

might accept the shipment of scientific journals at reduced rates, but this piece of special pleading would, we suppose, be resisted because many other people may also feel that they merit special consideration.

We make the following proposal: that every scientific journal should be published in two forms simultaneously, in the present form and in microfiche (or microfilm). Any subscription to the journal would automatically consist of a subscription to one copy in each form. The microfiches could easily be sent by airmail letter-post (this would be much faster even than present airmail subscriptions, because letters receive very much higher priority than parcels or printed matter even when the latter are sent airmail) at a very low cost and if the conventionally bound journal took several months to arrive by sea it would not matter so much. The additional cost of making the microfiches centrally and in such numbers would be very small, and the problem of copyright would not be more acute than at present, since the microfiches would be sent only to people who receive the journal by subscription in the normal way.

We are aware that certain journals are already offered in both forms but with the subscriber having to make the choice between them. We believe that our proposal is superior and that the additional cost would be sufficiently small that the price of subscriptions need not be raised significantly.

Finally we feel that the proposal would also benefit science libraries with more favorable postal services, as they would need to keep the bound journals only for a year or two while keeping a complete record of the literature on microfiche.

ENRIQUE GRÜNBAUM
President

CLAUDIO GONZÁLEZ
Secretary

Sociedad Chilena de Física
Santiago, Chile

REPLY FOR AIP: The Institute is continuing to study and implement ways of speeding up the delivery of our scientific journals. In Europe, AIP journals and those we publish for our member societies are shipped by bulk airmail to Amsterdam and then mailed to individual subscribers. We are presently exploring the feasibility of this approach for Japan. However, in many areas of the world such as South America, Africa and the Middle East the number of subscribers is not large enough to make bulk airmail shipment an economical solution.

We are also investigating microform

publishing including microfiche. The microfiche edition of a given journal can be produced simultaneously with the printed copy and then sent by airmail to subscribers desiring this type of fast service. Some subscribers may want to have both the conventionally bound journal and its microfiche edition. However, the additional cost for this "dual service" would probably result in most subscribers ordering only one or the other.

The microfiche technique presents some other interesting possibilities for the developing nations of the world. One approach involves the production of user-oriented packages of microfiche containing papers taken from a variety of journals covering the various disciplines of physics. The papers selected for these microfiche-user journals would reflect the special needs and interests of users in a particular country or geographical area. Additionally, abstracts of other papers could be added. This microfiche package would be produced on a regular basis, say every two weeks. Arrangements could be made to provide requested individual copies of papers from the abstract section for a nominal charge.

However, there is one major drawback. Microfiche subscribers must either own a microfiche reader or at least have easy access to one. At the present time available microfiche readers tend to be bulky and comparatively high priced. Several book-size microfiche readers, now in the development stage, are expected to be on the market by the middle of next year. The lower price of these units, in the range of \$50 to \$125, coupled with their compact size, promises to make microfiche journal editions more attractive to individual subscribers. We are following this development closely and will be ready to meet the expected demand for microfiche editions in the US and overseas when a compact, low-cost, high-performance microfiche reader becomes available.

R. H. MARKS
Associate Director for Publishing
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Tachyons revisited

I have read with great interest Olexa-Myron Bilaniuk's and George Sudarshan's article on "Particles Beyond the Light Barrier" (May 1969, page 43). I found it enlightening and instructive, and I admire the clarity of their presentation.

However, I wonder whether the names that were assigned to the particles they were discussing are the best that could be chosen. The term *tachyon* for a particle whose velocity is

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greater than that of light is satisfactory, but to me it seems unfortunate to go to a Latin root for its slower-than-light counterpart, particularly when a simple Greek term is available; why not call it a *bradyon*? But then the question arises what name to give the lightlike particles, because the obvious *photon* has already been preempted. I have asked several interested colleagues, who have suggested *aiglon*, *lampon*, *phaidron*, *phaeton*. My own suggestion would be *phaon*, from Greek *phaos*; Greek *phos*, from which *photon* is derived, is a variant of *phaos*.

Maybe now that *tardyon* and *luxon* have appeared in print, it is too late to change them, but I think that in all such groups of words it is nicer if they are based on roots from the same classical language.

JOSEPH D. ELDER
Harvard University Press
Cambridge, Mass.

As a word lover and editor I express my gratitude to A. C. L. Barnard and E. A. Sallin for their letter (October 1969, page 9) and for their having found the appropriate coinage for the antonym of "tachyon." The one that appeared earlier, I feel, is inappropriate.

I have a quarrel with a side issue, however. The fertile brain of Murray Gell-Mann has produced many delightful turns of speech as well as much outstanding physics, but he does not deserve credit for the totalitarian principle ("anything not forbidden is compulsory") that Barnard and Sallin ascribe to him. That is the work of T. H. White. In the *Sword and the Stone*, part 1 of *The Once and Future King*, Wart, the boy who will later be King Arthur, is being educated by Merlin by being transformed into various animals. One of his experiences is as an ant, and he finds that the ant hill is run on the totalitarian principle quoted.

