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What Future Will We Choose for Physics?

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What Future Will We Choose for Physics?

Abstract
Science in the United States is in a time of pain and uncertainty. The pain is felt most acutely by young scientists, who are having great difficulty establishing their careers. The uncertainty about the duration and outcome of the current situation stems from its roots in ponderous events of recent history—the end of the cold war, industrial downsizing, government deficits and demographic trends. Although budget difficulties and lack of jobs plague most of the sciences, the atmosphere of uncertainty about the future is palpably different from one profession to the next. Our concern here is with the profession of physics.

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WHAT FUTURE WILL WE CHOOSE FOR PHYSICS?

US physics faculties are aging rapidly and responding far too slowly to new opportunities across the sciences. We must reverse the trends if we are to preserve the historic vitality of the profession.

Sol M. Gruner, James S. Langer, Phil Nelson and Viola Vogel

Science in the United States is in a time of pain and uncertainty. The pain is felt most acutely by young scientists, who are having great difficulty establishing their careers. The uncertainty about the duration and outcome of the current situation stems from its roots in ponderous events of recent history—the end of the cold war, industrial downsizing, government deficits and demographic trends. Although budget difficulties and lack of jobs plague most of the sciences, the atmosphere of uncertainty about the future is palpably different from one profession to the next. Our concern here is with the profession of physics.

The natural tendency, especially among those of us in the physics community whose careers are well established, is to hope that current problems will work themselves out, as they have in the past, and that better times will resume without substantive changes in our way of life. The data to be presented here suggest that such complacency is dangerous, both because the extrapolation of current trends is clear and undesirable, and because there are steps that can be taken to alter the path of events. It seems to us, the authors of this article, that serious discussion about the future of the physics profession should focus less on external events that physicists cannot control and more on the field itself. We therefore believe that this is precisely the right time for our community to undertake a soul-searching analysis of the profession—its historical evolution, its current health and, above all, our aspirations for its future.

The analysis presented here focuses primarily on academic physics, where serious problems exist and where important decisions must soon be made. But we believe that what we are saying is very important for the field as a whole, and that all of us, especially physicists in industry and government, must participate in making these decisions.

Some unpleasant facts

Our analysis of the current state of physics begins with two startling sets of data. First, as figure 1 shows, the median age of physics professors in US universities has been rising almost linearly at the remarkable rate of eight months per calendar year for about two decades. By 1992 fully half of the full professors were at least 54 years old. Second, as the table on page 27 shows, the distribution of academically employed PhD physicists among the subfields of physics has remained nearly static over roughly the same period of time.

Both of these data sets convey much the same message. Events culminating around 1970 froze into place the membership of physics faculties and, along with them, their areas of specialization. The implications of this change were dramatic. In effect the term "physics" as the name of an academic discipline ceased to mean a broad-ranging mode of ever-changing scientific inquiry and came to denote a fixed set of topics that are studied and taught by physicists.

Is this a bad thing? Very much so, in our opinion. We say this despite the fact that, intellectually, almost every one of the mainstream subfields in physics has evolved dramatically in recent years. There is every reason to take pride in the beautiful developments in cosmology, astrophysics, particle physics, atomic and optical physics, the physics of superconductors and quantized mesoscopic systems, and a large number of similar accomplishments. Certainly the stability shown in the table on page 27 is indicative of the richness of the mainstream specialties. But it is also indicative of a reluctance to continue the historical extension of physics into newly emerging scientific areas.

Why, for example, despite the unprecedented wealth of new observational data, has astrophysics not been expanded within physics departments? Why does the physics that emerges from biology—the science that is having the most impact on today's world—not even merit an explicit place on our list? We know that there are a few biophysicists within the categories called "condensed matter" or "other physics," but we also know that there are, indeed, only a few. Where is the physics of pattern formation and complex systems on this list? How many physicists are addressing the emerging problems in advanced materials? In the environmental and Earth sciences? In information systems? The few who are working in these areas are not yet having much impact within US physics departments. Indeed, many of the best find that they have to leave physics departments to function effectively.

Our thesis, in short, is that academic physicists are setting themselves apart from too many of the areas of intellectual prosperity that properly belong within the discipline. It is urgently necessary that this trend be corrected so that academic physics can retain its vitality during the difficult times ahead.

