

relatively minor cost.

Further assessments of the biomedical possibilities of antiproton use would benefit from comparative evaluations by experts in other imaging and therapy techniques of the less widely known antiproton applications. It is not uncommon to hear those who have investigated antiproton applications express the belief that antiprotons can become the future's brightest choice for manifold biomedical purposes.

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10/92

The World Has Room for Two ϕ Factories

A news story in your July 1992 issue (page 54) discussed the report of the subpanel of DOE's High Energy Physics Advisory Panel that was charged with setting program priorities for high-energy physics. While it is clear that any Federally funded field requires an occasional priority review, it is also clear that such reviews can be very dangerous if they serve in place of, or pretend to be, peer reviews. The reason for this is that such panels do not have the time to analyze carefully any single project, let alone two dozen or more, as the HEPAP subpanel did. The panel's conclusions are also directly linked to the input it receives from the funding agency, and this can introduce a different bias into the study—that is, the agency may want to protect some projects.

Let me take the example of the proposed ϕ factory at the University of California at Los Angeles as a specific case. The subpanel simply commented that it didn't believe there was a reason for having two ϕ factories in the world. (The subpanel did not specifically reject the UCLA project.) In a previous peer review that lasted three days, chaired by Edward Temple, the reviewers, with full knowledge of the ϕ factory being built in Frascati, Italy, reached an opposite conclusion about the physics interest.

To my knowledge, the subpanel made no comparative review of the Frascati and UCLA ϕ factories. The proposed machine design and construction techniques are entirely different (UCLA would use a superconducting quasi-isochronous storage ring), and the UCLA group is emphasizing the search for *CPT* symmetry violations—for example, by looking for a tiny fractional mass difference between the K^0 and its antiparticle, on the order of 10^{-18} or 10^{-19} , which

is the ratio of typical quark masses to the Planck mass. This is, in my opinion, an extremely important scientific goal that might be carried out at more than one place on Earth! There was no comment by the subpanel on this scientific goal, possibly because it is unfashionable.

The UCLA project also involves US industry, national laboratories and international collaboration (Novosibirsk and Milan). There is no evidence from the subpanel report that this was appreciated or even considered.

The history of similar panels over the past 20 years or so shows a noticeable trend: Innovative projects proposed by nonestablishment groups normally have a difficult time. One notable example is the rejection of the proposal by Carlo Rubbia, Peter McIntyre and myself in 1976 to convert Fermilab into a $\bar{p}p$ collider to discover the W and Z bosons. A direct consequence of that rejection was the discovery of the W and Z at CERN in 1983—the last major discovery in particle physics. Other examples could be cited to indicate this trend. I seriously doubt that Ernest Lawrence could have gotten the cyclotron approved in similar circumstances.

We believe the HEPAP subpanel judged our project unfairly. However, since it was not a real peer review, the conclusions of the subpanel are apparently not subject to any questions or alternative viewpoints. This is a dangerous precedent for our or any field of science!

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7/92

A Physics Center Grows in Ukraine

It is with great interest that I follow *PHYSICS TODAY* reports on physics developments abroad, especially in the former Soviet Union. In this respect, the article "Soviet Science in Danger," by Evgenii L. Feinberg (May 1992, page 30), is of signal importance. Feinberg suggests that the best path to large-scale collaboration of scientists from the FSU with Western scientists will be through international research centers based at the leading research institutes of the FSU.

Already in the late fall of 1991, steps were taken in Ukraine to establish one such center. It is called the International Center of Physics and is based at the Bogoliubov Institute for Theoretical Physics in Kiev. The primary aims of the new center

closely parallel those envisioned by Feinberg. They are collaboration with other countries in programs of fundamental research; organization of advanced workshops, topical symposia and schools; sponsorship of a series of lectures by eminent physicists from Ukraine and from abroad; and assisting in the publication and dissemination of English translations of papers and monographs on some of the more significant physics research in Ukraine.

The first workshop held under the aegis of the newly established international center was on turbulence and nonlinear processes in plasma and took place in Kiev from 11 to 26 April 1992. It was attended by 40 participants from Ukraine, Sweden, France, Yugoslavia, Georgia and Russia. Three more international workshops were held in 1992: Current Problems in Quantum Field Theory, New Trends in Nuclear Physics, and Hadron Physics. An international congress of physics has been scheduled for 22–27 June 1993 at the center. The purpose of the congress will be to acquaint physicists from other countries with the outstanding work performed in Ukraine and to open avenues for future cooperation.

The center's advisory council has discussed the possibility of expanding the opportunity for foreign graduate students to pursue research leading to a PhD degree in physics in a very attractive program established in Kiev jointly by the University of Kiev and the Institute for Theoretical Physics.

The center will be supported financially by the Ukrainian Academy of Sciences, but for the foreseeable future this support will be in the form of the local, nonconvertible currency. Avenues for securing hard-currency support from Western foundations and other sources have been explored. Such support is particularly needed for participation in American and West European conferences and workshops, for journal subscriptions and books, and for electronic mail.

