

letters

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.

LINUS PAULING

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2/7/79

Menlo Park, California

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

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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

FORTTRAN 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.

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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}



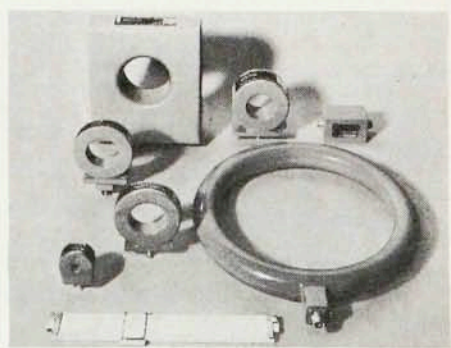
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