How has our community arrived at this situation? Is today's relatively narrow definition of "physics" consistent with the history and traditions of the field? Is it even consistent with physicists' own self-image? What changes are feasible? What changes are essential? None of these questions are easy to answer—especially the last two. But we must try to answer them if we are to

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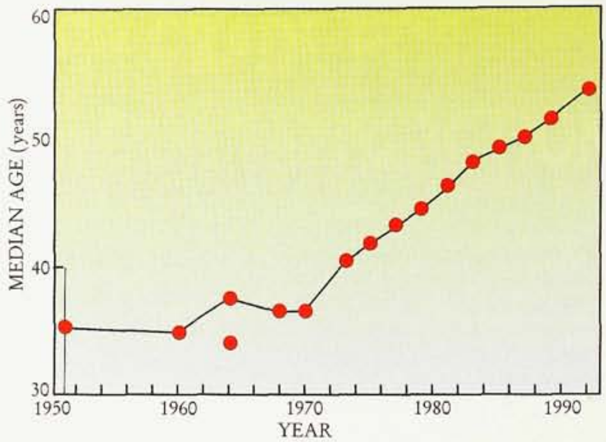
MEDIAN AGE OF US PHYSICS FACULTY, 1951–92. Datum for 1951: median age of all physicists employed full-time. From AIP statistics published in 1962. Datum for 1960: median age of all physicists. From AIP statistics published in 1962. Datum for 1964 (lower point): median age of physics faculty in universities granting PhDs in physics. From AIP statistics published in 1966. Data for 1964–70: median age of all physics PhDs in US colleges and universities. From 1972 NAS survey of physics. Data for 1973–87: median age of university professoriate (all professors) with physics PhDs. From unpublished National Research Council data. Datum for 1989: median age of university professoriate. From unpublished NRC data. Datum for 1992: median age of university physics full professors. From AIP survey of member societies. **FIGURE 1**



understand the problem and take effective action.

How did we get here?

Why, in its current academic definition, is physics identified with a fixed and tightly constrained range of subjects? Simply put, the situation is a consequence of successes in the decades immediately following World War II. The importance of technological developments during World War II, such as radar and nuclear weapons, convinced people in power, in both government and industry, to support an unprecedented growth in physics. The bulk of this support was directed at a rich but narrow set of questions that appeared to be relevant to the defense and electronics industries. Basic research without obvious short-term applications was justified because of the success and importance of these applications.

The atmosphere in those days was one in which the diversity of physics was not an issue because industrial growth and the cold war provided ready employment for as many physicists as could be educated. The areas being supported were intellectually exciting, thus it was easy to lose sight of the fact that the universe of physical phenomena is far richer and broader than that encompassed by the industrial or military needs of the post-World War II decades.

That would not have been a bad state of affairs had physics been able to continue the nearly exponential growth that, as figure 2 shows, persisted for 50 years following World War I. Had growth remained rapid, new faculty would have continued to be a large fraction of the total and would have continued to bring new research areas with them. But exponential growth never can continue indefinitely. We see in figure 3 that growth in physics came to a sudden halt in about 1970. Since then, the rate at which younger faculty have been replacing the old has been exceedingly slow. This is readily seen in the tenure statistics: Lee Grodzins estimates that 47 percent of the PhDs of 1959–60 who entered the physics job market were eventually tenured.[1] This proportion dropped to 8% for the cohorts of the early 1970s.

The result is evident in the data of figure 1 and the table. There has been little change in the distribution among physics subfields since the early 1970s because there has been little turnover in personnel. The slow turnover that has occurred has tended to keep the relative sizes of the subfields constant. In effect the sudden change in academic employment of 1970 froze the distribution of physics subfields into what we see today.

The jobs problem

No academic discipline can thrive if its graduates cannot find satisfactory jobs. The current employment crisis in physics has been extremely painful, as is all too evident in recent editions of PHYSICS TODAY. There is precedent for today's situation in the 1970 downturn, which shows up so clearly in figure 3. That event was well summarized in a prescient study, sponsored by the American Physical Society, that analyzed physics employment for the two decades preceding 1979.[2] Some passages from that report seem specially pertinent to today's problems:

> The decade of the 70s has been a time of turmoil and transition for the support of physics and physicists, especially of young physicists just completing their graduate years. . . . [In the 1960s] a whole generation of physicists had become accustomed to automatic careers, in which demand so much exceeded supply that the greatest problem was to choose from among desirable alternatives. . . . There were warnings in the 60s and plenty of signs (especially to the retrospective eye) that the days of glory were limited, but demography and the federal budget finally broke the spell. . . . Since science hadn't done anything for the country lately, wise heads in Washington decided federal largess should be diverted to more pressing demands.

