

LETTERS

Ge(Li) beans

SOMETHING TO CHEW ON.

How many take PSSC?

I am writing about the article on the PSSC course, by Uri Haber-Schaim, in the March *PHYSICS TODAY*. Haber-Schaim states that the "PSSC course in physics is used in its entirety by more than half the high-school students taking physics in the United States." Perhaps his enthusiasm for PSSC has carried him away, but it is about time that someone spoke publicly about the hyperbole technique which he and others are using, either deliberately or naively. We are familiar with the use of this technique in politics, but it should not be allowed to penetrate the field of science. As any high-school physics teacher knows, the PSSC course is used by only a very, very small percentage of students in the country. In fact, if the quote "used in its entirety" were taken literally, the percentage would approach zero.

Statements from the United States Office of Education indicate that roughly half a million students take high-school physics in the United States. Actual sales figures on our textbooks, *Modern Physics* (Charles E. Dull, H. Clark Metcalfe, and John E. Williams) and *Foundations of Physics* (Robert Lehrman and Clifford Swartz) prove beyond any doubt that more than half of the high schools in the country are using Holt textbooks in physics. I must assume that some students are using other physics textbooks, else other publishers would long since have stopped publishing them.

I am confident that Haber-Schaim cannot substantiate his statement. I am, admittedly, biased in my viewpoint. Therefore, I suggest some data gathering on this subject by a disinterested agency. I feel secure that such an approach would reveal that Haber-Schaim's statement is propaganda, apparently designed to perpetuate the myth that PSSC has produced a widely accepted course in high-school physics. Perhaps *PHYSICS TODAY*, undoubtedly a disinterested agency, would like to do some data gathering in the true spirit of science. If not, I trust that you will at least publish this

letter in a future issue of your magazine. In the interest of fair play, not to mention the scientific integrity, this matter deserves public airing.

Leonard S. Craven
Holt, Rinehart and Winston

Alienation by boredom?

Mark Zemansky conjectures in the March issue of *PHYSICS TODAY* ("Too Far, Too Fast?") that his disenchantment with the present trend toward the employment of highly advanced and sophisticated physics in introductory college courses may stem from his concern about the drop in high-school and college enrollments in physics.

I suggest that part of this drop in college enrollments might result from a course in "college physics" which, as Zemansky describes earlier in his article, is intended to "...make up for a possibly weak high-school course and to weed out the poor students." I would hope that the introductory course would devote significant efforts to showing the student what makes physics a worthwhile enterprise for the exercise of the human intellect. In the process of making up for a poor high-school course and weeding out the poor students, are we not alienating many potentially good physics majors by boring them to tears? Today's students are less willing to put up with this than were their predecessors.

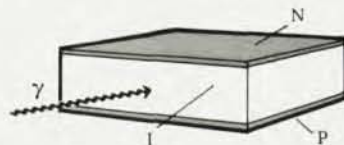
The approaches advanced in Kenneth R. Atkins's *Physics* and Arnold Arons's *Development of the Concepts of Physics* (with which Zemansky disagrees) constitute two superb efforts at dealing with this problem, the former by showing the students what physicists regard as interesting today and the latter by emphasizing the place of physics in the evolution of our culture. Relevance is important.

Although I share Zemansky's concern over the highly sophisticated introductory courses, one must admit that they challenge the intellects of highly talented students and may thereby prevent their alienation by the more pedestrian approaches. It may be, however, that the approaches of Atkins and Arons will interest both the

