

that the least one should do is add "Bortolotti" to this name.

We would have never been able to get all these historical facts correctly while writing our paper on Berry's phase of the spinning particles without kind guidance from Emil Wolf, who pointed out that all the relevant references can be found in his book with Max Born, *Principles of Optics*.

## References

1. I. Bialynicki-Birula, Z. Bialynicka-Birula, *Phys. Rev. D* **32**, 2383 (1987).
2. E. Bortolotti, *Atti R. Accad. Naz. Lincei Rend. Cl. Sci. Fis. Mat. Nat.* **4**, 552 (1926).

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## Divert SSC Funds to Physics at NSF . . .

I have just finished reading the February issue, in which Roman Czujko, Daniel Kleppner and Stuart A. Rice (page 37) report on the APS Physics Planning Committee survey, which reveals a dismal state of funding for young physics faculty. A news story in the same issue (page 75) focuses on Leon Lederman's report "Science: The End of the Frontier?"

I find it ironic that Lederman should now be taking up the cudgels for the funding of small-scale university-based physics research and calling for a doubling of the NSF budget. He was, after all, one of the leading proponents of the SSC, which is swallowing up enormous sums of money that could otherwise be spent in accomplishing exactly the goals targeted in Lederman's report. In my opinion, the success in funding the SSC program is a major contributor to the current funding shortfall elsewhere.

For the life of me, I can't understand why anybody should be surprised by the present state of affairs. There is nothing new about it; it existed in 1988. In a letter to *PHYSICS TODAY* in July of that year (page 9) I stated, in part: "The advocates of the Superconducting Super Collider vehemently protest that it is not in competition with other branches of physics—that they are asking for 'new money.' I believe that this view of the situation is unrealistic in the present climate of massive budget deficits and the necessity to economize at every level of government. Any money provided for this project will be diverted away from government support of other science. *At the very*

*least, it will siphon off funds that could be used to provide desperately needed increased funding for eV physics"* (italics added).

In a letter to the fellows of the APS dated September 1989, President James A. Krumhansl pointed out that "the most sobering aspect of this erosion [of funding] is that it has progressed almost unnoticed in Congressional and executive actions. Indeed, many of our legislators believe that, by funding a few high-visibility projects, they are doing quite well by science."

The SSC appears to be budgeted at \$243 million in fiscal year 1991. I don't have the budget for the physics division of NSF in front of me, but in fiscal year 1990 it was about \$130 million. My solution to the critical problems addressed in the Physics Planning Committee survey and in Lederman's report is simple: Cancel the SSC program as currently constituted, and transfer the funds to the physics division of NSF, doubling its budget—with \$100 million left over to expand the rest of the activities funded by the Mathematical and Physical Sciences directorate. Then all of the problems addressed in both the survey and in Lederman's report will go away. Moreover, money spent in support of university-based small-grant science by and large will be in support of the science of what happens on Earth. As I pointed out in my 1988 letter, such research is infinitely more likely to produce the economic benefits that society has a right to expect in exchange for its support than the same amount spent on the SSC.

It is not that the nation is not spending enough money in support of science. It's just spending it foolishly.

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## . . . or Use Some to Tutor Taxpayers

The Department of Energy has recently announced an official price tag for the Superconducting Super Collider of  $\$8.249 \times 10^9$ . It may be argued that this unprecedented sum will be spent almost exclusively for the intellectual exaltation of a handful of people. How much more usefully and effectively could these dollars be spent if only the US government would also provide the means for "fanning out" the excitement that the SSC will engender in the knowledgeable few!

Consider what might be possible if only 0.1% of the cost of the SSC itself, which is to say,  $\$8.249 \times 10^6$ , were

invested in educating interested persons around the world in the physics the SSC will elucidate. With such funds, AIP or some one of its constituent societies could exploit video technology and the talents of motivated and gifted lecturers and teachers to create an archive of knowledge with which to broadcast to the greatest possible audience the state of contemporary particle physics. An off-line, supranational classroom could be thusly created, in which persons like me, who wouldn't know a Higgs boson from a huge bison, could participate in the great adventure our tax monies will be paying for.

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## Crediting Some Polymer Pioneers

Due to an oversight on our part, Harvey Scher, Michael F. Shlesinger and I neglected to acknowledge in our article on time-scale invariance in disordered materials (January, page 26) thanks owed to Donald G. LeGrand and William V. Olszewski of the General Electric Research and Development Center for their efforts in preparing the polarized-light samples of polycarbonate shown in the photographs on the January cover and in our figure 1. We also did not point out the central role LeGrand and Olszewski's work played in demonstrating the applicability of the Kohlrausch-Williams-Watts ("stretched exponential") decay function to mechanical relaxation and recovery in polycarbonate and (subsequently) in a wide variety of other engineering thermoplastic resins.

A surprising result of their small-strain research on high-molecular-weight polycarbonate was the discovery (or renewed appreciation) of the fact that all mechanical deformation below the glass transition  $T_g$  could recover as long as the polymer chains were not broken. It had in fact been known to experimentalists for many years that yielded and crazed polymer recovers upon heating above  $T_g$ , but many theorists (and rheologists) are surprised to hear that there is no true plastic flow in these *plastics*. The reason is that it is difficult for the chain entanglement network to reorganize in the glass state, so that while this network may distort, it retains an almost perfect memory of the original geometry frozen in at  $T_g$ .

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