

## KNOWLEDGE *PER SE* IS STILL REASON TO FUND RESEARCH

During the past year there has been much discussion throughout the country at all levels about the future of science in our changing society, and in particular about the future of basic research and physics. In the recent report put together by the National Science Board and the National Science Foundation about the future of NSF (see *PHYSICS TODAY*, December 1992, page 70) and in the roundtable discussion in the February 1993 issue of *PHYSICS TODAY* (page 36), there seems to be a feeling of restrained confidence and a very strong continued commitment to the importance of basic research. Those sentiments are also being echoed more frequently in Washington, despite large budget cuts. This is very encouraging.

However, while basic research has, at least temporarily, survived the restructuring of NSF and the popularity of "technology transfer," I believe it is endangered by a much more insidious problem. In the panic to convince elected officials and the public of the importance of basic research to the well-being of the country, I believe scientists themselves are abandoning the fundamental goal of basic research, which is the advancement of the body of human knowledge. The NSF-NSB report made a strong point of the economic impact of basic research but did not mention knowledge for knowledge's sake even once as a supplemental motivation. And in the recent *PHYSICS TODAY* roundtable discussion, students and faculty were criticized for believing that the public should fund their research because they find it exciting strictly from a knowledge point of view. I question the observation on which that criticism is based, as I have witnessed in several graduate students' letters to various professional newsletters and in private conversations a growing sentiment among scientists that we are wasting our time and the taxpayers' dollars doing very fundamental re-

search. I believe this trend is largely a "trickle-down" effect from the attitudes in Washington.

Many of my colleagues have told me that to believe in knowledge for knowledge's sake is too idealistic and that I must face the reality of "selling science" during a time of economic recession and budget cuts. This criticism misses my point. I fully acknowledge the need to "sell" basic research using promises of future economic and standard-of-living gains. To ignore those aspects of basic research would be disastrous and incorrect. But to ignore totally the quest-for-knowledge aspect is equally disastrous. One small additional paragraph in a document such as the NSF-NSB report, giving some acknowledgment of the merits of knowledge for knowledge's sake, not only would provide additional merit to the report but also would provide encouragement to discouraged young researchers. Without the curiosity, ingenuity and innovation that are fueled by the desire for knowledge, there may someday be no basic research over which to debate.

TIMOTHY P. GRAYSON  
University of Rochester  
Rochester, New York

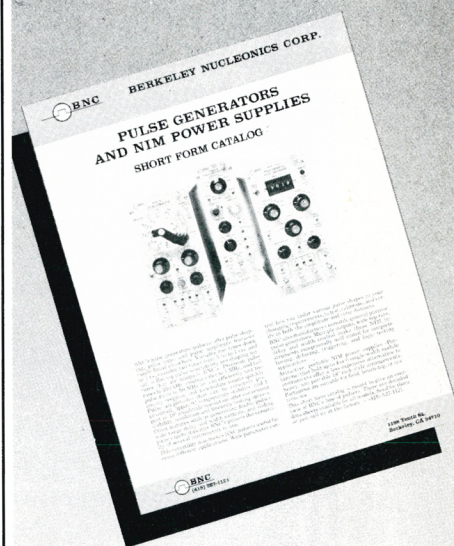
3/93

## Why Do Nobels Come Less and Less to US?

Certainly Nobel Prizes should not be the principal goal of physics research policy, but at the same time they are some kind of measure of science in our country. In the period 1976-83, 15 out of 19 winners of the Nobel Physics Prize were Americans. In the period 1984-91, only 7 of 18 were, and the work that earned those 7 people the prize was carried out in earlier times. What has changed?

A suggestion comes from the fact that during the period when Americans were receiving most of the Nobel Prizes, almost all of the American

A  
RARE  
FIND  
It's in BNC's  
new pulser  
catalog



BNC pulse generators offer shaping, rate, and amplitude features rarely found elsewhere. Find out the whole story by requesting your free copy of BNC's latest catalog. NIM Power Supplies also included.



**Berkeley Nucleonics Corp.**

1121 Regatta Square  
Richmond, CA 94804  
Ph(510)234-1100 Fax(510)236-3105  
**800-234-7858**

winners were principal investigators on individual research grants from the National Science Foundation or Department of Defense agencies or were supported by companies that provided largely unrestricted support for research of the scientist's choosing. During the later period the prizes were typically given to European physicists who had support of the kind that earlier had been available to Americans but was increasingly disappearing from the American scene. To what extent can our failure in this measure of effectiveness be attributed to a change in science policy by the NSF, which under Erich Bloch shifted increasingly to the support of research centers and programs in prespecified areas, at the expense of individual programs?