As is obvious in figure 3, 1970 marked a wrenching discontinuity. Physics employment improved very slowly in the years that followed until, at the end of the 1970s, energy problems, an improved economy and a defense-oriented Reagan administration persuaded Washington that more research funding was needed. For a few years it seemed that the bad times might be over, but by the end of the 1980s the job situation once again began to deteriorate, and it now seems worse than ever. For reasons that are all too familiar, this situation is unlikely to improve soon.

What is physics?

The answer to this question is central to understanding the present state of the physics profession and deciding where it should go from here.

If the history of modern science begins with Galileo, then the mode of scientific inquiry that we call "physics" is about 400 years old. It seems fair to ask, therefore, whether the brief interval since World War II has been typical. In the most obvious sense, the answer is certainly no. Physics has changed from being a tiny community of scholars to a major worldwide enterprise in just those few years. A more pertinent question, however, is whether the essential nature of "physics" has also changed during this transition.

Dictionary definitions of physics generally have failed to capture the word's full meaning for physicists. The trend over time has been to define physics ever more narrowly in terms of subject areas that are, or are not, to be included. If we go back to 1860, for example, we find

Employment by subfield of physics PhDs in US universities and four-year colleges, 1973–89.

	1973		1977		1981		1985		1989	
	Number	%	Number	%	Number	%	Number	%	Number	%
Astrophysics	421	4	562	5	708	7	703	6	719	6
Atomic and molecular	512	5	722	7	593	6	557	5	601	5
Plasmas/fluids	387	4	422	4	517	5	582	5	621	5
Elementary particles	1086	12	1040	10	1225	12	1504	13	1348	12
Nuclear	826	9	714	7	645	6	507	5	633	5
Condensed matter	1372	15	1400	14	1380	13	1792	16	1645	14
Optics	256	3	155	2	150	1	130	1	340	3
Other physics	2482	27	2667	26	3045	29	3169	28	3026	26
Subtotal physics	7342	79	7682	75	8258	79	8944	79	8933	77
Other fields	1810	20	2430	24	1935	19	2095	19	2307	20
No report on field	102	1	154	1	227	2	191	2	290	3
Total	9254	100	10 266	100	10 420	100	11 230	100	11 530	100

The data are based on all US residents who have a PhD in physics, and include postdoctoral fellows. The table does not include astronomy PhDs. Source: National Academy of Sciences, unpublished data.

that *Webster's Unabridged Dictionary of the English Language* defined physics very broadly.[3] It declared that physics is "the science of the material system. . . . This science is of vast extent, comprehending whatever can be discovered of the nature and properties of bodies, their causes, effects, affectations, operations, phenomena, and laws."

By 1934, however, *Webster's Unabridged Dictionary of the English Language* had changed this definition to "that branch of knowledge treating of the material world and its phenomena; natural philosophy; later excluding in turn various branches of natural science, as biology, astronomy, chemistry and geology."[4] In other words, the definition had been amended to exclude areas that had evolved into disciplines of their own.

By 1985 *Webster's Ninth New Collegiate Dictionary* was defining physics as "a science that deals with matter and energy and their interactions in the fields of mechanics, acoustics, optics, heat, electricity, magnetism, radiation, atomic structure, and nuclear phenomena."[5] Now the definition had been restricted not to what was excluded, but even more narrowly to what was included.

Of course, these dictionary definitions are no more than limited snapshots of the subjects that preoccupied physicists at the times they were written. Because these subjects have been changing, the definitions should not be viewed as constraints, but rather as vignettes of the problems that lent themselves to fruitful attack by the methods used by physicists.

Moreover, the progress of interest in any specific topic has seldom been monotonic; physicists have tended to revisit topics as new information or methods have become available. At the turn of the century, chemistry—a well-established subject in its own right by that time—again became interesting to physicists as a result of advances in the understanding of atomic structure. Similarly, atomic spectroscopy, which diminished as an active area among physicists through the middle third of this century, has been revived by measurements made possible by lasers. Currently, biology is becoming attractive to physicists as a consequence of the wealth of new information on macromolecular structure and the flowering of techniques that make possible the manipulation of macromolecules. Change in subject matter, and regeneration of interest as techniques allow, has always been a part of physics.

