

Star Wars: Is it technically feasible?

By Jim W. Lai

On the night of March 11, Prof. H.M. vanDriel of the University of Toronto gave a public lecture at the Duffy Amphitheatre on the "Star Wars" defence program and its technical feasibility. From his illustrated and sometimes technical discussion, he came to the conclusion that the Strategic Defence Initiative (SDI) is not feasible and that it will have "no friends, no funds, and no function." The arguments below follow excerpts from his talk.

A misconception that must be dispelled is that scientist can do anything given enough money. In real life, there are many physical limitations that must be faced when developing a space-based defence system.

Firstly, the earth is round and rotates on its axis. Defence systems, if launched from submarines or ground bases, will have to climb hundreds of kilometers before they can be used. Satellites will have to be placed thousands of kilometers up.

Secondly, x-rays, infrared light, and visible light are absorbed by the atmosphere. Consequently, lasers are effective only outside the atmosphere. All light beams spread; lasers become less and less effective with increasing distance. Lasers are also inefficient sources of energy. Typical laser efficiencies are only on the order of 1%.

Ideally, a "Star Wars" defence system must be able to provide rapid and reliable warning of attack and initiate an appropriate defence. It must rapidly distinguish between friendly and hostile missiles. It must be able to per-

form at a moment's notice and perform near perfection. It must be able to anticipate a deal with every conceivable problem as well as problems that even the designers can't conceive of. If the system breaks down and requires repair technicians to be sent up, the system will be vulnerable.

Such a system must be able to eliminate over 99% of the incoming missiles. If the system lets even 1% of the incoming warheads through, the launch of 10,000 warheads would result in 100 warheads striking targets. A handful of well-placed warheads could devastate a nation.

Finally, the system must be cheaper than and relatively invulnerable to any countermeasure taken. For example, if a multi-billion dollar laser system is easily destroyed by a space mine costing only millions — the technological equivalent of stone-throwing — the system would be very vulnerable.

There is a premium for being able to respond soon after a hostile missile launch, while they are still in the atmosphere or shortly afterward. During this boost phase, missile systems are large and fragile and make relatively easy targets while their exhaust flames are visible. Systems which begin to respond during later phases are much more complex to develop and deploy since the warheads will have separated from their boosters and no longer have telltale exhaust flames. In addition, thousands of decoys may be deployed in large numbers.

Of the systems currently being

considered for the crucial boost phase, the laser-based systems are the most promising. However, all proposed SDI systems, for all phases, present formidable technical obstacles.

Space-based lasers in low orbit, 1000 km above the earth, would have to be deployed in large numbers. Assuming it takes 3 seconds to accomplish and verify a missile kill and the boost phase lasts 30 minutes, a satellite can kill 60 ICBMs at most. If the Soviets were to launch 1400 multiple warhead ICBMs, at least 24 satellites must be constantly on station. Since the earth is 40,000 km around and such satellites would have an attack range of 1000 km, a give satellite would be on station at most 5% of the time. Thus, at least 480 satellites will be required. In the event of an attack, most of the satellites up to 95%, would not be useful.

If the system used satellites in geostationary orbit, thereby allowing satellites to "hover" over a target, the satellites would be about 40,000 km above the earth. At the distance, aiming at a missile only few meters wide would be difficult as aiming from Charlottetown to Vancouver at a moving pencil. X-ray lasers, which are far from being developed, might be capable of pumping enough energy to destroy ICBMs at such distances, but research indicates that focusing problems would be more severe for x-ray lasers than other types of lasers. A major drawback is that, being triggered by a small nuclear bomb, an x-ray laser could only be used once.

Simple countermeasures could greatly reduce the effectiveness of space-based defence systems, such as increasing the number of missiles launched, increasing the number of decoys released, or shortening the boost phase. The latter could greatly reduce the boost phase attack window, making lasers unreliable. In addition, the proposed defence systems would not protect against low-flying cruise missiles or submarine-launched ICBMs.

It is estimated that if a system were actually deployed, it might cost from 500 billion to one trillion dollars. If electrical power were used, the amount consumed would be equal to the output of three hundred 1000-megawatt power plants, about 60% of present U.S. capacity. The power stations alone would cost over 100 billion dollars to build.

It is interesting to note that the leading laser physicists are generally against the SDI program many of them actively protesting SDI.

When asked why, if SDI won't work, are the Soviets so concerned about SDI, Dr. vanDriel replied, "Maybe by complaining so heavily the Russians are encouraging the Americans to spend their money foolishly." He noted that there could also be benefits in spinoff technologies.

He further proposed that SDI may be a form of economic warfare. The Soviets cannot allow the Americans to get ahead, so they will have to spend billions to keep up. This concluded his discussion.

Although Dr. vanDriel clearly

showed that SDI is practically infeasible from a technical point of view and practically unaffordable from an economic point of view, he did not explain why the Americans are still willing to spend \$26 billion on SDI research over the next 5 years, or why the Soviets are so vehemently opposed to SDI research. It would appear that both governments are behaving senselessly. We should instead assume that both the American and Russian governments are clever and even insidious in this regard.

In my opinion, the intention of the American SDI research program is to develop laser technology in hopes of finding significant military and industrial applications. Using a defensive system with the name Strategic Defence Initiative as a cover, the U.S. government would like to disarm anti-nuclear activists while simultaneously developing laser technology to such an extent that the Soviets would have no chance of catching up.

The Russians are in a dilemma. If they spend a comparable amount of money to develop their laser technology, it will drain funds from other sectors of their economy, adversely affecting their standard of living. Knowing that the Americans will not halt SDI research, they turn to criticize SDI research so they can lay the blame for the failure of future arms talks totally on the Americans, thus scoring a propaganda victory as a peace-loving country.

In this manner, the power play between two superpowers will drag on.

Letter(s):

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I think Litton Industries is wrong, wrong, wrong. We as Islanders shouldn't allow such things to spoil our Island's peace and beauty.

Litton is unwelcome and unneeded here and is out it goes!

I have spent much thought on the matter and I think the Summer-side Airbase should go too. We must keep the Island weapon and nuclear free.

I say out goes the Airbase, out goes the Charlottetown Armory, and out goes the Veterans Department because they're part of it too. Then we can pave the way for world peace.

Let's hope these poor misguided pro-Litton lunatics don't build their plant here and ruin our international reputation.

— an Island way supporter

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