Vol. 14, No. 1
Spring 1994

CSWP

A Newsletter of the Committee on the Status of Women in Physics of The American Physical Society

Judy Franz Named Executive Officer of APS

The American Physical Society announced in January that former CSWP Chair Judy Franz has accepted the position of Executive Officer of the APS. Dr. Franz is currently on leave from the University of Alabama at Huntsville. She recently completed her term as Chair of the APS Division of Condensed Matter Physics.

Judy Franz received a B.A. degree in Physics from Cornell University in 1959 and a Ph.D. from the University of Illinois at Urbana-Champaign in 1965. She was a post-doc at the IBM Research Laboratory in Zurich from 1965 to 1967 and served in all the professorial ranks in the physics department of Indiana University between 1968 and 1987. From 1987-1991, she was professor of physics at West Virginia University. She has held visiting professorships at the Technical University of Munich and at Cornell.

Dr. Franz's field of research is Condensed Matter Theory. She has published extensively in the area of electronic properties of disordered materials. In addition, she has worked vigorously to improve physics education. Her administrative experience includes service as an associate dean at Indiana University.

She is a fellow of The American Physical Society and of the American Association for the Advancement of Science, as well as a holder of the Indiana University Distinguished Teaching Award. She has an extraordinary record of service to the scientific community, including the presidency of the American Association of Physics Teachers and membership on the Governing Board of the American Institute of Physics, the Council of the Association of Women in Science, the Executive Board of the Council of Scientific Society Presidents, and the Advisory Committee on the NSF Division of Materials Research. In The American Physical Society, in addition to her participation in the governance of the Condensed Matter Physics Division, she has served on the APS Council, the Executive Committee and half a dozen other committees, including, as chair, of the Committee on Education and the Committee on the Status of Women in Physics.

Judy R. Franz, APS Executive Officer

The Gazette caught up with Judy Franz, and asked her about her new position, her goals for The American Physical Society and her opinions on the prospects for women in the field of physics.

Please see Franz, pg. 20

INSIDE

The Editor for this issue is **BUNNY C. CLARK**, Managing Editor **TARA McLOUGHLIN**; Design & Production **ELIZABETH BUCHAN-HIGGINS and ADRIENNE MOSLEY.**

PUBLICATION INFORMATION

The ***CSWP GAZETTE***, a quarterly newsletter of The American Physical Society Committee on the Status of Women in Physics (CSWP), is mailed free of charge to all those listed on the computerized "Roster of Women in Physics," all U.S. physics department chairs, and others upon request. Because editorial responsibility rotates among CSWP members, please address all correspondence to: ***CSWP Gazette***, The American Physical Society, One Physics Ellipse, College Park, MD 20740-3844 or e-mail to: TARA@APS.ORG.

A Letter from the CSWP Chair, Luz Martínez-Miranda

I would like to extend to you all my belated wishes for a happy and productive New Year. I am delighted to serve as this year's Chair for CSWP and feel very fortunate to have Bunny Clark on the Committee as Past Chair. The mission of CSWP is to improve the participation of women in all fields and at all levels in the physics community. It's final goal, as the CSWP mission statement says, is to make itself unnecessary once this mission has been achieved.

As part of our mission, we seek to improve the retention of women in physics in both graduate and undergraduate programs; to increase the recognition of exceptional women physicists; and to increase the visibility of women physicists in the field. During the last four years, both AAPT and APS have worked to achieve the first goal, by collecting statistical data on physics departments in research universities in the United States through the NSF sponsored Site Visits Program. In addition, twenty-one distinguished women colleagues were named APS Fellows this past year. This year, we will continue our work on these goals, and concentrate new efforts in increasing the visibility of women physicists in the field.

To achieve this, we need the help of all members of the APS, both male and female. I would like to encourage all to recommend, whenever possible, the names of competent women for invited talks at APS meetings, as well as topical and international meetings; and also, to recommend women physicists as member of organizing committees for such meetings. Finally, I would like to encourage colloquia organizers to include women in their list of speakers on a semester-basis. A very useful source of names is the CSWP Colloquium Seminar Speakers List (CSSL), available from APS (see order form, page 14). I encourage all women physicists to add their names to this list. Please also note that the Travel Grants

Luz J. Martínez-Miranda

for Women Speakers Program of the APS, which provides funding for the travel expenses of women colloquium speakers, will be available for the 1994-1995 academic year from APS beginning in August of 1994. Watch the *Gazette* for details.