A better answer to the question "What is physics?" can be obtained by looking at the history of physics through the eyes of physicists. For example, a book such as Morris Shamos's *Great Experiments in Physics* makes it clear that physics—as a mode of scientific inquiry—has indeed maintained its integrity since the time of Galileo.[6] The physicist's definition of physics is based not on a list of specific topics, but on the set of conceptual tools that have bound this community of scientists together across time and diverse research activities.

These tools are

▷ Advanced training in a common set of core subjects—presently, mechanics, electricity and magnetism, thermodynamics, statistical mechanics and quantum mechanics.

▷ An inherently quantitative and reductionist approach to understanding physical phenomena.

▷ A strong tendency to abstract and attack the common, universal features of a problem to gain insight that goes beyond the specifics of the particular system being examined.

These conceptual tools, more than anything else, differentiate the physicist from other scientists. The physicist is most cogently identified, not by the subject studied, but by the way in which a subject is studied and by the nature of the information being sought. A concept-based definition also distinguishes physics from other disciplines that are more closely tied to specific subjects. For example, astronomers study pulsars and biologists study living systems; but because there is interesting physics in both pulsars and the organizational principles of living systems, physicists study both.

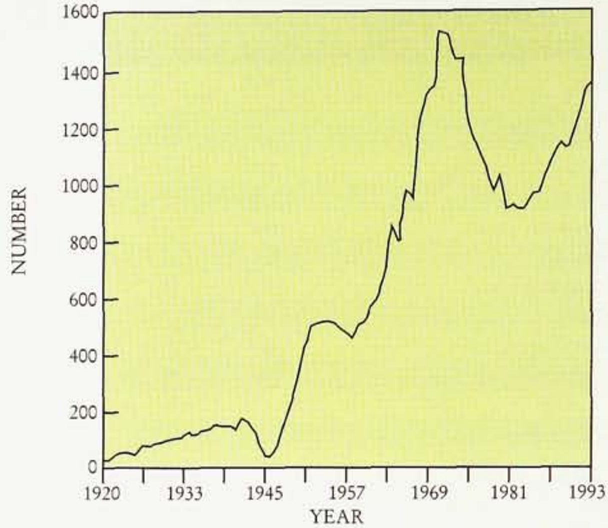
A definition of the physics profession in terms of conceptual tools, instead of subject matter, survives the test of time. This manner of precise, generalizable, quantitative thinking is as readily identified and admired in the classic papers of Galileo as it is in the works of Fermi. It has characterized physics through almost half a millennium, and it will serve as an excellent standard for the future.

Where to go from here?

Under present circumstances, business as usual is an unacceptable option. It would lead to an embattled physics enterprise, diminished in size, strength and significance. The alternative is for physicists to respond energetically, in new and creative ways.

The history of physics is replete with examples of how

NUMBER OF PHYSICS PHDs conferred in the US from 1920 to 1993. Note the near-exponential growth until about 1970. (From reference 10.) **FIGURE 2**



physicists have identified and successfully attacked the most important scientific problems of the day, even when the problems have been very much out of the mainstream of research within the profession. The historical lesson is that the primary goal must be to broaden the range of research in academic physics when problems appear that lend themselves to attack. What must be stressed is not the nature of the subject but rather the importance of the problem and whether or not progress can be made by using the methods of the profession. There are two practical corollaries to this proposal. The broadening of research in physics must be accompanied by a broadening of the training of physics students. And, if these two challenges are to be met, room will have to be made on faculties for younger physicists.

Broadening research in physics

The world has evolved irreversibly while subject areas in physics departments have remained fixed. The cold war is over, international competitiveness and economic factors have forced industry to focus ever more closely on short-term goals, and discretionary government spending is being squeezed ever more tightly. The needs of society also have evolved, spurred by spectacular developments in research areas only peripherally related to the concerns of physicists during the post-World War II decades. These areas include living organisms, the Earth, imaging and information systems, macromolecules, nonlinear behavior of complex systems, and novel multicomponent materials.