Members of the pool of physicists in Ukraine are ready and willing to join their Western and Japanese colleagues in collaborative efforts in fields not only of academic but also of industrial interest. One of the missions of the International Center of Physics in Kiev is to serve as a clearinghouse for such contacts. The center's address is International Center of Physics, Bogoliubov Institute for Theoretical Physics, 252130 Kiev, Ukraine; telephone: (044) 266-5362; fax: (044) 266-5998; e-mail: nmakovsky@glas.apc.org. or

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'Culling the Herd' of FSU Physicists

Having lived in the Soviet Union for more than a year, gotten married there, worked at scientific institutes in several of the republics and made an additional 14 visits there since 1977, I would like to offer some modest observations on the proposals to fund physics in the former Soviet Union.

The Soviet (now Russian) Academy of Sciences and its institutes are a model of how not to do physics. First, a truly enormous number of physicists are educated, based on quotas established with the input of the academy. The number of these scientists has no rational basis in terms of the technology of the country and greatly exceeds the number produced in the US and Japan combined. (It is akin to having a million physicists in Albania or the Cayman Islands.) To worsen the situation, most of these physicists are theoreticians, whose skills, while often considerable, have little if any immediate application to short-term economic or societal (for example, environmental) problems. Finally, to make the situation truly impossible, these physicists are isolated in research institutes where they have no direct access to universities and students or to industry and engineers. If a system were ever designed to minimize the usefulness of physicists to society, this is it!

The short-term solution to the FSU's physicist problem is to close the academy institutes (almost without exception) and to reassign the better physicists to work of more immediate use in newly created positions in universities and industry. Funding the continued existence of literally thousands of academy "think tanks" only exacerbates the situation. In the US and Japan most physicists earn their livings teaching students who are not physics majors or doing rather applied problems in industry; why should Russian physicists be more privileged than we are?

Also, there are other countries of the world, such as India, that have a fine tradition of mathematics and physics. Why are we not clamoring to support Indian physicists?

The long-term solution to the problem is that the FSU must drastically reduce the production of physicists to match the number of jobs in its new society. When wartime and postwar

Russia was extremely impoverished, it produced Lev Landau, both Lifshitz brothers, Aleksandr Prokhorov and a collection of other luminaries. It is not apparent that the grotesque overproduction from 1960 to 1990 has produced Russian physicists of the same quality. Perhaps "culling the herd" would be quite healthy for Russian science.

Russian physicists for years have led a privileged existence envied by all other citizens. (There was great complaint at the Institute of Spectroscopy in Troitsk when the new office building was completed, because afterward the theoreticians were actually required to come to work five days a week; previously they came in only on the day of the weekly seminar.) Of course the life of an academician is still amazing by Western standards, with private restaurants, private resort hotels, private hospitals and so on. Those days are almost over. Russian physicists will actually have to work like other Russian citizens. It is a kind of modest revolution. And very few Russian nonscientists are shedding any tears about it.

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8/92

Reconciling COBE Data with Relativity

There is one aspect of your news story on the recent COBE data (June 1992, page 17) that I find disturbing. The article states that the dipole anisotropy in the cosmic microwave background radiation is due to "the motion of Earth relative to a 'comoving observer'—one who rides along with the general expansion of the universe." This velocity of the Earth can actually be measured, the story says, and is found to be 370 km/sec.

We were all taught in undergraduate physics that the basis of both the special theory of relativity and the general theory of relativity is the "relativity principle," the fact that all reference frames are equivalent and that there is no experiment that can determine a preferred reference frame. What your news story seems to say is that at every point in space-time there is a preferred reference frame, namely that of the "comoving observer," and that one's velocity with regard to this preferred reference frame can be determined by simply measuring the anisotropy in the cosmic background radiation. Thus it would seem that measurement of this dipole anisotropy is in effect a modern-day Michelson-Morley experi-

ment, but this time with a positive result, and that the cosmic background radiation acts in effect like the stationary ether that Albert A. Michelson and Edward W. Morley failed to find. Thus it would also seem that while the special and general theories of relativity may be correct, the relativity principle, on which these theories are presumably based, is not. I would be grateful to any experts in cosmology or general relativity who could comment on this point.

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SSC: Too Much to Pay for Too Little Promise

How can the world's largest debtor nation, running a \$400 billion annual deficit, with millions out of work and a collapsing industrial base, afford the Superconducting Super Collider, an \$8.5 billion toy for high-energy physicists? The answer, of course, is that it can't, but an allegiance of "scientists," politicians and manufacturing companies seems to be in a position to push this project through Congress.

We have seen it before. What have recent NASA projects given us? The Hubble Space Telescope, built for the price of 50 to 100 world-class Earth-bound telescopes, needs about a billion more dollars. The space shuttle? How about the Galileo probe? Its antenna failure threatens to drain the resources of the entire deep-space network! Can big science point with pride to results from fusion research? After 30 years and Lord knows how many billions of dollars, there is no hint of commercial fusion prospects.

The products of scientific research that we use in our daily lives are the result of industrial research and small-scale university research, not big science. Our world has been immeasurably changed by the transistor, integrated circuit and laser, and now we await the fallout from high-temperature superconductivity. Is there a message here?

Are the "scientists" who mailed the letters to Congress supporting the SSC (see PHYSICS TODAY, August 1992, page 59) so out of touch with reality that they don't realize that the country is in a recession and we need to invest that money in a way that can benefit the country?

It's time that scientific research is targeted to benefit the people of the country, not to sate the intellectual curiosity of a few "scientists," the political ambitions of a few politi-