid?

**Dr. Canavan:** These are serious questions, but most of them are not unique to the SDI. They have to do with any sort of military expenditures, and there are always those who argue that no money should be spent on military technologies as long as there is hunger in the world. I would only point out that defense and freedom are also important values, as important in some ways as material wants. And the point I stress for Western democracies is that, even with their expenditures for defense, they have a much smaller proportion of material wants than do the totalitarian states from which they are attempting to protect themselves.

Sometimes these issues are amplified by connecting them with the issue of stability. There is a concern that there is not just a basic investment in testing and trying to deploy strategic defense, but that there is a possibility that we would get ourselves into an arms race, which would divert even further requirements from the unfortunate of our society. The numbers on the cost estimates we went through earlier, actually show the contrary. It has been pretty clearly explained by various spokesmen, perhaps most prominently by U.S. ambassador Paul Nitze, that if strategic defenses are cost-effective—that is, if it is more effective to develop defenses than to deploy further offenses—then one does not get into an offensive or defensive arms race. The net effect of the development and even the initial deployment of strategic defenses will be to give a positive incentive to both sides to reduce their offensive arms levels and, with them, their overall defense expenditures.

**FEF/EIR:** This sounds like a contradictory statement. Are you saying that the introduction of new weapons for strategic defense would reduce the number of weapons that will be deployed?

**Dr. Canavan:** It sounds contradictory, but let me back up a little and say a word to the seeming illogic of the offensive arms race. Over the last 40 years, we ourselves and the Soviet Union have observed that there is in fact a utility for strategic offensive weapons. And although it is hard to argue precisely what the utility of going ahead with the offensive arms race is, no one has ever had any difficulty perceiving the *disutility* of being behind in it.

And that generated, I would say, progressive pressure for upward levels of offensive arms. That is where we are today. The arms-control process has been unsuccessful, because of this positive upward incentive. If, on the other hand, you

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have an option of not really building more offensive systems, but building defensive systems, and if the defensive systems are less costly than the offensive systems which could offset them, then a rational economic decision is to build defensive systems.

As one starts to build defensive systems, there is also an unobvious, but real pressure to let down on offensive systems. After all, offensive systems are at that time less cost-effective even just to maintain. Therefore, one has an incentive to reduce those offensive systems. In particular, this is so if both sides are trying to build defensive systems.

If both sides have a defensive strategy, there is a positive incentive for both sides to reduce offensive weapons simply to minimize levels of defenses that are required for the defensive dominance. It sounds a little intricate, but the point is very simple. At the time it becomes cost-effective to switch from offensive systems to defensive systems, it also becomes

cost-effective to retire offensive systems, to maximize the impact of defense.

**FEF/EIR:** It is often stated that the American SDI program would automatically force the Soviet Union into aggressive opposition to defensive systems, force it to build even more missiles, and that there would be no way to go from the realm of Mutually Assured Destruction to that of Mutually Assured Survival. Is this true?

**Dr. Canavan:** In my experience, and I think in general experience, the Soviets are, despite their rhetoric, very logical in pursuing their arms programs. If defenses turn out to be more cost-effective than offenses, then, independent of their rhetoric, I think the Soviets will be inclined to build defenses.

The only situation in which they could be inclined to build further offensive rather than defensive systems would be one in which defensive systems were more expensive. This gives the definition for efficient defensive is being done on strategic defenses in the United States. Implicitly, part of that research is the exploration of what the costs of those defenses would be. In the United States, we have a very large Department of Defense, which spends most of its time in making decisions not to build things which are not cost-effective. If defenses turn out not to be cost-effective, I don't think they will ever seriously be proposed by the United States. Therefore the concern about the Soviets having a cost-ineffective defense to counter it is not a valid one.

**FEF/EIR:** In the meeting today, Dr. Edward Teller of the United States raised the question that the U.S. press has probably been more destructive to the SDI than the KGB, because of the massive disinformation that was funneled through the Western media on the matter of the SDI. What can you say to this?

**Dr. Canavan:** Dr. Teller is a very colorful fellow. He certainly has more experience with the American media than I have. One can try to guess what the motives of the press are. I don't have any particular insight into that.

