PHYSICS and SOCIETY

The NEWSLETTER of the FORUM on PHYSICS and SOCIETY

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REPORT FROM THE APS COUNCIL, WASHINGTON APRIL, 1979, Earl Callen, Forum Councillor

Professional Concerns Committee: We've got our Committee on Opportunities (?) in Physics. Council approved a Bylaws change to drop the Professional Concerns Committee and add a Committee on O. in P. with a mandate to "be responsible for activities relating to opportunities in physics and the evolution of physics as a career and to make appropriate recommendations on these matters to the President and Council". The intent of the change in title and charge is to mollify the IRS. APS President Branscomb will now appoint committee members, and promises to nudge the committee into life. I've got a number of ideas for things they can do, and no doubt many of you have ideas also. Write to Brian Schwartz, Acting Chairman (Dean of Arts and Sciences, Brooklyn College, New York, N.Y. 11210). Most important, send in suggestions (including yourself) for committee members. Lets have some good, unreasonable, irascible people.

New Building: Physical Review has to leave the Brookhaven site. No room. Council empowered the Executive Committee to commit up to $750,000 to buy land and erect offices for the Physical Review/Physical Review Letters staff. A developer has a site near the entrance to Brookhaven Labs. It sounds like a reasonable solution (and a good investment).
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IN THIS ISSUE:

PHYSICS PH.D.'s AND PERMANENT CAREERS IN PHYSICS - 1979, By the Editor

According to Suzanne Ellis' 1979 report[1] on physics degrees and enrollments, we have finally reached a leveling off in the rate at which physics Ph.D.'s are granted in the United States. From a high of almost 1600 per year in 1970 (Figure 1), the rate has decreased to 972 Ph.D.'s granted in the 1977-78 academic year; and reliable extrapolations predict a constant rate of about 1000 per year through 1983. The crucial question is whether this rate of production of new physics Ph.D.'s is equal to the yearly demand for new Ph.D.'s in physics and physics-related fields? In more human terms: can the new physics Ph.D's all find permanent careers in physics? This was not possible during most of the 1970's when overproduction of physics Ph.D.'s forced at least 6000 physics Ph.D.'s to leave the traditional areas of physics and at least 1000 to leave science altogether.[2] These numbers are quite large when one considers that the total number of physics Ph.D.'s granted in this country is about 30,000. A look at the painful days of the early 1970's can be obtained by reading the February, 1975 (Volume 4, No. 1) issue of this newsletter which is an informal proceedings of the Conference on Tradition and Change in Physics Graduate Education (Pennsylvania State University, August 1974).

A great deal of information relevant to the question of whether the new Ph.D.'s will be able to find permanent physics careers is contained in the 1977 article by Lee Grodzins called "Supply and Demand for Ph.D. Physicists, 1975 to 1980".[3] Present day economic conditions, general employment conditions, and academic employment conditions are very close to those assumed by Grodzins when he wrote this article. Figure 2 is taken from his Figure 9. Physicists like to understand where numbers come from, and so I'll give a brief explanation of Figure 2 for the year 1980. Grodzins uses for his calculations a

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base of about 19,000 Ph.D. physicists employed in traditional areas of physics; which he defined as those areas in which graduate schools of physics concentrate.[4] Actuary data predicts a 1.16% death and retirement rate for 1980. This leads to a need for abour 200 new Ph.D.'s per year for death and retirement replacements. The next category in Figure 2 is replacement of those physicists who voluntary leave physics for some other field. The third category in Figure 2, upgrading of non-Ph.D. physics positions to Ph.D. physics positions assumes that the 6000 non-Ph.D. positions will be converted to Ph.D. positions at the rate of 4% per year. Thus, if there is no net growth in the employment in the traditional areas of physics, the need for new Ph.D.'s is about 600 per year.

There is no way to substantially increase this estimate of 600 per year. Indeed it may be optimistic in view of the new federal law which says that the minimum age for mandatory retirement is 70; compared to the traditional 65. And in California, which is often a bellwether for the nation, it is illegal to have a mandatory retirement policy based on age.