In closing, I would like to extend my heartfelt congratulations to Judy Franz on being appointed Executive Officer of the APS. Bravo, Judy!

Luz J. Martínez-Miranda
Chair CSWP

Changing your Address?

Please fill out the address section of the Roster Enrollment Form on pg. 25 and return it to APS.

A Letter from Bunny C. Clark, the Past Chair of CSWP

For the past two years I have had the pleasure of chairing the Committee on the Status of Women in Physics. It has been a wonderful two years. During this time the CSWP celebrated its 20th year of existence, and there is no doubt in my mind that this Committee has made a difference to women in physics and has lived up to the expectations of its founding members. The new chair of the CSWP, Luz Martínez-Miranda, is committed, energetic and just the right person to lead the CSWP. We all are very happy that she is taking on this job. She is a winner!

However, we all know that much work is still to be done to ensure that women have equal opportunity to participate fully in the physics profession. This point was clearly made in the *Physics Today* article "Women in Physics: Reversing the Exclusion" by Mary Fehrs and Roman Czujko. It is continually made in dialogue appearing on the CSWP e-mail bulletin board WIPHYS.

The annual report of the CSWP as well as articles which have appeared in the *Gazette* describe many of the programs that the CSWP sponsors to improve the opportunities for women in physics. The number of young women in the field is on the increase. Perhaps in a few years the number of women will reach what Mildred Dresselhaus has termed a critical mass. I think that this will no doubt be beneficial to the discipline.

I would like to take this opportunity to mention a new endeavor that the Committee will be undertaking this year. I have been a practicing physicist for 35 years. I have seen many positive changes in our field, although there is still a lot of pain out there. Women hold a number of positions of responsibility within the APS. I am particularly happy that Professor Judy Franz, Past Chair of CSWP and DCMP, has accepted the position of Executive Officer of the APS. She brings strength and skill to this important job. I know all young people

Bunny C. Clark

in physics will find that she is a caring and effective advocate for them in these uncertain times.

I have become increasingly concerned by what appears to me to be an under-representation of women in what I call "the professional power structure". Women are well represented in some, but not all areas of physics. We all know that invitations to give invited talks at conferences are very good for one's career, and that visibility is critical to the development of young scientists, both men and women. However, it is my perception that, at least in my own field (nuclear theory), few women serve on organizing committees for national and international conferences, or serve on the planning, advisory and organizing committees of federally funded institutes and laboratories.

For example, the most important such institute in my area, the Institute for Nuclear Theory, located at the University of Washington, Seattle and funded by the DOE, has no women on its advisory board, something that I have pointed out on a number of occasions to the present and former director. In truth, it seems that the same male names keep showing up time and time again as members on committees/boards. My field is relatively small, but it is my guess that the lack of women on such committees may well account for the relatively few women participants, and for the small number of women who are giving invited talks at conferences. I do know that our Chair, Luz Martínez-Miranda, was instrumental in getting women participants in the upcoming joint meeting with the Mexican Physical Society. Score one for Luz!

Before the Committee makes any statement on this situation, we must have some facts. For this reason, the CSWP is beginning a program to gather information on the number of women serving on professional advisory committees and organizing committees for both national and international conferences as well as the national labs and institutes. Many such institutes and conferences are funded by federal agencies and, as such, should welcome diversity in all of their activities. I find that most NSF advisory committees do have at least one woman member. It has not been possible for me to find out much about DOE advisory committees.

We can probably obtain the membership of advisory committees for laboratories and institutes, but the task of obtaining the membership of conference planning committees and advisory committees is daunting. This is where we need your help. If you have suggestions on how we can best get this information we would appreciate hearing from you. You can send me a message on e-mail (BCC@MPS.OHIO-STATE.EDU), or contact WIPHYS, or send a message to Tara McLoughlin at APS headquarters (TARA@APS.ORG.). The Committee plans to monitor the situation and make a full report after the survey is completed.

I wish to thank the members of the CSWP for making my two years as Chair so rewarding. The things that we have accomplished together have been good for women and good for physics. As always, we have been most fortunate to work with the APS staff, Tara McLoughlin, Arlene Modeste and Brian Schwartz; they have been wonderful.

I wish you all a good year.

