

LETTERS

must be competitive with other opportunities.

It is interesting to note that in all the innovatory curricula the emphasis has been on "hardware" first. Certainly, most of the text materials, teacher's manuals, films and other paraphernalia are needed; these are useful and even exciting, but these are

concluded by suggesting that he might get more help at a prominent institution near his home. Yesterday I got a thank-you note which included the sentence, "Until now I had not been able to get a definition or a straight (answer?) out of _____."

George L. Trigg
Physical Review Letters

Placement of Physics Teachers at Western Michigan University, 1962-1966

Year	Available jobs	Seniors placed	Beginning salary
1961-62	49	1	\$4900
1962-63	83	1	4800
1963-64	98	2	4500
			4800
1964-65	71	1	5400
1965-66	173	1	5300

no more than working tools. Of enormous help to the good teacher, they puzzle and confuse the poor teacher.

Let us have a moratorium on curricula packaging and Madison-Avenue-style promotions. These will not stop or reverse enrollment trends. It is high time to concentrate on the recruitment, training and retention of the most important component of the introductory physics education—the high-school physics teachers.

Haym Kruglak
Western Michigan University

Any time for students?

So we are concerned, are we, about the dropping interest in physics on the part of students? Consider, then, the sequence of events I will now describe.

About two weeks ago, there was posted on the bulletin board of the theory group here at Brookhaven a letter from another part of the country which read in part as follows: "I am a high school student. . . . I have been told that you were the place to write for information on antimatter. Please tell me all you can about it." After about a week, I took the bull by the horns and wrote the boy a letter of slightly over two pages, trying to give him at least some sort of a start on the business but warning him that without any knowledge as to his background I might not do too well. I

Make room for drop-ins

I wish to contribute a brief comment on the feature content of the March issue of *PHYSICS TODAY* and in particular on the article by Susanne Ellis on "Enrollment Trends."

Take the case of a college sophomore with no particular background in physical science who enrolls in the traditional noncalculus arts and sciences general physics course for a two-semester introduction to physics. Some students in this group will always find such a course interesting and stimulating. A dozen years ago such a student could decide near the end of his fourth college semester that he would like to major in physics, and he (or she) could do so, completing the required major courses in the junior and senior years—taking a great deal of math and physics in those two years. This made the physics majors a very heterogeneous group—with a few outstanding students who needed special honors courses or seminars to provide a mechanism for intellectual growth at a rate commensurate with their abilities. The great majority of the physics majors of that time went into industrial or commercial positions of an engineering nature while small numbers went into other fields (such as law, medicine, business) or secondary school teaching and graduate school. The situation has changed—and now a first semester freshman college student may feel that it is already too late for him to consider majoring in physics if he did not have PSSC physics in high school.

It is understandable that engineering students should have physics in their very first three or four college semesters since it is fundamental to all that follows in that curriculum. It is understandable that engineering-oriented students will generally take high-school physics. It is understandable that college physics depart-

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ments (with enrollments of freshman engineers) should like their own majors to have their general physics in the freshman year as the engineers have theirs; for this gives three years instead of two for the completion of the major physics courses. But in so doing we effectively cut off the statistically predictable and significant group of students who could take a physics course by accident (or as a physical science requirement), find that it was stimulating and interesting and that it aroused talents the student may have failed to appreciate or understand, and then decide to major in physics.

As our curriculum shifts toward the preparation of potential graduate students, not only do we lose in the numbers of students we enroll, but society loses in the physics majors from a less pressured curriculum who have, in the past, brought their training to bear in other fields such as engineering, law, medicine, business and teaching.

Mrs Ellis concludes her article by observing that our educational system is not as tightly structured as some European systems so that physics dropouts (from college physics major programs) can find other academic major fields, and she speaks of such flexibility as being a great asset to our system. It seems that perhaps we are not as flexible as we should be. In physics we should be concerned not only with the dropouts from our major programs who can be counted, interviewed and evaluated but also about the absence of the drop-ins who can not be identified individually but whose absence can only be inferred as the cause of an unknown part of our enrollment decline. The statistical significance of this group might be evaluated if one could survey physicists today to find what fraction made their decision to major in physics before entering college and what fraction during their freshman, sophomore (or later) years, and to find out what factors were influential in steering today's physicists into physics.

I believe that the facts warrant a study of a new (or 15-year-old depending on one's point of view) college physics curricular program that

would have general physics, algebra, trigonometry and analytic geometry as prerequisites, which (with its calculus and differential equations) could be completed in the student's fifth through eighth semesters without having the onus of being regarded as second class. It should be a good terminal program, and perhaps it could be followed by a one-year master-of-arts program that would bring its better students up to the ever rising admission levels of the better graduate schools. Such a program might be called a physics major in the conventional sense, whereas today's programs might perhaps be regarded as honors physics major programs.

If our programs today exclude the physics drop-ins, then our system may be more rigid and inflexible than we recognize.

Albert A. Bartlett
University of Colorado

Superconducting semiconductor

Minko Balkanski's review of the September ferroelectricity conference at the General Motors Research Laboratories (PHYSICS TODAY, February, page 87) contained two remarks that particularly caught my attention. The first was William Cochran's discussion of the simple ferroelectric transition that occurs in GeTe, and the second was Bernd Matthias's comment that ferroelectricity and superconductivity seem to be entirely mutually exclusive. I would like to point out that GeTe is not only the first diatomic ferroelectric but has also achieved a certain reputation as the first known superconducting semiconductor.¹

Reference

1. R. A. Hein, J. W. Gibson, R. Mazelsky, R. C. Miller, J. K. Hulm, *Phys. Rev. Letters* **12**, 320 (1964).

R. S. Allgaier

*US Naval Ordnance Laboratory
Silver Spring, Maryland*

Fiddling with fiddles

Several years ago I made a violin for my daughter, following the results and recommendations of Frederick A. Saunders and Carleen Maley Hutchins, who wrote "Founding a Family of Fiddles" in your February issue. The

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