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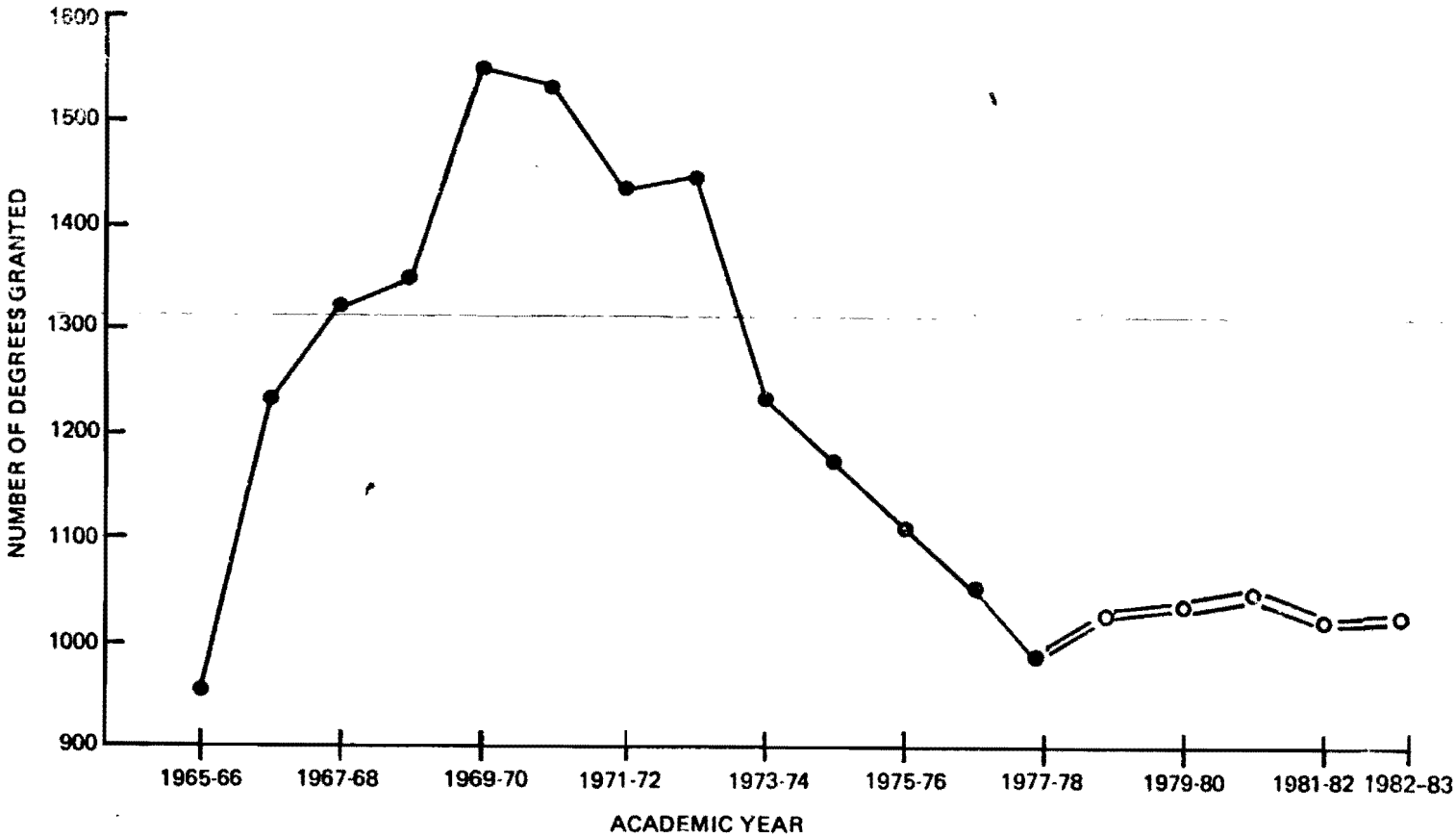

FIGURE 1

Actual and projected number of physics doctorated granted 1965-1983 (Ref. 1)

PHYSICS PH.D's AND PERMANENT CAREERS (continued from page 2)

How will the gap be closed between Figure 2's estimate of 600 new jobs per year and Figure 1's estimate of 1000 new Ph.D.'s per year? It will be closed in three ways.

a) Foreigns Students: about 25% of those receiving U.S. Ph.D.'s in physics are citizens of foreigns countries. Grodzins[3] assumes that 10% of all