Bunny C. Clark, Past Chair CSWP
The Ohio State University

Update on the Chilly Climate for Women in Physics

by Mildred S. Dresselhaus, Massachusetts Institute of Technology

In this article, we first provide evidence for the chilly climate for women in physics, and then offer preliminary suggestions for enhancing the opportunities for women undergraduates, graduate students and faculty members in physics.

In Fig. 1 (based on NSF data), the pipeline for men and women in science is illustrated, clearly showing the lower probability for women to first study science at the high school level, through college, through graduate programs, and eventually attaining the Ph.D. degree. Whereas the pipeline continues to narrow more dramatically for women relative to men, as shown in Fig. 1, the effect is more dramatic in physics than in science, generally, as shown in Fig. 2, where the pipeline is followed by American Institute of Physics data through academic careers in physics.

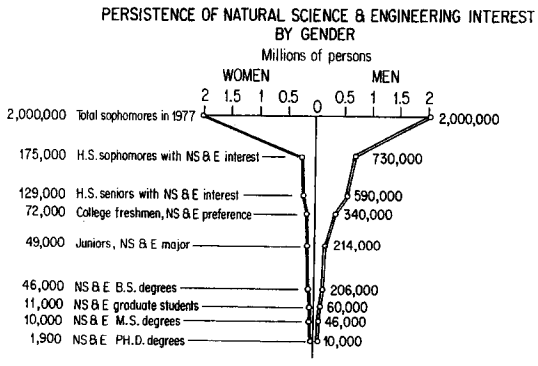


Fig. 1

Over time, impressive progress has been made in expanding the opportunities for women in all fields of science, and this is documented in Fig. 3 for achievement of the B.S. degree and in Fig. 4 for the Ph.D. degree in selected fields of science. In these figures we also see the increasing numbers of women in physics over time relative to other science fields. At present, women constitute 15% of the cohort receiving B.S. degrees in physics (Fig. 3),

Participation of Women at Different Points in the Physics Educational Pipeline

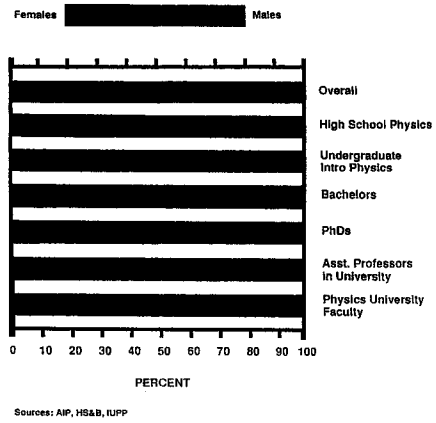


Fig. 2

and just over 10% of the Ph.D.'s (see Fig. 4) are awarded to women. Figures 3 and 4 show that the increasing participation of women physics students over time is slower than for other fields of science. In absolute numbers, the number of women Ph.D. degrees recipients in physics (currently 150/year) is small relative to the other professions, as shown in Fig. 5 for the year 1985. A more detailed recent comparison of doctoral degree recipients in science fields is shown in Fig. 6, where it is seen that over 1/3 of the Ph.D. science degrees (36%) currently go to women. The probability for a woman to attain a Ph.D. degree in the physical sciences is only half (18%) that for the sciences generally, while in physics the level is only 11%. Except for engineering, physics ranks lowest in the percentage of women earning Ph.D. degrees. The relative unpopularity of the physical sciences for careers for women is illustrated in Fig. 7, which also highlights fields that are popular for women.

Since employment figures are sensitive to the small numbers of women entering science and engineering careers in the past, the percentage of women with careers in Physics/Astronomy is much lower than the percentage of degree recipients. Figure 8 shows that women constitute 20% of scientists employed in academia, whereas only 4.6% of those in physics are women. Similarly in industry (or self-employed), Fig. 9 shows that 15% of all scientists are women, but this number drops to less than 4% in physics. Figure 10 shows the percentage growth of scientists and engineers over the 1978-88 decade, a decade where the number of technical workers increased dramatically; this figure shows that the percentage growth of the workforce was even greater for women than for men, while

Percent of Bachelors Degrees in Selected Fields Earned by Women, 1971 - 1985.

