letters

Graduate intern program

I read with interest (January, page 103) of the new Industrial Graduate Intern Program proposed by the Education Committee and approved on a trial basis by the Council of the American Physical Society (APS). While ineligible for participation (telephone conversation with Mary L. Shoaf of APS, 1/17/79), Argonne National Laboratory will follow with considerable interest the development of this new program.

Argonne National Laboratory and other US Department of Energy Laboratories have had considerable experience with activities of this type, principally in the form of research participation programs for college and university faculty, graduate students, and undergraduate students. Argonne's experience indicates that student research participation and internship programs are an effective component of science education and a major stimulant to the professional growth of science students. The APS Education Committee is to be commended for its recommendation of this new program. If it has not already done so, the Committee should additionally give consideration to the merits of similar programs for faculty and undergraduate students and the role which the APS might play in encouraging development and support of these activities.

In an era in which the name of the game is to make better use of existing physical resources, it is encouraging to read of efforts to make better use of existing educational resources.

William H. Rauckhorst
1/24/79 *Argonne National Laboratory*

Opinionated scientists

A recent letter "Scientists' public image," by George M. Stamps (January, page 15), brings to mind ways scientists tarnish their own image other than through misplaced ex-cathedra statements.

The treatment of Velikovsky is a first example. Your magazine published a book review by a "scientist" (one prone to detached observations) who calls another's theories "absurd" and "asinine" or "part of a neo-religion." Very fine, unemotional, detached words. Then one finds out that most "scientific" commentors on Velikovsky haven't even read his works, which is like saying elephants don't exist, without turning around to face the big grey beast.

But these scientists continue a long history of opinionated conclusions. Many scientists I knew laughed at and refused to read Rachael Carson before it was OK to admit to ecological disasters. And like Christians, scientists come in various faiths and beliefs. "Scientists say brightly blinking lights traveling over several counties against the wind are effects of marsh gas." "Government scientists say smoking is hazardous to health." "Industry scientists say smoking is good for you." "Atomic energy safe." "Safety report shown erroneous." Union of Concerned Scientists, and so on. Remember Fulton's Folly?

If Velikovsky is wrong, what did cause the disasters, catastrophies, and chaos recorded in history and in geology?

It is not only scientists speaking out about things out of their fields of expertise, it is also their pronouncements about things in their fields, that causes the public to lose faith in them.

Peter Grant
2/14/79 *Bristol, Vermont*

Pauling on human rights

I have today sent to President Carter a letter about human rights, reading as follows:

> I support you in your work to help people in every country in the struggle for human rights.
>
> A quarter of a century ago I was prevented from participating in a two-day symposium held by The Royal Society of London to discuss my discoveries about the structure of proteins by the refusal of the United States government to grant me a passport. I have hoped that the United States would not continue to interfere in this way with the rights of scientists to discuss their scientific work with one another, but I have seen in *New Scientist* for 11 January 1979 that a well-known French physicist, Jean Pierre Vigier, was prevented from attending a symposium on materialism and causality in physics when the United

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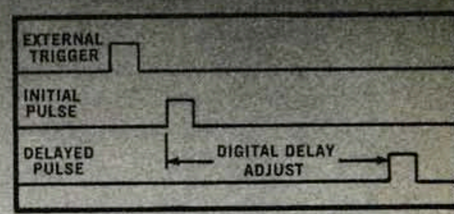

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States Embassy in Paris refused to grant Professor Vigier a visa. Professor Vigier is a world authority on the subject of causality in physics, in which Albert Einstein was interested and Louis de Broglie and other leading physicists continue to be interested.

I suggest that you should pay some attention to violations of human rights of this sort by the United States government.

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Computer program support

The letter by E. N. Maslen (February, page 9) regarding the poor judgment shown in fund allocation for computer programs for crystallography and chemistry was timely and persuasive. An aspect of computer use in scientific work that he didn't include may help understand the reason for this lack of appreciation he criticized. This is that computer work by a research-oriented scientist (as opposed to a computer-oriented mathematician) is, for the more sophisticated codes, extremely complex and time consuming. Long problem trial turn-around time, frequent changes in coding rules and in-out format with active software groups, the human-error factor and the difficulty of finding errors once made all serve to reorient the attention from physics to programming methods.

A remarkably capable theoretical crystallographer I knew several years ago was in the computer room every time I was, and I worked 16 hours a day for 3 years on a laser problem. Since his work was abundantly recognized in the Citation Index, I inferred that his own support problem was not due to its quality, nor to the lack of recognition of his work in the world of science. More probably, it was the excessive demands on his time and energy when supporting active experimental groups by theoretical methods using the computers. The frequent required justification of one's work, perhaps impossible where theory occasionally conflicts with appropriate measurements, may be the more basic reason for the lack of appreciation of the real usefulness of some computer programs.

C. B. MILLS
2/19/79 *Santa Fe, New Mexico*

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As a physicist who has become involved in writing application software, I heartily concur with E. N. Maslen's letter. In nuclear and particle physics useful software becomes widely dispersed and implemented on a variety of machines. These programs are normally written in FORTRAN and are more or less transportable depending upon local FORTRAN enhancements by the originator.

It is possible to produce programs which are more efficient in terms of size and speed while maintaining transportability. To take a simple example, suppose a programmer wishes to set an array of a given size to zero. The programmer would normally set up a DO loop and explicitly set each element in the array to zero. An alternative would be to invoke a subroutine, written in the assembler of the local machine, that has been optimized. This subroutine (called, say, VZERO) would, given the array name and the size of the array, set the entire array to zero in a more efficient manner than the code produced by most compilers. If we could all agree that this subroutine was to be called VZERO and further agree upon the sequence of its arguments, we could maintain transportability while assuring ourselves of efficient code. This one example is perhaps trivial but there are many such examples possible and the sum of all is not trivial.

The additional argument in favor of such a standardization of application software is that it has been proven to work. Because of the central role that CERN plays in nuclear and particle physics in Europe, they have been able to set such a standard. To participate in experiments at CERN, as a practical matter, one has to use some software produced at CERN. This software typically expects to have available many subroutines written and optimized for the host computer. The net savings in terms of utilization of computer resources throughout Europe must be very large.

Why doesn't such a standard exist elsewhere? Mainly because of the lack of a focal point which fulfills the role of CERN. It must be the responsibility of those of us involved in this work to identify the need and the possibility of an efficient application software standard. When we then approach the appropriate funding agencies with a plan that will literally save money, it will be their responsibility to support such a plan.

LESTER C. WELCH
Indiana University Cyclotron Facility
2/21/79 *Bloomington, Indiana*

Laser annealing

In your "Search and Discovery" article on laser annealing (July 1978, page 17) the average reader may find it difficult to see the connection between that topic and our previous work on "laser damage in phototransistors" which you mention. Two important phenomena which we demonstrated in those early experiments were production of a molten layer by short intense laser pulses and redistribution of dopant impurity caused by the melting and recrystallization of that layer.[1,2]

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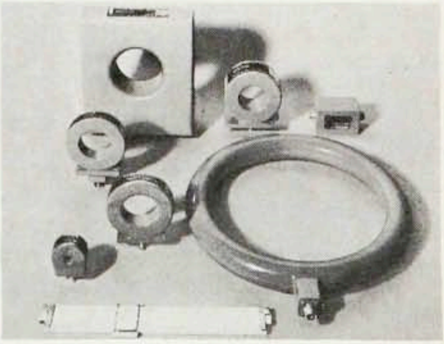

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