GEORGE L. TRIGG
Editor,
Physical Review Letters

THE AUTHORS COMMENT: Totalitarian Principle: We appreciate George L. Trigg's reference to the fact that T. H. White's ant hill had been functioning under the totalitarian principle since 1939. Rereading *The Sword in the Stone* was a delight. However, we were dismayed that the deeply significant ant-hill episode was expurgated from the "complete and unabridged" Dell paperback issue of the volume. We found it only in the original G. P. Putnam's Sons edition. It may be of interest to add that T. H. White made another point that vividly exemplifies one of the important concerns of superlumi-

nal physics: his Merlyn was operating by advanced causality, because he "was born at the wrong end of time and had to live his life backwards."

Tardus versus bradys: We have turned to Latin for a term to denote lightlike particles for the reason pointed out by Joseph D. Elder: the obvious *photon* has been preempted by the electromagnetic quantum, and in *luxon* we found a natural and evocative alternative. It was also for reasons of evocativeness—and because of a tinge of a humorous connotation in several European languages—that we opted for the Latin *tardus* (slow), instead of the Greek *bradys*, as a root for the term to denote subluminal particles. Because this term is derived from the Latin *tardus*, rather than from the English *tardy*, the proper way to spell the generic name of slower-than-light particles is *tardon* (instead of *tardyon*). The spelling *tardon* has now been adopted by *Physical Review Letters* (24, 1245, 1 June 1970). We share the concern of Trigg and Elder for etymological consistency of scientific terminology, but we feel that Latin is an acceptable source of new terms.

Causal cycle: In a letter to PHYSICS TODAY (May 1970, page 19) Roger G. Newton has drawn the attention of readers to his recent article in *Science* (167, 1569, 20 March 1970). In that article we found a cogent and highly readable review of our work (*Am. J. Phys.* 30, 718, 1962; PHYSICS TODAY, May 1969, page 43), and a variation on the theme of causality. Even though he expresses concern that the finding and meaningful identification of tachyons may threaten the validity of relativity theory or quantum mechanics, we found nothing in that article to invalidate Newton's own statement made in *The Physical Review* (162, 1274, 1967):

"Hence he (observer signalling with tachyons) is forced to the conclusion that in this experiment the effect preceded the cause. My purpose of pointing out this consequence of the existence of tachyons is not to argue that their existence is either impossible or logically contradictory. Nor would their existence destroy causality. It would simply produce occasions on which the temporal order of cause and effect is reversed."

It is this statement that we interpreted as implying a positivistic "So what?" attitude towards causal cycles. As we pointed out earlier (PHYSICS TODAY, December 1969, page 47), we do not believe that tachyons would produce occasions of cause-effect reversal, inasmuch as tachyonic causal cycles appear to be thwarted by cosmological boundary conditions. Obviously, Newton must

agree with our solution because he does not take issue with it. But then his conclusion that "relativity theory or basic rules of quantum mechanics would have to go by the board" if tachyons were found, appears to be unwarranted.

O. M. BILANIUK
Swarthmore College
E. C. G. SUDARSHAN
University of Texas at Austin

Physical Review delay

Hugh C. Wolfe recently told us (August 1969, page 15) that the time lag from publication of an issue of *The Physical Review* to receipt by subscribers was about to be reduced to around seven weeks from its then current length of three months. From where I'm sitting now, the time lag is precisely five months.

Coupled with the enormous cost of publishing in and subscribing to *The Physical Review*, these ever-increasing delays are making many physicists seriously consider both sending their papers elsewhere as first choice, and cancelling their individual subscriptions. The way things are going, what should be the most prestigious and widely read journal of current physics research stands every chance of degenerating into a formal storage place for long-out-of-date works.

As part of a remedy, I would like to suggest (even at personal cost!) that editorial and refereeing standards be brutally raised, that the "Comments and Addenda" section be done away with (both these to weed out pages of trivia), and that modern methods of printing and distribution be uniformly introduced. How about it, AIP?

R. C. JOHNSON
University of Durham, UK

REPLY FOR AIP: The lateness problem with *The Physical Review* did indeed get worse before getting better. PR-A has been almost one month late for several months but the June issue was mailed on 15 June. PR-B built up backlogs at the printer and is currently two months late. All issues through that of 15 June are now scheduled to be mailed by about the middle of July. PR-C for June was mailed on 3 June. PR-D is latest of all. The two March issues were mailed by the end of June. April and May issues have been composed parallel, using two printers, and the printers promise to have all issues through that of 15 June mailed by the end of July. We have not solved all the problems with our printers but things now look better.

HUGH C. WOLFE
Director,
Publications Division
American Institute of Physics □