

Report from Czechoslovakia

I have read your news story in the January issue (page 119), which reported that APS has decided to take a stand in the case of our colleague B. Levich.

This decision is only natural and merits appreciation, since the international community of scientists has a moral obligation to react on occasions that concern the very basis of science, its morals as well as ethics, wherever they occur in the world.

The Universal Declaration of Human Rights considers as one of the fundamental ones the right of men to move freely. No legal or other persecution as a result of such a decision can be justified. Consequently the concern of APS is correct and should be welcomed.

I wish, however, to add another aspect to your report. Levich's case has provoked a great deal of sympathy because he is internationally renowned. But his is only part of a much wider problem.

The loss of employment and possibility of scientific activity happens to many in other countries as well. The world community of physicists (and scientists in general) must take a stand also in these other cases, which have not yet become internationally as well known.

I should like to say a few words about my native country, where I am living—Czechoslovakia. In the last two or three years a considerable number of scientists have lost their employment in research institutions and universities. Those men, of whom every one has made some more or less important contribution in his field, are now frequently forced to earn their bread working far from their field of knowledge and interest.

As for myself, since the early 1960's I was for a period of almost 10 years head of the Department of Theoretical Nuclear Physics in the Nuclear Research Institute, Czechoslovak Academy of Sciences, Rez, near Prague. In the course of 1970–1972 three members of the department (including myself) have been forced to leave the institute due to purely political reasons. From among the three of us only one has been able to find employment in his field. Three other members, who happened to be abroad at the critical time, decided not to return home afraid that



they would experience the same fate. At least one other member of my former department is very uncertain of his future.

Hence about 40% of the scientific staff of my former department is suffering only because they made use of the natural right of every citizen to express their views.

Somewhat "more favorable" is the situation in the whole institute: At least 20 scientists have lost their jobs due to the same reasons. Their scientific and professional futures are for the most part uncertain.

I devoted most of this letter to my former institute and department only because I am in possession of incontrovertible proof of these facts. I want to be sure not to collide with the very wide and subjective interpretation of paragraph 112 of the Czechoslovak Penal code, according to which a Czechoslovak citizen who causes damage to the interest of the republic by spreading abroad unfounded information about the conditions in the country "will be punished with prison up to three years."

The fate of my colleagues is especially tragic in that their scientific careers have been interrupted at the time of their highest scientific activity, without as yet having reached renown and

recognition. Their fate therefore remains unfortunately without the international response that could eventually moderate or solve their situation.

The problems here mentioned have their moral and ethical aspects as well. In our days, when science is becoming a globally important factor, breaching national borders and ideological frontiers, these facts of which I write are objectively causing impoverishment of the intellectual and material potential of mankind.

F. JANOUCH

Prague, Czechoslovakia

Professional responsibility

Judging from the sample of letters published in your November issue (page 42) it appears that the APS Amendment on Professional Responsibility will be voted down by the membership. One should ask why. It is not the humanitarian aim of the amendment—"to contribute to the enhancement of the quality of life for all people"—that members object to, it is the means indicated to achieve that goal—"The APS shall shun those activities which are judged to contribute harmfully to the welfare of mankind."

One writer after another moans that it is impossible to make this judgment. Nonsense. Physicists have always had to improvise new mechanisms, make new measurements and exercise new kinds of judgment in order to advance their understanding of the world around them. Making a judgment doesn't mean that you have to be 100% right, it means that you are exercising your rational faculties to the best of your ability; it means that you are a human being, alive, and distinct from a computing machine.

I believe that so many APS members oppose the amendment not because it is difficult for them to see how it could be implemented but rather because it is easy for them to see what that implementation would imply. The major issues up for judgment are well known: physics has put weapons of mass destruction into the hands of military powers, physics has put instruments of mass exploitation into the hands of industrial powers, physics has put systems of mass control into the hands of centralized governmental powers.

