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LETTERS

Proposal to HEPAP

Faye Flam's article "Panel presents a vision for physics after the Supercollider" (News & Comment, 3 June, p. 1397) correctly describes the recommendation made by the subpanel of the High-Energy Physics Advisory Panel (HEPAP) that I chaired for the Department of Energy to join the large European collider project now that the Superconducting Super Collider (SSC) is dead. This would be an very important extension of the international collaborations that have characterized high-energy physics research in recent years. The United States would be participating in the actual construction of the accelerator as well as in building detectors and analyzing data.

Unfortunately, the article goes well beyond the recommendation of our report when it says that the report "puts top priority on participation in Europe's planned Large Hadron Collider (LHC) and research on a future international accelerator." What we emphasized strongly in the report is that a continuing strong and healthy U.S. high-energy physics program that is competitive with the world leaders must also support a strong university-based program in the United States that uses the marvelous accelerators that exist in this country and are currently being upgraded. What our report emphasizes is that there must be a balance among productive use of these facilities, support for university-based researchers to do good physics and train a next generation of the best young minds without which the field cannot flourish, pursuit of advanced acceleration techniques with which to open new frontiers at higher energies in the future, and significant participation in the European collider project, which will define the energy frontier when completed within the coming decade. It was this vital balance that our panel showed how to achieve within a realistic budget.

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Flam reports that "nearly all physicists agree that the next step after the LHC should be a long, straight linear collider." How could this be when less than a year ago nearly all physicists agreed that the next step after the LHC should be a 20 tetra-electon volts (TeV) proton collider? A proton collider uses known technology at known cost, whereas no one knows how to build an electron-positron collider of reasonable cost and of high enough energy to produce Higgs particles.

A previous 1990 subpanel chaired by Sidney Drell of HEPAP concluded that the LHC energy is about a factor of 3 too low "to elucidate [with confidence] the nature of electroweak symmetry breaking" (*1*). Now a new Drell subpanel not only endorses the LHC, but recommends a U.S. contribution to it of $400 million over 10 years! If $320 million of that $400 million were given to Fermilab instead, the Tevatron energy could be doubled and its luminosity increased to 10^{33} cm^{-2} s^{-1}. (*2*). With such an upgraded Tevatron at 4 TeV in the center of mass, more than 2000 top-quark events could be produced per day (*2*). This would make available the new realm of physics that could be done by such a t-factory. Also there would be some chance of finding clues to electroweak symmetry breaking: heavy Higgs particles of mass of about 300 gigaelectron volts decaying into two vector bosons could be seen (*2*). In addition, fixed target experiments could be done with a primary beam of twice the present energy. All this would be more exciting and more cost-effective than trying to fit in with the 1500 European physicists already planning to use the LHC, and it would reverse the present decline of American high-energy physics.

Such a Tevatron upgrade would be an ideal injector for a future 20-TeV ring that could do SSC physics at a fraction of the cost of the SSC. Fermilab would have antiproton beams almost as intense as proton beams, and there would be no need for two rings of magnets, as was necessary for the SSC. The number of magnets would be 1/3 that of the SSC. I would estimate a cost of $1 billion for the magnets and $200 million for the tunnel. Besides, the state of Illinois had pledged to cover tunnel costs in the Illinois site proposal for the SSC. This may sound like world hegemony, but it is not. The Tevatron is already a U.S. accelerator, and we are talking about upgrades, not about building a new high-energy physics laboratory from scratch at an unknown location. As is the usual practice, other countries would contribute to the new, large detectors and the experimental program in proportion to their participation.

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References

1. S. Drell, chairman, *Report of 1990 HEPAP Subpanel on SSC Physics* (U.S. Department of Energy, Washington, DC, 1990).
2. G. Jackson *et al.*, "Conceptual pre-design for a Tevatron upgrade to 2 TeV beams and luminosity $>10^{33}$" (Fermi National Accelerator Laboratory, Batavia, IL, 25 March 1994).

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BST and Milk Production

A. L. Rubin and M. Goodman (Letters, 13 May, p. 889) raise objections to the use of bovine somatotropin (BST) in milk production. They repeat the claim that use of BST, by accelerating milk flow, would increase mastitis (udder infections) and that this would lead to administering more antibiotics, which would get in the milk.

BST did not increase the incidence of mastitis in dairy cows in 15 full lactation trials of 914 cows in Europe and the United States and 70 short-term studies (*1*) in 2697 cows in eight countries. There are counter measures, including vaccination against *Escherichia coli* and sanitary postmilking treatments, that can reduce mastitis, which is costly (up to $378 per cow). As regards antibiotics, milk is routinely tested for antibiotic residues and is discarded if the levels are unsafe. This program has served consumers well. In addition, a Food and Drug Administration advisory committee has announced a program to monitor milk from cows, with and without BST, that are treated for mastitis. A National Institutes of Health panel concluded that BST "does not appear to affect appreciably the general health of dairy cows" (News & Comment, A. Gibbons, 14 Dec. 1990, p. 1506). Milk from BST-treated cows is safe for human consumption (*2*).

Rubin is concerned about BST increasing IGF-1 (insulin-like growth factor–1) in milk. IGF-1 is a protein-type hormone and is broken down by digestion. It has no oral activity in rats (*3*). The IGF-1 level in milk from BST-treated cows is within the range (a few parts per billion) found in human breast milk (*3*). The NIH panel commented that the levels in milk are less than those found in human saliva (News & Comment, A. Gibbons, 14 Dec. 1990, p. 1506). Prosser (*4*) notes that there is no evidence that increased IGF-1 levels in milk of BST-treated cows are unphysiological.

Both Rubin and Goodman fear an adverse economic effect of BST on small dairy farmers. However, such farmers consistently endeavor to increase milk yields by genetic selection of cows and by improved management (*5*). The two procedures increased milk production per cow by 6000 pounds in a New York state dairy herd program starting in 1958 (*5*). These farmers could use BST to increase milk yields or, alternatively, to produce the same amount of milk with fewer cows. Goodman says that "increasing milk production will only exacerbate the current oversupply." But underprivileged and malnourished children need more milk. The challenge is to provide for their need.

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References

1. T. C. White *et al.*, *J. Dairy Sci.*, in press.
2. W. H. Daughaday and D. M. Barbano, *J. Am. Med. Assoc.* **263**, 1003 (1990).
3. J. C. Juskevich and C. G. Guyer, *Science* **249**, 875 (1990).
4. C. G. Prosser, *Lancet* ii, 1201 (19 November 1988).
5. R. D. Smith and D. E. Baumann, *Anim. Health Nutr.* **3**, 20 (1988).

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Life-Sciences Peer Review at NASA

A much needed shift in science funding policy may be at hand, if the Office of Science and Technology Policy–Office of Management and Budget memorandum cited by Jeffrey Mervis in his 3 June article "Memo backs basic research with words, not cash" (News & Comment, p. 1395) results in increased pressure to peer review research conducted or supported by federal science agencies. This shift would be particularly hard on some intramural research programs, which in many cases waive peer review or undergo a less-than-rigorous version. However, a quote attributed to science adviser John Gibbons regarding the adequacy of peer review at the National Aeronautics and Space Administration (NASA) is not completely accurate.

While I cannot vouch for all NASA programs, NASA's life-science activities have received the benefits of peer review since 1965 under the auspices of the American Institute of Biological Sciences (AIBS). Since that time, AIBS has convened peer-review panels to provide NASA with assessments of the strengths and weaknesses of proposals received through their life-science extramural research programs. More recently, many NASA intramural life-science proposals have been brought into this reviewing process.

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