# FEF proposes two-stage missile defense

by Marsha Freeman

A first-generation anti-missile defense system capable of knocking down hostile ICBMs in mid-flight could be operational within five years, Fusion Energy Foundation physicist Dr. Steven Bardwell told a packed meeting room in the Sam Rayburn Senate Office building in Washington, D.C. on Nov. 18.

Bardwell told 65 congressional office representatives, the press, diplomats, and military personnel that the technology exists to deploy a system which would protect the United States from an accidental launching by one of the two superpowers, or a small-scale attack by a third country. This first stage of protection against nuclear-armed intercontinental ballistic missiles (ICBMs) would be a hybrid system partly based on Earth and partly in Earth orbit, which could destroy a small number of incoming ICBMs.

On Earth would be a large, high-energy laser system, with its power supply and supporting equipment. The beam produced by this sytem would be directed toward a series of orbiting mirrors which would concentrate and focus the beam of laser light and point it at the missile. This would provide continuous protection against the most likely kinds of nuclear attacks.

By the middle of the next decade, Bardwell reported, the United States could be protected from full-scale nuclear war by a totally orbiting, space-based system which would rely on advanced beam weapons, including short wavelength and x-ray lasers.

The advantage of the x-ray laser is that it relies for power, not on huge power supply systems, but on a small neutron bomb in the satellite which through an advanced nuclear reaction, turns x-rays and neutron energy into concentrated bursts of x-rays. X-ray lasers would be small and compact, making them defensible in space, as no large mirrors or power conversion systems are necessary.

With this kind of development program, scientific and technological resources of the military are directed toward defensive weapons, Bardwell told his audience. "This is the kind of arms race you want to have," Bardwell stated. You do not have to be concerned about "verification" since it is in the interest of all parties to build *as many* of these defensive systems as is possible, he said.

## Technical readiness

Dr. Bardwell, a plasma physicist and editor of *Fusion* magazine, described the strategic situation of the last 25 years as "inherently unstable" because since the intercontinental nuclear-tipped ballistic missile is an offensive weapon for which we have had no defense, "you can never make a mistake." Now, for the first time with the deployment of beam weapons there is the potential to put the initiative in the hands of the defense.

Due to important scientific and technological developments in the past 18 months to two years, Bardwell reported, we can talk realistically about these systems. "The technological arguments against beam weapons are based on outdated information and do not take into account developments in five critical areas," he said.

First, advances in sensing technology now provide the ability to discriminate real nuclear warheads as targets from background noise and decoys. Long-wave infrared sensors base detection on the heat-transfer properties of rockets due to weight which can discriminate real warheads from lighter decoys.

Second, advances in gyroscope and computing techniques allow for accuracy in pointing the beam and tracking the target which have not before existed. Some of this technology has been demonstrated already in high-precision civilian scientific astronomical satellites.

Third, advances in computer circuit integration and new algorithms in programming allow the rapid processing of data from the sensors which is necessary to make very rapid decisions. The in-coming missiles must be destroyed 5-10 minutes before they release their warheads, and while they are still in a boost phase.

Fourth, production of high-powered lasers, which will be the first generation of beam weapons, has been demonstrated. Megawatt-level laser beams have been produced and engineering problems are being solved.

Finally, the first generation of optical capabilities that would be required to focus and concentrate a laser beam over a distance of 1,000 to 2,000 miles can be fabricated. This will require Earth-orbiting mirrors that may be fifteen to thirty feet in diameter which are essentially perfect. Such mirrors, where the shape and curvature are computer controlled once the mirror is in space, benefit from the Space Telescope program managed by the civilian space agency, NASA.

"The cumulative impact of these developments," Bardwell stated, "is that it is possible in the next five years to prevent the accidental detonation of a missile or the detonation of a missile of a third party." In 12-15 years, the second and third generation systems, using advanced x-ray lasers, would provide complete protection against full-scale attack.

Such a system would be fully orbiting and finally would end 25 years of nuclear terror.