R A N D O M

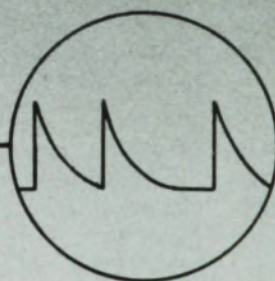
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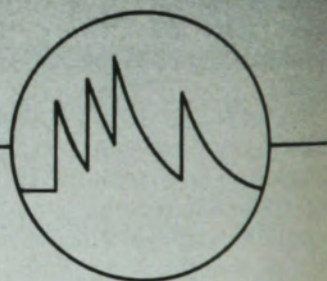
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letters

These powerful agencies are the ones responsible for the harmful uses of science; they are also the main sources of financial support for science. If physicists were seriously to shun the harmful avenues of scientific work, they would assuredly incur severe economic hardship for themselves. I do not expect physicists to volunteer for martyrdom; but I do think that the truth in this situation should be openly acknowledged.

Thus, the APS membership may be expected to vote down the proposed amendment because the majority is fundamentally dedicated to "the enhancement of the quality of life" for themselves first, and concern for "the welfare of mankind" is secondary.

CHARLES SCHWARTZ
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Superconducting progress

The curve below provides an amusing perspective on current efforts to find superconducting materials with higher critical temperatures. A survey of researchers would probably yield the opinion that this progress is rapidly saturating. In point of fact, however, the accompanying curve suggests that the progress made since the discovery of superconductivity has been more or less constant. This is a curve of the maximum known critical temperature plotted throughout the years since the discovery of superconductivity. Data were obtained by starting with the most recent data point and working backwards using references in the cor-

responding article. There is some "fuzziness" in the curve around the early 1940's when data were slow in coming out of Germany, where some of the research was being done.

Notice that the recent materials are becoming increasingly more sophisticated, indicating that it is perhaps becoming more difficult to discover them. Although linear extrapolations are always dangerous the curve suggests 2140 and 2840 AD as dates for achieving superconductivity at 77 and 300 K, respectively.

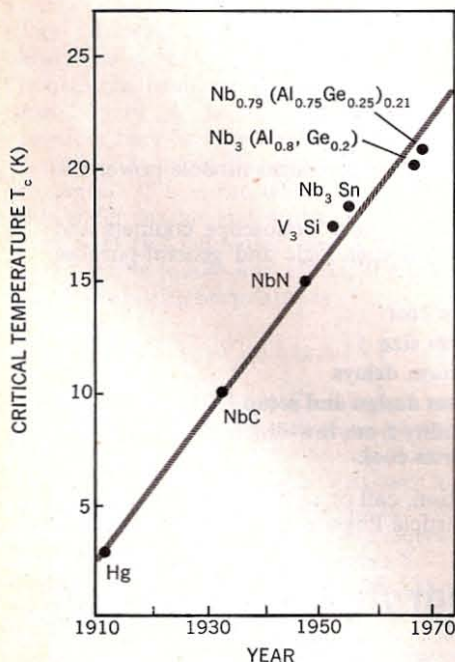
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Large-volume problem

Clarence Zener's article "Solar Sea Power" (January, page 48) was interesting both in what it said and in what was omitted. It is quite likely that most physicists have at one time or another considered the vast amount of energy stored in the thermal gradients that exist in the oceans or in other geophysical systems. One always concludes, as Zener illustrates, that the potentially available energy is sufficient to satisfy the most inflated estimate of our power needs. Even at the low conversion efficiencies that result from small temperature differences, the total amount of power that may be extracted is huge.

The major problem that arises when one contemplates extraction of power from a source such as the ocean's thermal gradient is not in designing an engine to operate across small temperature differences, but rather in finding some way to make thermal contact with the required enormous volume of each thermal reservoir. This is very important, because the volume density of available power is small; it is the tremendous volume of the ocean that results in the great size of this resource. Hence, one is forced to gather water from many square miles of ocean surface, and the generator's effluent must similarly be distributed over many square miles of ocean area. This input/output process must be accomplished in such a way that the effluent does not return to the intake before it has been heated sufficiently by solar radiation.

Unless the generator is situated in a natural current, it is difficult to see how the efflux will be sufficiently isolated from the intake. Putting it another way, it would appear as if a natural, strong current is needed to bring the required volume of water into thermal contact with the generator. The artist's impression on page 49 shows a vertical structure that may not utilize an ocean volume much greater than the cube of its length (or an order of magnitude larger) unless some undis-



Progress in attaining higher maximum critical temperatures since the discovery of superconductivity.

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11