The NSF might argue that some half of the support it offers is still through individual research grants. However, this level of support has fallen so far behind the growth of the physics community that the nature of the support has automatically, and completely, changed. In my own area of condensed matter physics, which comprises about half of the active physicists in the US, NSF proposals are typically reviewed by five peer referees. A return on a recent proposal of mine of one "excellent," three "very good's" and one "good" placed it far out of the running for funding. In fact, another proposal, with a rating of two "excellent's" and three "very good's," was also not granted funding.

Drawing the line for support so high is of major concern. It would appear, for example, to rule out just the kind of work that led to the recent Nobel Prizes to European physicists. Three sets of European prizewinners in condensed matter physics were Klaus von Klitzing, for the quantum Hall effect; Gerd Binnig and Heinrich Rohrer, for the scanning tunneling microscope; and J. Georg Bednorz and K. Alex Müller, for high- $T_c$  superconductivity. One could certainly expect that each of these programs would have drawn at least one disqualifying "good" from a set of five reviewers prior to its ultimate success. The difficulty is not only that such leading programs might well not be funded in the present climate, but that all physicists are strongly pressured to generate proposals that they hope might avoid any critical reviews. The American physicist is driven away from the kinds of projects that earlier brought Nobel Prizes to Americans and now bring them to Europeans.

The research centers, thrusts and

topical programs that have replaced these individual projects are programmed mediocrity. The funders can feel that they no longer squander their money on small projects—which were in fact the lifeblood of American physics—but concentrate it in large projects of their own choosing. Can they argue that this approach is providing backup to American industry? Has it made us competitive with industry abroad? The thought would be amusing if it were not so sad.

At the same time that the NSF is draining the ingenuity that earlier characterized American physics, Bell Labs, IBM and other industrial firms, perceiving physical science research as not so relevant to their futures, are reducing their support for it. And with peace in the world, there is increasing pressure to cut the traditional research support by the Department of Defense. Perhaps the problem is soluble. What is required is the reversal of the trend toward large projects and collective centers, and a return to the principal-investigator system. The current and projected funds for the NSF may be enough to restore the vitality of our physics. The peer review system is intact; only the policy at the top level needs revision.

WALTER A. HARRISON  
Stanford University  
Stanford, California

1/93

## Germans at Farm Hall Knew Little of A-Bombs

In early 1992, the British government released the top secret transcripts<sup>1</sup> of the surreptitiously recorded conversations of Werner Heisenberg, Carl-Friedrich von Weizsäcker and the other leading German nuclear scientists confined at Farm Hall in England in the period around 6 August 1945—the day on which, at approximately 6 pm, they were apprised by their "host," Major T. H. Rittner, that an atomic bomb had been dropped. Thus it is now possible to compare the contents of the transcripts with the conclusions published by physicist Samuel A. Goudsmit<sup>2</sup> in 1947 and with the contrary opinions put forward by historian Mark Walker in 1989 and thereafter.<sup>3,4</sup> (See Walker's article in *PHYSICS TODAY*, January 1990, page 52, and the letters to the editor on that article, which include a reply from Walker, in May 1991, page 13.)

Brief reviews skimming the transcripts have appeared already.<sup>4,5</sup> Some contain short quotations from

## JVST: Now on CD-ROM

*The Journal of Vacuum Science and Technology (JVST)* will be available on CD-ROM with 1994 issues. This is the first major physics journal available on CD.

*JVST* is a major source of fully refereed papers on surface science, interfaces, nanometer-scale science and applications, and scanning tunneling microscopy as well as related technologies. *JVST* has published, for example, over 50% of all refereed papers ever published on STM.

New topics of interest include surface science at solid-liquid interfaces, bio-interfaces, and Si-luminescence. *JVST* papers are refereed at the same level as the *J. of Applied Physics* or *Surface Science*.

*JVST* will be published quarterly on CD, containing that quarter's issues plus prior issues for that year.

**CD-ROM Demo**  
*JVST-A 11(4)* ..... \$20

**AVS Membership:**  
paper or CD-ROM ..... \$60  
paper and CD-ROM ..... \$85

**Corporate or Library Subscription:**  
paper or CD-ROM ..... \$630  
paper and CD-ROM ..... \$730

*JVST* is distributed worldwide to over 7,000 libraries and members, over twice the circulation of the *J. of Applied Physics* and 10 times that of *Surface Science*. For subscription or membership information or to order a demo disk, please contact: Angela Mulligan, AVS, 120 Wall Street, 32nd Floor, New York, NY 10005, phone 212-248-0200, fax 212-248-0245, e-mail: mulligan@pinet.aip.org.

Circle number 11 on Reader Service Card