that time reversal also must be violated if the product *CPT* is to remain invariant.

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9/92

More $ for Equipment, Less for Grad Students

I read and very much agreed with Stephen Sacks's letter (December 1991, page 103). It seems to me that university-based physics research is moving in a very unhealthy direction, because to advance, each professor has to produce additional PhDs—PhDs who will ultimately be clamoring for research support of their own. As Sacks points out, this is a very unstable situation.

I believe that the resources to fund university-based physics research should be allocated in a very different way. The amount for graduate student education should be cut, and the money saved should be spent for capital equipment as well as for the hiring of permanent technical, engineering and scientific staff at the university. Such a reallocation of resources might be accomplished by accrediting agencies and funding agencies such as NSF, as well as by a university itself.

I have heard many times about surveys predicting an imminent shortage of PhD physicists. However, in my 25 years as a scientist, I have never really seen this shortage materialize. In the medical profession, the highest obstacle is at the entrance to medical school. I strongly believe that if physicists were more like doctors in this respect, the profession, the individual physicists and the country would all benefit.

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1/92

A Brief for Brevity

I have been following the debate in PHYSICS TODAY about replacing traditional archival journals with electronic publishing and thereby avoiding involvement of referees and editors. Such a scheme would, I think, aggravate an already bad situation and lead very quickly to the death of useful scientific literature. All too often papers submitted for publication today have not had even proper proofreading. And the great majority of papers are now read and referenced by very few scientists besides the authors themselves. Who will have the courage to scan through all the mediocre (or worse) entries that would accumulate in an electronic system, in a vain attempt to locate the few gems?

Recently, however, I have been shaken from my own complacency by demands from some journals to reduce the size of all papers. As an author, I am confronted with higher charges for papers longer than an arbitrarily set length. As a referee, I am asked to advise other authors on how they could shorten their papers. Such requests are not at all easy to fulfill. It seems to me that we are experiencing a critical phenomenon soon to be followed by a phase transition. The question is what the new phase should be. (Electronic publishing? Not!)

One possible answer I have not seen seriously discussed is organizing a major change in the style of the papers themselves. My research has once again led me into a subject new to me, so I have recently spent some time reading original references from the physics literature of the 1930s, '40s and early '50s. I could not help but notice a startling difference between many of these older (and often famous) papers and virtually all the modern papers I see: They were short—only one or two pages! They go directly to the subject and the new results, without introductory or concluding discussion. This style is contrary to the one I learned in school: "Tell them what you are going to tell them. Tell them. Tell them what you told them." While I still think highly of the introduction–body–conclusion style, in general we can no longer afford to use it for all our papers. Perhaps if we worked harder at saying what we have to say well once, the other two times might not be necessary.

Why do we use this long-winded style when our forebears were able to present their results in a more concise format? Part of the problem arises, no doubt, from the far greater number of scientists working today and the diversity of their background and training. Also, the interdisciplinary nature of much modern research constrains authors to avoid the use of specialist jargon, whose purpose is to abbreviate discussion of commonly understood topics. Authors writing papers for journals like *Physical Review Letters* are forced to deal with the same constraint by the requirement that all papers appeal to a general (nonspecialist) audience. Thus both the subjects written about and, in some cases, the journals force papers to be longer.

My recommendation? Clarity without redundancy—or at least without so much redundancy. If an author is going to write just one paper on a given topic, then he or she should be allowed to write the clearest possible paper. That probably means using the introduction–body–conclusion style. However, if the author foresees a series of papers on the same subject, she or he should dispense with the "self-contained" criterion in most of the papers. I think this modest proposal could easily reduce the number of journal pages by a factor of two, and possibly more if everyone played by the same rules.

I am willing to try it if you are.

JAMES G. BERRYMAN
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6/92

Whitehead's Science–Religion Reference

Art Hobson (April 1992, page 120) asks for help in locating the exact reference for his quotation from Alfred North Whitehead, "When we consider what religion is for mankind, and what science is, it is no exaggeration to say that the future course of history depends upon the decision of this generation as to the relations between them." I suggest that Hobson look, for example, at Whitehead's *Science and the Modern World* (Mentor Books, 1954, page 180).

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7/92

Another Boltzmann Trip Translation

I read with interest the article "A German Professor's Trip to El Dorado," by Ludwig Boltzmann, abridged and translated by Bertram Schwarzschild (January 1992, page 44). I would like to point out that this article by Boltzmann was previously translated by Margaret Malt and appeared in *Annals of Nuclear Energy* **4**, 145 (1977).

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3/92