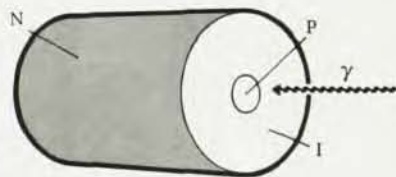
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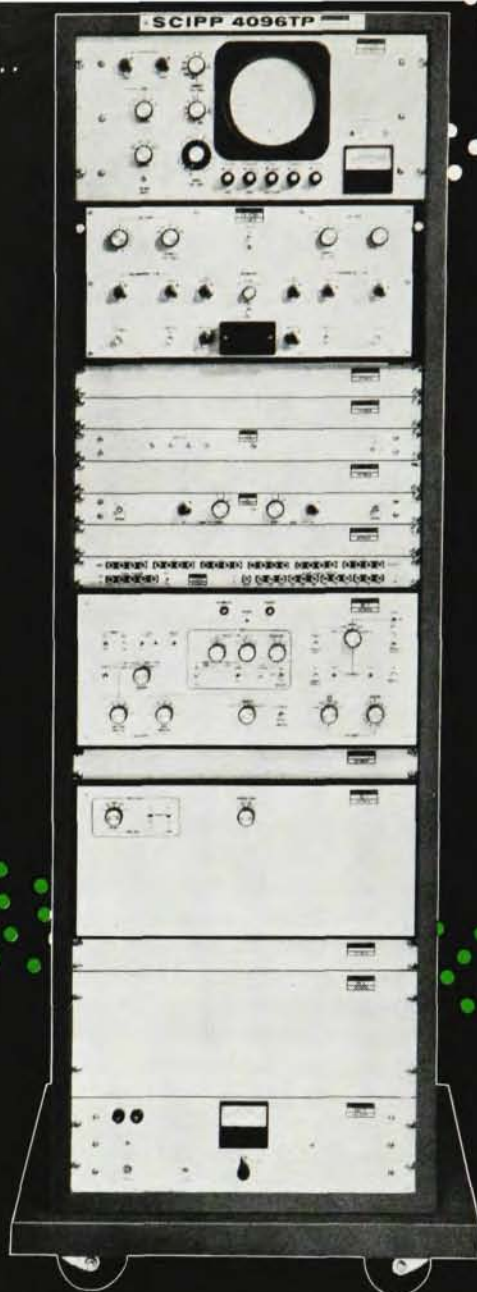
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highly talented students and the average bright students and therefore should be encouraged.

Robert David Turoff
Antioch College

ZEMANSKY REPLIES: The suggestion that a conventional course in college physics containing subjects such as statics, geometrical optics, calorimetry (which may be dull to the teacher but not necessarily to the student) might be the reason for part of the drop in college enrollments can hardly be taken seriously. Highly gifted students have always been bored with conventional courses, even to tears, without removing their persons and their wet handkerchiefs from the physics classroom. In the olden days, when, say, Julian Schwinger was a student of elementary physics, highly gifted students like Schwinger were just as unwilling to be bored as similar students are today. Schwinger didn't drop out; he absorbed his assignments in Hausman and Slack quickly and then went on to read the original works of Maxwell, Jeans, Eddington, et al. Nowadays there are first-rate and inexpensive materials prepared for the extra bright student who is bored with college physics. Any teacher who can't interest his few gifted students in many different ways ought to be fired.

I am firmly of the opinion that an adequate course in college physics should not limit itself to "showing the students what physicists regard as interesting today" any more than a first course in college music should limit itself to showing the students what musicians regard as interesting today or a first course in college mathematics should limit itself to showing the students what mathematicians regard as interesting today. By "students" I do not mean the few hundred high-IQ prep-school graduates admitted to Cal Tech. I mean the thousands of students who were graduated from high schools where the physics course was weak, who need a knowledge of physics to prepare for careers in engineering, medicine, chemistry, physics, etc. "Emphasizing the place of physics in the evolution of our culture" is a lux-

ury that can be afforded by the few hundred first-year Amherst students but not the thousands who are entering the big city colleges and state universities. This large group will have to postpone this luxury until their junior or senior year when they will presumably be in a better position to know what our culture is and how it evolved.

Mark W. Zemansky
Executive Secretary, American Association of Physics Teachers

Economics of teaching

Your special issue on introductory education in physics is an excellent presentation of the recent curricular trends and changes.

Bravo to Mark Zemansky for expressing the sentiments of the vast majority of seasoned physics teachers in colleges and universities with a high preponderance of C and B students (PHYSICS TODAY, March, page 71). Though the admission standards at my institution have gone up considerably, the physics staff notes little improvement in the high-school physics backgrounds of students enrolled in our elementary courses. A nation-wide, longitudinal study is urgently needed to assay the effects of the new curricula. Unfortunately, the AAPT Committee on Testing, a natural initiator of such a study, has apparently disbanded.

There are probably many reasons for the decreasing enrollment in high-school physics. However, it is the conviction of many individuals familiar with the conditions in the secondary schools that the shortage of well-trained and enthusiastic physics teachers is one of the important factors. Western Michigan University is the second largest teacher-training institution in the world, but only 7 out of the 47 physics majors accepted jobs as physics teachers between 1962 and 1966. The data are summarized in my table (page 13).

It is a question of economics! Because of the large pay differential between high-school teaching and other employment, we shall continue to lose the battle for the qualified and able instructor. To attract and retain him, the salary and working conditions

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