Letters

What About Physics?

The symposium papers in the January issue of *Physics Today* deal with the role of the physicist in a number of industries. When considered together with other similar articles they represent a widespread desire for more physicists to direct their efforts toward a multitude of related fields. In view, however, of the small number of physicists in this country (the first article in the same issue indicates that there are less than 20 000), these papers raise a question of paramount importance to physics and, ultimately, to these other fields as well, "What about physics?" That is to say, if physicists shift into the many neighboring fields in response to the demands from these fields, who will be left to do physics?

In addition to the seven industries represented in the symposium papers—missiles and satellites, communications, high polymers, petroleum, automotive, materials, and optics—it is easy to name a number of other fields to which physicists can make worthwhile contributions—chemistry, biophysics, computers, nuclear reactors, etc. It is equally easy to find representatives of each of these fields who believe that more physicists should join them. Add to all these the increasing managerial responsibilities of physicists and we see already a dozen distinct directions in which physicists may be drawn away from the central problems of physics. Furthermore, all will agree that the overriding need for educating our students will require a substantial amount of physicists' time. This must certainly be considered as among the central activities of physicists. In fact, the only long-term answer to the needs of these areas of application is expanded physics training for people in these other fields.

There can be no doubt that physicists are proud of most of the applications which accrue from their science. It is this very feeling to which are directed the many appeals for diversion from physics. Such appeals, based generally upon patriotic or economic grounds, sometimes become so insistent that the physicist must virtually apologize for simply remaining in his field. This sort of harassment will not be beneficial to the relations between physics and its fields of application.

It will be clear to physicists that the point of these remarks is not to judge the relative merits of physics and its various applications. Neither is it the point to draw a line between physics and its applications. What we must do, however, is recognize the myriad forces at work and their possible consequences. In the technical parlance we might say a physicist, whether in industry or university, occupies a position of unstable equilibrium from which attractive forces extend in many directions. Surely, the population of such a state will decrease as the strength and number of such forces increase.

Finally, it should be said that these problems are recognized by some in industry. The symposium paper by A. H. White is clear evidence of this. To the many others from whom the diversionary forces come, however, we should warn, "In the scramble to pick the fruit, beware you do not trample the vine."

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Not Nuclear, Thick!

There has arisen in cosmic ray physics a custom of calling photographic emulsions used in this work "nuclear emulsions". This terminology is unfortunate because various international customs officers confuse the word "nuclear" with nuclear materials which are generally forbidden entrance except when licensed. Indeed the word is a misnomer anyway for the emulsions are often used to detect other entities than nuclei. Many persons attempting to import or export these emulsions have had trouble because of this terminology.

I would therefore urge the cosmic ray fraternity to originate and use any other appropriate adjective to describe the emulsions. Many other words would be properly descriptive, such as "extra thick", or "extra sensitive", or even simply "thick". The words to be avoided are "nuclear" and "radiation" both of which carry unfortunate implications.

I am also writing to the manufacturers of some of these emulsions in the hopes that their advertising or packaging departments may be able to originate some appropriate procedure.

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Superconductivity

The article reporting the conference on superconductivity at Cambridge, England [*Physics Today*, November 1959, p. 26] has given an unfortunate impression of my remarks at that meeting about the Bell Laboratories work on magnetic impurities in superconductors. There is no question that a number of samples of whose chemical composition and character there can be no doubt (a) exhibit a ferromagnetic Curie point and (b) have a lower superconducting transition, below which the ferromagnetic remanence remains but the susceptibility is that of a pure superconductor. Such a phenomenon certainly has startled me and other theorists, and leads to grave difficulties even in the London phenomenological theory, not to mention all later theories, which have as their goal the explanation of London's equations. This and other examples of the association of magnetism and superconductivity are of great value in keeping our minds free of the illusion, which Lynton mentions, that "all basic mechanisms are understood".

My doubts referred to the exact interpretation of these experiments. Alloy systems or impure metals often show an incomplete Meissner effect—i.e., up to 100% of an externally applied flux may be "trapped" in the sample—a phenomenon so far always assumed to be due to a small number of normal regions caught in the sample. Trapped flux cannot easily be distinguished experimentally from a ferromagnetic remanence, so it is very hard to distinguish whether superconductivity and ferromagnetism actually occur together on an atomic scale, or only in the same sample. The straightforward interpretation of the experiments certainly leads to the former conclusion, one's prejudice in favor of London's equations to the latter.