Despite the ups and downs of research, few would deny that these areas continue to have excellent prospects for growth and societal support. And there is no shortage of important, intellectually challenging physics problems associated with these modern developments. Yet these problems are being shunned by physics departments, not because it would be historically out of character for physicists to address these questions, but because of the special history of the last 20 years.

Academic physics departments must foster new, non-mainstream areas of research and education if the importance and vitality of the profession is to be maintained. Accomplishing this objective will be a difficult and risky process. There are certain to be problems in obtaining financial support both from funding agencies and deans; there will be interdisciplinary tensions; and it will be especially hard to recruit and retain the right young people to become involved in such efforts. Because physics departments are unlikely to expand in the near future, the introduction of new areas will have to come at the expense of the old. We are not suggesting that physics departments give up mainstream research—just that they be more flexible in accepting new ideas and that, when opportunities arise, they accept the necessity of growing in new directions.

There is no foolproof formula for nurturing new areas of physics, but we can suggest some guidelines.

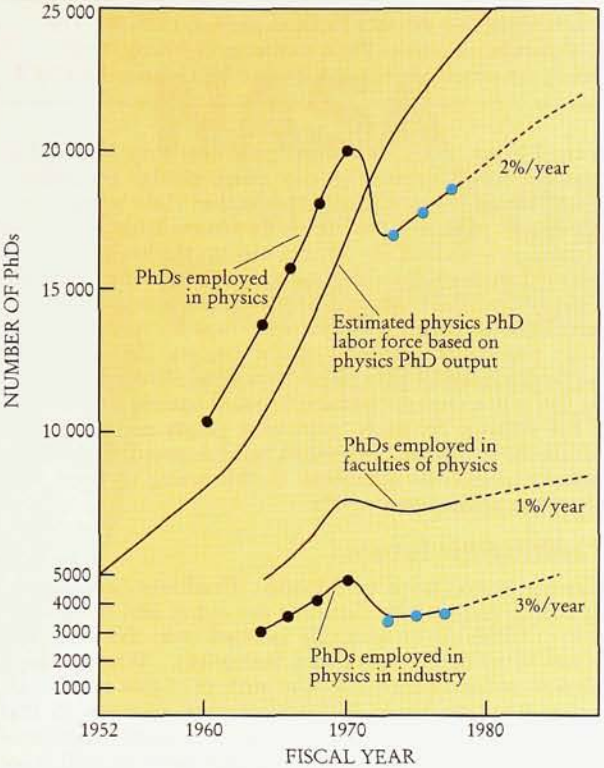
First, existing faculty must be strongly committed to the success of the new areas. The young faculty who will actually make the changes will face immense hurdles. It is unreasonable to expect that these barriers will be overcome in the presence of begrudgingly accepting senior colleagues. Nor will the young faculty be able to go it alone. Despite the difficulties, some established senior colleagues must join them.

Second, home institutions must be prepared to provide generous start-up packages. Proposals for research support in nontraditional areas most likely will be reviewed by scientists outside of physics departments, who will question whether physics faculty have the resources and connections to succeed in cross-disciplinary areas. Our experience has been that this skepticism often evaporates when results are obtained, but the home institutions themselves must provide the support needed to get to this stage.

Third, faculties must be unusually flexible in evaluating candidates for tenure. This is by no means a call for the weakening of standards; rather it is a recognition that the evaluation of physicists in many nontraditional areas will involve input from outside physics departments. We suggest two important questions that should be asked in such evaluations. First, what has been the impact of the work on the field in question? Second, does the work bear the hallmarks of a physicist or does it simply imitate the approach of the alternative community? (If imitation is the answer, then perhaps the person being evaluated belongs in the alternative department.)

Fourth, physics departments must be prepared to promote interdisciplinary interactions. Physicists have talked a great deal about the benefits of interdisciplinary research in recent years but, in fact, have been more resistant to such interactions than have other scientists. Part of the problem is simple arrogance. Physicists have to recognize that the cultures of colleagues in other disciplines usually have been molded by the constraints of problems typical to those disciplines, and that it will be necessary to learn both the languages and basics of those disciplines to be able to interact effectively with them. And it is naive of physicists to assume that they can defer making such efforts while insisting that others learn the language of physics.