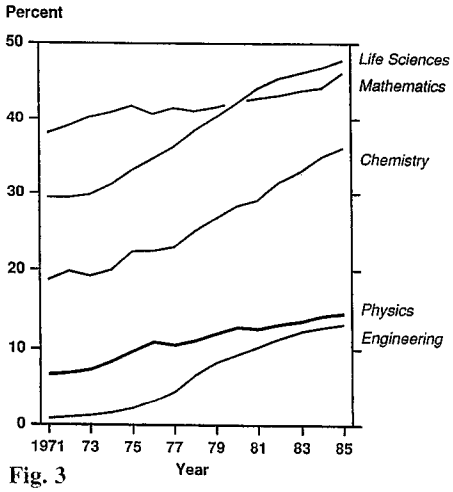


Fig. 3

Fig. 11 shows that the growth rates for women exceeded those of men in all three sectors: academia, industry, and the federal government.

As a result of the demographic figures of the past, the percentage of women in academic ranks in physics departments is low overall (3%), as shown in Fig. 12, where it is also seen that as the rank increases, the percentage of female participation decreases sharply. Figure 12 also shows women in academic physics are more likely to be in alternate academic ranks than in the

tenure track. Figure 13 shows that over the decade 1975-85, the percentage of women on physics faculties in the U.S. increased only by 10%, despite the significant increase in the number of women Ph.D.'s in Physics during this

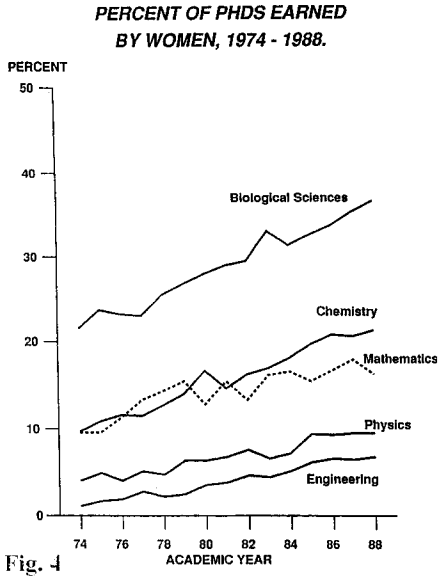


Fig. 4

time period (see Fig. 5) and the larger increase in women faculty in the other fields. Of particular interest is the large increases in percentage of women engineering faculty members in this 10 year period, although the absolute numbers are small.

Number of Women Receiving Degrees in Selected Disciplines, 1985	
Physics PhD's	97
Mathematics PhD's	106
Engineering PhD's	198
M.D.'s	4,874
L.L.B.'s	14,421

Sources: U.S. Dept. of Educ. & N.A.S.

Fig. 5

Further aspects of the chilly climate for women in physics are shown in Fig. 14, where it is seen that women in the physical sciences are about twice as likely as men to be unemployed, similar to the situation for all women scientists compared to their male counterparts. In Fig. 15 we see that the average salaries for women in the physical sciences are about 75% that of men, again comparable to the general situation in the sciences.

In comparison to women physicists in other countries, American women physicists represent a relatively small percentage of the total for B.S. and Ph.D. degree completion and in the faculty ranks as shown in Fig. 16. American women compare less and less favorably in the international comparisons as the degree level increases. In fact American women show the lowest percentage of all countries in physics faculty ranks. If women in physics are doing so much better in other countries, then we should try to understand the factors in our university system that are so discouraging to women.

In Fig. 17 we see some evidence that interventions can improve the climate for women. In this figure we see a 5-fold improvement in the retention rate for women employees at the Corning Corporation when positive steps were taken to improve the climate for women. The figure shows that the steps taken to improve the climate for women also resulted in a twofold improvement in the retention rates for men. An important consideration for improving the climate for women in physics is shown in Fig. 18 where the ages of men and women members of The American Physical Society (APS) are plotted on the x and y axes, respectively. For members 45 years and older, women represented approximately 3% of the membership, whereas the youngest age cohort (<30 years old) has a 15% female participation. The average age of women members of the APS is ~33 years, whereas the average age of male members is 45 years. Thus many of the men believe that there are very few women in physics, whereas most of the women feel that they are not so greatly outnumbered relative to men (only 7:1). The breakpoint in the slope of Fig. 18 corresponds to 1972, when the Committee on the Status of Women in Physics was started. These data give us some hope that interventions can have some positive effects on improving the climate for women in physics.

