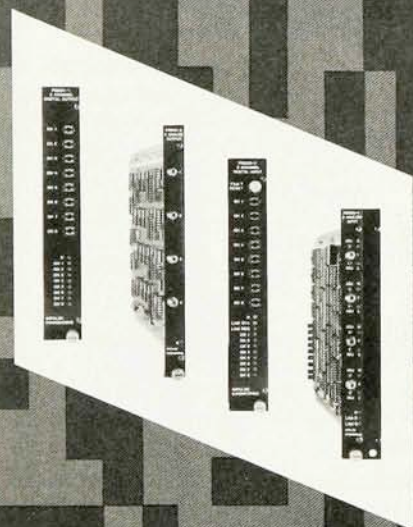


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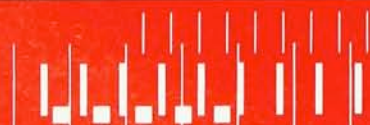
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late about unexpected benefits and use examples from history, both old and recent. But let us never again pretend. Even if we cannot sell that argument on moral principles, we may make a good case based on the financial ones.

Z. F. DANEŠ

University of Puget Sound
and US Geological Survey
Tacoma, Washington

11/87

Physics Pro Bono Redux

I found the letter by Jan Beyea of the National Audubon Society (October 1987, page 152), appealing for physicists to devote their spare time to the solution of environmental problems, highly offensive in its implication that scientists had an obligation to atone for their "sins" in developing technology that may lend itself to misuse or bring harm to the environment. It would seem to me absurd, for instance, to blame Henry Ford for smog in Los Angeles, or Heinrich Hertz for the learning disabilities of children distracted by television. It can perhaps be argued that the threat of mutual destruction by nuclear weapons has kept the world at peace, however tenuously, for a longer time than that ever before.

It may well be that the priority our society gives to solving environmental problems is inadequate and needs review, but many of those problems require more than the spare-time efforts of some uncorrelated scientists for their effective resolution. In many cases, resources are available but are squandered on problems of high emotional appeal, such as low-level nuclear waste disposal or asbestos removal, where a minimal number of lives may be saved at enormous cost, when the same amount devoted to feeding the starving, erecting railroad crossing barriers or reducing coal use might save many more lives in a more cost-effective fashion. I do not think we are confronted with "failures of technology," in Beyea's words, but merely with a lack of political leadership to push technical issues on the basis of effectiveness rather than political expediency or activist scare tactics.

GEOFFREY G. EICHHOLZ

Georgia Institute of Technology
Atlanta, Georgia

11/87

BEYEA REPLIES: If a scientist like Heinrich Hertz is to be given credit for the benefits of his discoveries, is it not appropriate for him to be assigned some responsibility for their ill ef-

fects? By shielding ourselves and those we train from the fact that physics does not always lead to socially desirable ends, we lose motivation to correct the negative side effects of technologies that have been made possible by physics research.

Hertz could not, of course, have anticipated the negative impacts of his work, neither the glare of neon advertising lights made possible by the study of discharges in rarefied gases, nor the possible health impacts from defective microwave ovens, nor the use of radar to improve the weapons of war. Because recognition of side effects tends to be delayed, an ethical pact is needed between generations: Today's physicists should work to mitigate the impacts of past discoveries; the next generation should work to mitigate the impacts of discoveries taking place today.

Geoffrey Eichholz questions the adequacy of relying on amateurs for this purpose. Such pessimism contrasts with the physicist's traditional belief that there are few physical science and engineering problems that can't be solved on the back of an envelope. In any case, the same objection could be raised to lawyers doing *pro bono* work in their spare time; yet thousands of lawyers consider it their responsibility to do so, often working on cases that are far from their specialties.

Imagine the benefits of physics professors as a group advocating and practicing *pro bono* physics. Is it conceivable that they would fail to bring insight to many problems? Would not their example hasten the arrival of the focused effort that Eichholz believes might do a better job? Would not this demonstration of social concern lead to great public respect and an increased willingness to listen to physicists on questions of technological risk and the setting of risk-management priorities?

JAN BEYEA

National Audubon Society
New York, New York

7/88

A New Spin on an Old Rotation

In Per Andersen's Search and Discovery comments on massive objects in galactic nuclei in your October 1987 issue (page 22) the impression is given that the rapid rotation of the nuclei of M31 and M32 is a recent discovery. In fact, this is very old news. Data on both galaxies, and inferences on the probable nuclear masses involved, were published in 1962 by Merle F.

Walker in the widely respected (if apparently unread) *Astrophysical Journal*.

WILLIAM P. BIDELMAN

Case Western Reserve University
Cleveland, Ohio

10/87

ANDERSEN REPLIES: My sentence "New observations indicate rapid core rotation in both M31 and M32" may have been somewhat misleading. I have asked John Tonry (MIT) and Douglas Richstone (University of Michigan) to help me clarify the relationship of Walker's observations to the recent work. In observational accuracy and realistic modeling of the nucleus, the new data analyses go far beyond what Walker was able to achieve. The real novelty is not the fact of the rotation but the recognition that the atmospheric blurring may be hiding a discontinuous rotation curve and that there must be substantial dark matter in the form of black holes or neutron stars in the galactic nucleus. In 1962 it was thought that galactic nuclei, like globular clusters, would have a decreasing mass-to-luminosity ratio toward the center, that is, less dark matter than the outer parts. (Walker states in his conclusions that his observations support this view.) In any case, Walker's contributions have not been forgotten; his paper (*Astrophys. J.* 136, 695, 1962) is referenced in the papers mentioned in the PHYSICS TODAY news story.

Make Assistantships Available to PhDs

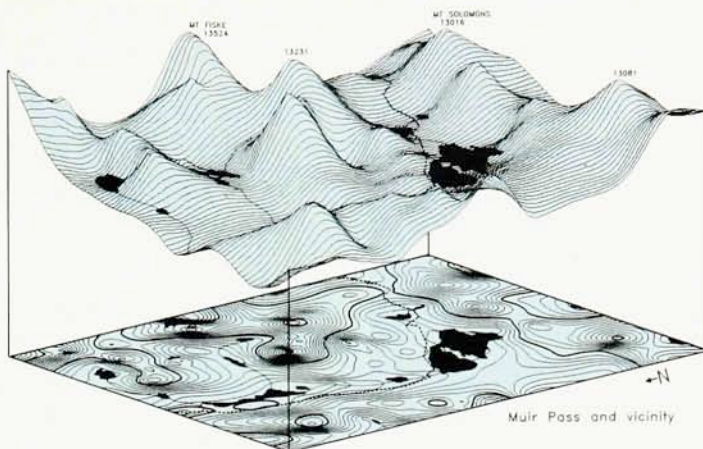
According to the November 1987 issue (page 86) about half of the graduate students in US physics departments in 1986 were foreign students. Many of them are holding down low-paying research and teaching assistantships amounting to \$8000-\$9000 a year. Some schools do not exhaust their allotments of such assistantships.

At the same time, persons with the doctorate degree, like myself, are supporting families on unemployment insurance of \$1000 a month. Should not our universities make these assistantships available also to needy persons having a PhD but no job?

I have responded to the advertisements in PHYSICS TODAY for faculty positions; the letters that come back often are accompanied by glowing descriptions of the experimental research assistantships—available only to graduate students.

Any department chairman must

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