colleague" letter on 6 May under a two-line title:

Falsehood flies on falcon's wings
While truth shuffles along in wooden shoes!

The letter declares that "the report is egregiously flawed in some very important respects" and claims it is a "rather misleading piece of work." To support his assertion, Hyde attached an "SDI watch" column from the 22 May issue of *National Review*, based, according to Hyde, on a paper written by Gregory Canavan of Los Alamos. The article states that the study group's estimates for the electric power required to maintain DEW-equipped satellites in orbit are too high by a factor of 30. In fact, the difference between the report's estimate and Canavan's estimate is about a factor of 2—a reasonable disagreement because no detailed study of scaling SDI architecture has been done by anyone.

Protests. Other objections were raised on 19 May by Seitz, accompanied by Lowell Wood of Lawrence Livermore, during a combined briefing for a scattering of Republican members of the House of Representatives and the press. Seitz, who is chairman of SDI's scientific advisory committee in addition to his other affiliations, protested that the APS report "is not worthy of serious consideration" because it contains "numerous errors, inconsistencies and unrealistic assumptions"—"always in the direction of making . . . SDI seem farther from achievement of its objectives than it actually is."

Wood's qualms were of a different order. Though Wood based his technical comments on a 60-page paper written by Canavan, his discussion of the APS report often sounded like political polemic. He charged that some members of the study group and the review committee either opposed SDI or "expressed deep reservations in private" about the program. The APS report, Wood argued, is therefore not an objective examination of DEWs. He then attacked the APS Council's statement (see box, page 45) on early deployment, saying the group was passing judgment "on the basis of no technical studies or reviews done by it or under its auspices."

In a telephone interview, Canavan disavowed such remarks. "My paper is strictly a technical review of the APS report," he observed, "and it says very clearly that some of the calculations are wrong. The numerical errors have nothing to do with the personalities behind the report. There was no cabal. It's not even an issue of scaling or architecture. The fault is not in the panel's politics but in its math."

'Boo-boo.' One of the glaring errors Canavan caught is the inconsistency between the first conclusion and the full text. The conclusion says chemical lasers have attained power levels exceeding 200 kW with acceptable beam quality—a factor of 100 below the minimum requirements of an SDI system. In an early draft, it turns out, the APS study group had used the correct number for chemical lasers, only to have this altered by the SDI office during a classification review. Later in the review cycle, however, SDI officials relented and allowed the panel to write that chemical lasers had attained more than 1 MW. The Pentagon's about-face took place because in the meantime *Aviation Week* had printed the correct figure. The APS panel changed chapter 3 but failed to change conclusion 1 accordingly. "It was an editorial boo-boo," says an APS panelist. If the conclusion had been changed, it would have read, "greater than 1 MW and thus a factor of 20." Even so, notes Patel, the APS conclusion is correct in stating that chemical laser output will encounter problems in scaling to higher power levels, probably by two orders of magnitude.

In citing errors relating to laser lethality effects on ablative shielding used to harden ballistic missiles in their boost phase, Canavan argues that the study panel was in error by a factor of 160 in power performance. The trouble with Canavan's recalculations, Patel asserts, is that he specified excimer lasers as the kill mechanism where the report speaks of x-ray impulses. "This is a case where the report doesn't say explicitly x-ray fluence," says Patel. "We should have made sure the section was headed 'Structural damage from impulse loading by x rays.' Canavan caught us out here, but if he had read the report in sequence he would have known we were speaking of x rays."

Many of Canavan's other quarrels with the APS report—particularly those involving the length of time that a particle beam would take to penetrate a missile, the power needs of neutral particle beams and the number and wattage of orbiting nuclear reactors for peacetime "housekeeping" of an SDI system—depend largely on differing assumptions rather than on faulty physics. "My intention was not to discredit the report," says Canavan. "It was always to make it more accurate and complete. I think of myself as a reviewer."

Hearings. In Washington there are those who believe that Canavan's cavils as well as arguments against the APS report by the conservative Heritage Foundation will lead inevitably to hearings about DEWs on Capitol Hill. Indeed, editorials criticizing the report in the *National Review* and *The Wall Street Journal* are likely to hasten the hearings, especially while both houses of Congress are determined to cut SDI's budget request for fiscal 1988 by $2 billion or more.

In a letter to the *Journal*, Val Fitch of Princeton University, currently president of APS, writes that the committee members "performed a monumental service to the country. We of The American Physical Society believe that the report is as objective as humanly possible, that it will make an important contribution to the formulation of policy and that it will substantially raise the level of discussion."

—Irwin Goodwin

Washington Ins and Outs:

Space physicist replaces engineer at NASA

Lennard A. Fisk Jr, a space physicist and vice president for financial affairs at the University of New Hampshire, became NASA's associate director of space science and applications on 6 April. Fisk is highly regarded for his research on the Earth's magnetosphere. He had been a member of the National Research Council's Space Sciences Board, which has sometimes been at odds with NASA policies, especially since the Challenger space shuttle debacle sent planetary science and Solar System exploration off course. As chairman of the Space Science Working Group of the Association of American Universities, Fisk is considered politically savvy, possessing considerable credibility on Capitol Hill, which comes from his frequent testimony before Congress.

Fisk succeeds Burton I. Edelson, who had occupied the job since February 1982. Edelson's appointment had been greeted with hostility by scientists because he is an engineer, having spent 14 years with Comsat, where he was latterly senior vice president, and before that 20 years as a commissioned officer in the Navy. During his years at NASA, several new projects were started, only to be be placed on hold for lack of launching opportunities because the agency emphasized the space shuttle over expendable rockets. "In a period when space science is increasingly exciting, with wider horizons and expanding interactions with a larger scientific community, Burt found himself hoist by the petard of higher costs for more sophisticated projects and limits on our accessibility to space," says a friend of Edelson's at NASA. □