The history of interaction has been that the critics of strategic defense have gotten along better with the press than the supporters and even neutral observers of the program. I do not attribute that to any particular bias of the press, although there are a lot of people who went through the previous ABM debate and who do have pre-formed opinions. My impression is that the critics received so much applause from the press because they very quickly organized, put out a series of reports, some by very senior scientists, with a number of very crisp arguments, like that strategic defense could not work because of the finite speed of light and because the Earth is curved. These were arguments that were simple, that were crisp, and that were *wrong*. But at that time, they seemed plausible and people could make good headlines of them.



NSIPS/Elisabeth Chambless

*The critics of the SDI in the press made the headlines, but the supporters of the program were right. Here, a rally for strategic defense in Los Angeles in 1983.*

The Department of Defense, because it is a big, slow-moving body, took a long, long time to put out a statement of its own. In addition, its arguments were not terribly direct and quotable. So the OTA report received headlines in the press, but I do not think that the DoD's rebuttal, which came out the following week, received coverage in papers outside of Washington, D.C.

Since the DoD process was fairly slow, some people who were interested, people like Dr. Teller or like myself, felt it necessary to get involved in some of the deliberations about defensive technologies, to think through technically what the arguments were and go out as private citizens or with laboratory publications and articles to try to argue these technical issues and put them to rest. . . .

**FEF/EIR:** Finally, I would also like to ask you what you think the SDI program means for Europe. There have been suspicions that the SDI might "decouple" Europe from the United States, by only shielding America and leaving Europe out.

**Dr. Canavan:** I think that not enough thought has been given to the impact of strategic defense on the theater. I personally had not given much thought to that, until a few months ago, when Dr. Fred Hoffmann, who had led the policy panel in response to the President's speech, asked me to address this particular issue. It was an issue which con-

cerned him: "What is the impact of strategic defense on the theater?" As I thought about it and worked through it, and wrote on the subject, I came to a s were quite unconventional a few months ago, but which are becoming now much more widely accepted. I have written a paper on this subject, and it will be published by, I believe, the European-American Institute this fall in a book. Let me say what the conclusions were:

If strategic defense concepts are evaluated in terms of their applications as a theater adjunct to global strategic defense, you see several things. If one would develop a strategic defense and also try to use some of these same technologies to better defend the theater, you see that the limited threat and the selective Soviet objectives in the theater provide an attractive framework for the application of the concepts. That is, there is a rational engagement that you can understand how to fight, which tends to make the concepts a bit better. In addition, surprisingly to me, almost all of the concepts—the lasers, the particle beams, the missiles—are directly applicable in the theater generally, with significant advantages in performance and survivability.

Let me amplify on this. The performance has to do with the fact that, in the theater, it is very much more difficult for ballistic missiles to develop effective decoys or surrogate targets. In the intercontinental engagement, the principal problem with the mid-course phase of the engagement is the presence of large numbers of decoys for each real warhead that you need to intercept.

In the theater, none of the missiles like the SS-21, SS-22, SS-23 ever gets above the atmosphere; therefore, they cannot deploy effective decoys. So their interception is a fairly straightforward thing, with the non-nuclear concepts that have been developed and evaluated for strategic defense.

On the survivability issue, the main thing is that, even in Europe, with non-nuclear concepts, it is possible to disperse many of the interceptors over wide areas; it is possible to move them at times, so that the adversary does not know where to look for them and where to take them out. Many of the mid-range concepts could, moreover, be based either airborne or remotely, out of the theater, in part on a submarine, if you will. Therefore, it is the survivability [of the anti-missile weapons], which is the dominant issue; the strategic engagement is of much less importance for the theater interaction.

The third point that hit me is that the impact of defensive systems for the theater on stability is generally favorable; in particular, if they are evaluated in concert with global defense. This is a point that is quite confusing for a lot of people. People have a concern that as strategic defenses are evaluated, the United States and the Soviet Union might withdraw behind their strategic umbrellas and leave the Europeans very much out in the cold. Because of fundamental technical factors, which have to do with the performance of the different concepts, in actual point of fact, that would not be the case.