The most effective way for physicists to establish footholds in interdisciplinary areas is to collaborate with scientists in other departments. Collaborations are not only valuable for research but also strengthen grant proposals in the eyes of nonphysicist reviewers. Some mechanisms available for encouraging such collaborations are jointly taught courses in multidisciplinary subjects, joint seminar series and jointly supervised students. (However, joint faculty appointments at the junior level are rarely successful. The faculty involved are always expected to give full-time duty to both departments.)



PHYSICS PHD LABOR FORCE from 1952 to 1979, with projections for the 1980s. The black points represent National Science Foundation data. The blue points represent NRC data. Part of the discontinuity of 1970 shown here may be a consequence of the shift of reference frame. See reference 1 for details. **FIGURE 3**

Broadening the curriculum

The disillusionment of recent physics PhDs echoes that of their peers after the crash of 1970, as noted in the 1979 Fiske study,[7] which analyzed the difficulties of the decade:

> In the euphoria of the 50s and 60s it seemed natural and right that society should support physicists in doing what they wanted to do; society would be well repaid by good things out of science, or at least by a sense of having supported worthwhile activities, like symphonies or the arts. However, young men—adults, not children—came to believe that because they were bright and had spent dedicated years seeking the Truth, society was bound to continue supporting their quest. The revelation that society was bound to do no such thing came as a shock and disillusionment to very many young physicists, and the past decade has been a time of trauma for many of them.

Fiske's declaration was not a call for more applied research; rather, it was a call for a more broadly applicable physics training. Unfortunately, the training of graduate students did not change. The continued narrow focus of physics education is partly responsible for the pain felt by recent graduates. Perhaps the reason the lesson of the 1970s has not been taken to heart is that the burden of changing educational practices falls upon the tenured academic community, whereas the consequences of not changing falls hardest upon newly minted PhDs.

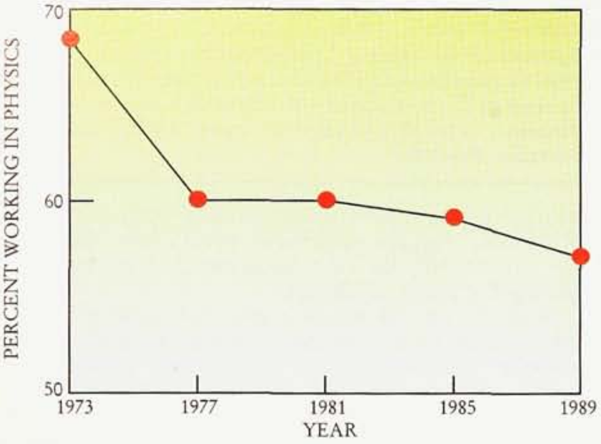
We have to face two compelling facts: Physics employment is dependent upon producing scientists who fill the needs of society; and the needs of society in the future will be different from what they have been in the past. The future demand for scientists is likely to grow in subject areas that currently seem foreign to most physics departments, such as transportation, environment, materials, consumer goods, health, entertainment, human services and finance. Perhaps unforeseen world events will alter these projections, but such uncertainty is no basis for planning the future of physics.

Some of our colleagues argue that physics has no place in these areas and that it would be preferable to encourage the profession to shrink. We emphatically disagree. In the near future, shrinkage is likely to happen whether we encourage it or not. More fundamentally, we believe that physics has much to offer society across a wide range of evolving subject areas, and that a physics major who has not been hemmed in by overspecialized training ought to have a wider range of job options than is now the case.

The transition to a broader curriculum will face many of the same difficulties that must be overcome in broadening the research base. Too much of academic physics training is still constrained by the narrow subject-based definition of physics that is prevalent in the profession. But we cannot recommend broadening the curriculum by teaching more topics in less depth. Our concept-based definition of physics implies just the opposite—that at least a few topics be taught in enough depth that students learn what it really means to solve problems. Therefore the debate must focus on questions of priority. Ultimately, it may have to be decided whether all physics degrees must mean the same thing, or whether the boundaries between physics and other disciplines might be moved or blurred in significant ways.

But major changes, no matter how difficult, are inescapable. As seen in figure 4, roughly half of all physics PhDs already are employed outside of physics. That trend almost certainly will accelerate. We must ask, therefore, how the training currently given to physics students prepares them for work in a diverse, predominantly nonacademic environment. Do current curricula encourage concomitant study in nonphysics areas, or are they so crammed with physics courses that interdisciplinary experiences are precluded? Do physics students come into contact with a broad range of professional scientists—academic and nonacademic, physicists and nonphysicists? How do physics faculty respond to students who express interests in careers in nontraditional areas?