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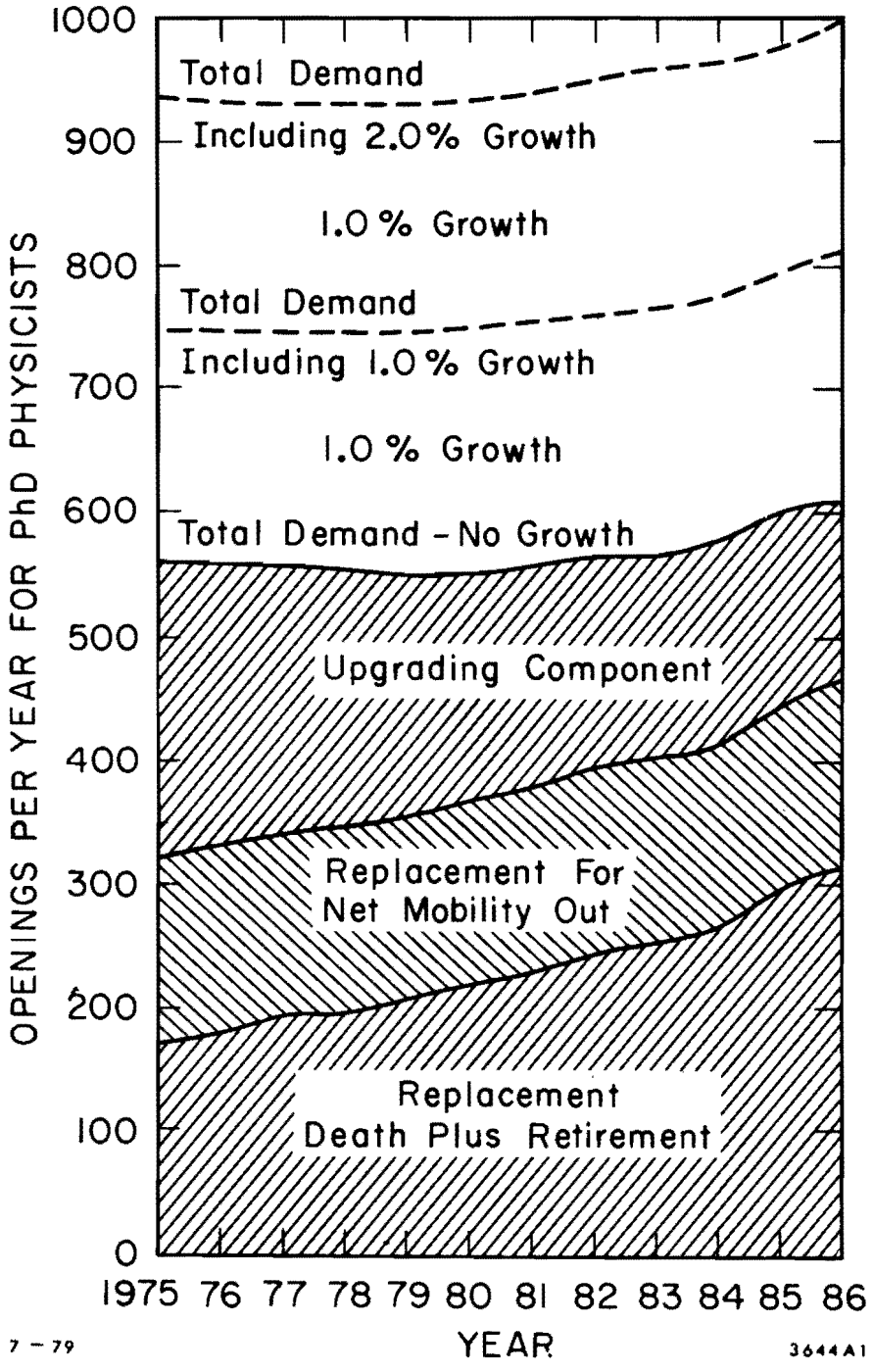
FIGURE 2



Demand for Physics Ph.D's
(modified from Ref. 3)

new Ph.D.'s (mostly of course foreign citizens) will go abroad upon receipt of their Ph.D. This leaves 900 Ph.D.'s per year to find employment in the U.S.

b) Growth in Traditional Physics Employment: in the post-Sputnik boom years there was a growth rate of 7% per year; in the early 1970's the growth rate was zero or negative. What it will be in the next five years is impossible to predict. Figure 2 shows both 1% and, probably optimistic, 2% growth curves.

c) Leaving Traditional Physics: if there is a 2% growth rate in employment in the traditional areas of physics, then all the new Ph.D.'s will be able to find permanent careers in those traditional physics areas. If the growth rate is less, say 1%, then some 100 or so new Ph.D.'s will have to take their physics skills into non-traditional areas[4] or leave science completely.

Taking all this together, the predicted yearly rate of about 1000 U.S. physics Ph.D.'s seems about right for the next five years. Fairness towards our graduate students and young Ph.D.'s requires that category c) leaving traditional physics, not be allowed to increase. Certainly some new Ph.D.'s want to take their physics skills into non-traditional areas or to leave science completely. However, most physics graduate students are looking forward to permanent careers in the traditional areas of physics.