The theater probably would tend to be protected *first*, more so than even the U.S. homeland. The point is that strategic defenses, particularly space-based strategic defenses, tend to be very sensitive to the rate of attack, the missiles per unit time. Since the number of missiles in the theater is much smaller, by perhaps an order of magnitude than what is faced in an intercontinental engagement, what that means is that a concept that was just barely sized to handle the intercontinental engagement, would be oversized by a factor of 10 to handle the theater. Or, said another way, a system that was very marginal to handle the intercontinental engagement would be more than adequate to suppress ballistic missiles in the theater. And therefore the strategic umbrella actually would appear to be developed first over the theater.

**FEF/EIR:** Aren't the reaction-times much shorter, and isn't the battle management much more difficult in Europe?

**Dr. Canavan:** No, the burn-times for the theater missiles are not dramatically shorter than the boost times for strategic missiles. The time high up in the atmosphere, in which they are accessible, is quite adequate for engagement. The battle management problem is made complicated in the strategic engagement because of the need to handle a large number of objects, but this problem is much simplified in the theater.

There is a small auxiliary point that I should make with respect to the theater, and that is that should some concepts such as space-based lasers be available, those lasers could fire very far down into the atmosphere.

ence of these lasers would not only suppress the delivery of nuclear weapons or conventional weapons by ballistic means, but they also could, given modest advances in the detection and the acquisition of air-breathing crafts, suppress cruise missiles and bombers before the delivery of either nuclear or non-nuclear ammunitions in the theater as well. So that is another bonus.

The fourth and final point is that it should not be overlooked that the deployment of global layered defense will have an unavoidable and beneficial impact on theater defenses. It must be evaluated whether theater defenses are to be deployed or not. That is to say that, even if strategic defenses were deployed, but there were no underlay of those defenses specified to the theater, the mere presence of that strategic overlay would have a profound impact on the way we would go about trying to defend Europe and the way the United States would try to perform its continuing role on the defense of Europe. It is extremely important to understand that interaction, whether or not strategic defenses are applied in the theater per se.

When you put all these things together, to me what that says is that there is tremendous importance in understanding better the application of strategic defense concepts to the theater; and in doing that evaluation I think there is no substitute for an involvement of the European allies in the SDI.

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## Documentation

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# Soviet strategic defense programs

*The following are excerpts from Soviet Strategic Defense Programs, released jointly by the Departments of Defense and State in October 1985. The booklet demonstrates that the Soviet Union is ahead of the United States in strategic defense programs.*

The Soviet emphasis on strategic defense is firmly grounded in Soviet military doctrine and strategy, which call for the following actions in the event of nuclear war:

- destruction and disruption of the West's nuclear-associated command, control, and communications;
- destruction or neutralization of as many of the West's nuclear weapons as possible on the ground or at sea before they could be launched;
- interception and destruction of surviving weapons—aircraft and missiles—before they reached their targets; and
- protection of the Party, the State, military forces, industrial infrastructure, and the essential working population against those weapons that survived attacks by Soviet offensive forces. . . .

Marshal V.D. Sokolovskiy, in *Military Strategy*—the basic Soviet strategic treatise, originally published in 1962—defined the aim of Soviet strategic defenses in this way: "They have the task of creating an invincible system for the defense of the entire country. . . . While, in the last war, it was sufficient to destroy 15-20 percent of the attacking air operation, now it is necessary to assure, essentially, 100 percent destruction of all attacking airplanes and missiles."

. . . The Krasnoyarsk radar is designed for ballistic missile detection and tracking, including ballistic missile early warning, and violates the 1972 ABM Treaty. It is not located within a 150-kilometer radius of the national capital (Moscow) as required of ABM radars, nor is it located on the periphery of the Soviet Union and pointed outward as required for early warning radars. It is 3,700 kilometers from Moscow and is situated some 750 kilometers from the nearest border—Mongolia. Moreover, it is oriented not toward that border, but across approximately 4,000 kilometers of Soviet territory to the northeast.

. . . The Soviets are also developing components of a new ABM system which apparently are designed to allow