Many physics faculties in the US are beginning to take these questions very seriously, but there remains much resistance. Part of the resistance stems from a fear that conceding to the needs of a more diverse student body will somehow compromise pure research. It is an irrational fear; training students for a more diverse job market does not mean compromising the quality of research expected of graduate students. This is the essential message in the recent National Academy of Sciences study, *Reshaping the Graduate Education of Scientists and Engineers*[8]—namely, that the graduate research experience is the appropriate foundation for diverse job opportunities. Moreover, there is no reason to believe that a more diverse research environment will dissuade the very best students from pursuing careers in academic physics. On the contrary, a greater danger is that such students will shun the pursuit of a physics PhD out of fear that there will be too few options open to them once they graduate. In other words a healthy physics enterprise will encourage,



EMPLOYMENT OF PHYSICS PHDs in physics, 1973–89. The total number of physics PhDs rose from 19 900 to 31 400 during the period. (From unpublished NRC data.) FIGURE 4

not discourage, the growth of pure research.

A historical perspective regarding this issue may be obtained from Spencer Weart's 1979 essay on the transition in physics that occurred between the world wars.[9] The interwar period was a time of tension between pure and applied physics that displayed some of the same biases that exist today. Farsighted leaders prevailed in the 1920s with the argument that the strength of the pure enterprise was inextricably linked to the applied, and they persuaded the physics community to take concerted action to prevent a schism. The American Institute of Physics was created as an umbrella organization under which the American Physical Society could coexist with specialized sister societies (the Optical Society of America, the Acoustical Society of America and so on), which were founded to fill specialized needs. At about the same time, new journals such as the *Journal of the Optical Society of America*, the *Journal of the Acoustical Society of America* and the *Review of Scientific Instruments* were begun as complements to the *Physical Review*. A remarkable result of these actions, as Weart details, was that physics—both pure and applied, industrial and academic—grew throughout the depression years.

Yet each era is unique. Our goal today should be to produce students who are trained to find important physics in the new areas that will be profitable and exciting in the 21st century. This goal seems more difficult, and yet more urgent, than the challenges that faced our predecessors 75 years ago.

Rejuvenating physics faculties

It is an unfortunate fact that, as we grow older, even if we remain highly productive, we find it increasingly difficult to take advantage of new opportunities. The flexibility to move into uncharted areas is by and large an attribute of youth. This fact is part of the precariousness of the current situation in physics. Our vision for the future of physics includes increased emphasis on novel areas, but we need new people to play leading roles in these transitions.

Of all the problems facing physics in its current crisis, this one—the aging of physics faculties—seems the hardest to solve. Clearly the line in figure 1 cannot be extrapolated for many more years if physics is to retain any semblance of vitality. Yet the options for a systematic response to this problem are severely limited.

The best we can suggest is simply that physicists take an opportunistic approach—that is, that all physicists become keenly aware of the overwhelming seriousness of this problem and take advantage of whatever opportunities arise. In some special circumstances, such as in the situation that has prevailed at the University of California in the last several years, early retirement programs may be feasible. Perhaps other universities can adopt similar programs.

There are several cautions, however. One is that early retirement programs are not really accomplishing much for physics as a whole if the retirees reenter the job market and compete successfully with their younger colleagues for positions at other institutions, or if young people replace retirees in exactly the same research areas. Another concern is that early retirement programs might become the means for permanently decreasing physics faculties. The physics profession is in a stronger position to guard against such a trend if the impetus for early retirement programs comes from within the profession rather than being imposed upon it from without. Here, as elsewhere in this essay, we urge that physicists behave proactively.

Creating the future

Physics is now at a crossroads. Graduates are having difficulty finding jobs, faculties are aging and the profession is becoming increasingly isolated from the dominant issues of modern science and technology. Where should physics go from here? We—the authors of this article—do not pretend to have ideal or painless answers to this question. We have suggested steps that seem reasonable to us, but we recognize that the real answers will have to emerge from introspection and open-minded discussions among our colleagues. We care deeply about our profession and believe that, by concerted effort, much can be done to ensure a healthy future for physics. Of two things we are certain—that the future of physics will be different from its recent past, and that we physicists must work energetically to choose the future we want.

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