Even 1000 new Ph.D.'s per year does not result in everything being sweetness and light in the physics community. In academia there are about 8000 physics Ph.D.'s and 2000 physics non-Ph.D.'s who teach.[5] There is no present growth in academic teaching employment and no growth is foreseen in the next five years. Using the same kinds of calculations which went into Figure 2, the total demand for new physics Ph.D.'s for teaching positions is at most 200 per year. Hence 1 in 5 physics graduate students can copy their thesis advisors career pattern and be called professor. While this problem is somewhat alleviated by a growth in non-teaching, permanent research positions in academia; in some subfields of adademic physics there is a severe problem. For example, about 50 new Ph.D.'s in theoretical particle physics are produced each year;[6] yet my theoretical friends tell me that there are about 10 openings each year for tenure track theoretical particle physics positions. This includes permanent positions in national laboratories.

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Turning to industry, anecdotal information indicates that there are plenty of jobs for new Ph.D.'s in experimental physics; but the starting salaries are comparatively modest. They range from $20,000 to $30,000 per year; not much greater than the starting salaries of bachelors in engineering. We might conclude that industry once more likes to hire new physics Ph.D.'s, but that it is not desparate for them.

Thus both statistical reasoning and anecdotal information strongly indicate that 1000 new U.S. physicists Ph.D.'s per year is about the right number if we consider the welfare and future careers of the new Ph.D.'s. If anything, 1000 per year is an upper limit. Yet we recognize that an upper limit of 1000 per year produces problems in graduate education and in basic research. Some graduate physics departments have too few students at present. Some physics subfields, such as experimental particle physics, have too few postdoctoral research associates. This latter problem is being partially solved by the creation of additional permanent positions in national laboratories and of permanent non-teaching research positions in universities. We have to find similar solutions to the other problems; solutions which accept the upper limit of 1000 new physics Ph.D.'s per year in the United States. To do otherwise whould be unfair to the young physicists and would ultimately be unhealthy for the entire physics community.

1. Suzanne Ellis; Enrollments and Degrees, February, 1979; American Institute of Physics Report R-151.16;

2. Lee Grodzins; Where Have All The Physicists Gone?, Newsletter of the Forum on Physics and Society, Vol. 4, No. 1 (1975), page 4;

3. Lee Grodzins; Supply and Demand for Ph.D. Physicists, in Physics Careers, Employment and Education (American Institute of Physics, 1978) edited by M.L. Perl, page 52;

4. Quoting Grodzins[3] "By the phrase "traditional physics" we mean those areas in which graduate schools of physics concentrate. Operationally, the labor force in traditional physics is determined by the number of Ph.D.'s who select one of the traditional sub-fields of physics when surveyed as to their principal specialty of employment. We use the phrase "non-traditional physics" to encompass those areas with substantial overlap with physics but which are not identified by those surveyed as being primarily physics. Non-traditional physics fields include growth areas such as nuclear medicine, as well as some sub-fields of mathematics, earth sciences, the bio-sciences and engineering which spun off from physics in decades past."

5. T. E. Senator; Profile of Non-Ph.D. Physicists, the Physics Careers, Employment and Education (American Institute of Physics, 1978), edited by M.L. Perl, page 5. I have used the difinition of a physicist by major field of highest degree.

6. Report of HEPAP Subpanel on High Energy Physics Manpower (1978); Chairman of subpanel: J. D. Sullivan.

REPORT FROM THE APS COUNCIL (continued from page 1)

ERA: ERA came up again. You will recall that Council had previously resolved not to schedule any more general or divisional APS meetings in states that have not ratified the ERA, while ERA is pending. At the April meeting it was moved to limit the scope of the resolution to general meeting only, the argument being that the separate Divisions should be free to set their own policy. The motion failed (for 8; opposed 12; abstaining 2). That probably settles the issue for the APS.

Broida Prize: A few months ago Council voted to make a proposal to ONR to pay for a fluid dynamics prize. We were told that a search had been made, and no other source of the funds was forthcoming. Well, now we are doing the same thing again, and with less excuse, for a prize in atomic and molecular spectroscopy or chemical physics (the Herbert P. Broida prize). We already have $3000 available, which is as large as the majority of the APS prizes. But Council voted to make this prize $5000 and ask ONR for the money (ONR has indicated receptivity). (For: 21; opposed 1). But there were 5 of us who voted to lower the prize to $3000. In my terms that's a groundswell.

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IF YOU JOIN BEFORE DECEMBER 1, 1979, THERE ARE NO DUES.

To become a member of the Forum fill in this form and mail to:

E. William Colglazier
Center for Science and International Affairs
John F. Kennedy School of Government
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FORUM SESSIONS AT APS MEETINGS

The Program Chairman for Forum sessions at the APS meetings is Dean Brian Schwartz. The three meetings for which programs are being planned are the annual meeting in Chicago in late January, the Solid State meeting in New York in late March and the Washington meeting in late April. If you have a suggestion for a topic for any of the meetings, please write to Dean Schwartz. You should include the title of the session, possible speaker and their affiliation, and the name of an appropriate person who will arrange the program. Please wirte directly to:

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