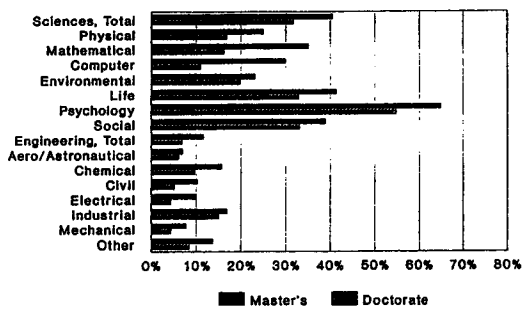
Figure 19 shows that women are now well supported in their pursuit of studies in the physical sciences, essentially equivalent to the support given to men. This is an encouraging sign. We note that this is not true in all academic fields.

Doctoral Degrees Awarded to Women, by Field, 1990

Field	Total Degrees	Degrees to Women Number	Degrees to Women Percent
TOTAL, All Fields	36,027	13,061	36
Physical Science	5,859	1,068	18
Mathematics	892	158	18
Computer Science	704	110	16
Physics	1,392	149	11
Chemistry	2,102	502	24
Environmental Science	769	149	19
Engineering	4,892	414	8
Life Sciences	6,613	2,474	37
Biology	4,333	1,606	37
Health	960	595	62
Agriculture	1,320	273	28
Social Sciences	6,076	2,815	46
Psychology	3,267	1,906	58
Humanities	3,820	1,741	46
Language/Literature	1,308	746	57
Education	3,736	6,484	58
Professional/Other	813	2,283	36

SOURCE: Delores H. Thurgood and Joanne M. Weinmann, *Summary Report 1990: Doctorate Recipients from United States Universities,* Washington, DC: National Academy Press, 1991.

Fig. 6



SOURCE: National Science Foundation, *Women and Minorities in Science and Engineering* (NSF 90-301), Washington, DC: NSF, 1990, p. 22.

Fig. 7 Percentage of advanced degrees in science and engineering granted to women, by field, 1990.

Employed Women Doctoral Scientists and Engineers in Educational Institutions, by Field, 1989

Selected Fields	Total	Women	
		Number	Percent
All Fields	220,942	39,864	18.0
All Science*	195,981	39,185	20.0
Chemistry	15,074	1,861	12.3
Physics/Astronomy	13,825	640	4.6
Mathematics	11,614	1,116	9.6
Computer Science	6,349	689	10.9
Environmental Sciences	5,519	534	9.7
Biological Sciences	43,198	10,264	23.8
Engineering	24,961	679	2.7

*Includes social sciences and psychology.
SOURCE: Betty M. Vetter, *Professional Women and Minorities*, Washington, DC: Commission on Professionals in Science and Technology, 1992, p. 131.

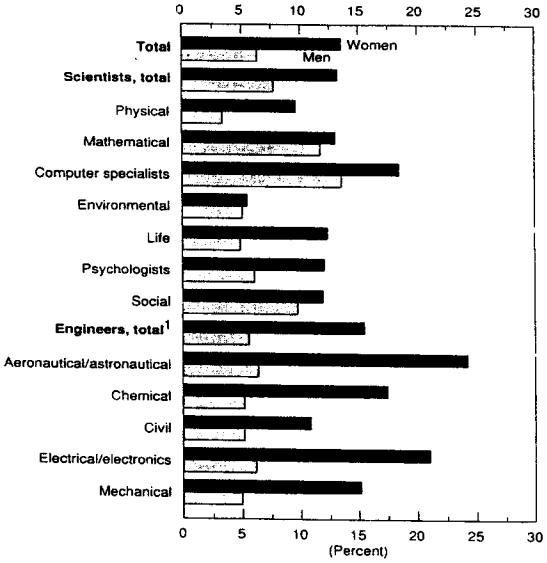
Fig. 8

Figure 20 shows that women are now doing well compared to men in the award of National Science Foundation (NSF) graduate fellowships in physics. With regard to women in other fields, women in physics and astronomy are doing well, and these data show significant progress between the 1992 and 1985 data. We consider these data as providing further hopeful signs.

Additional hopeful signs are seen in Fig. 21 which shows that the mean time to completion of a Ph.D. degree at UC/ Berkeley (starting from the time of the awarding of the B.S. degree) is less than that for men; in all other fields shown in Fig. 21, men complete their Ph.D. degrees more quickly. The Ph.D. completion rate for women in the physical sciences is however close to 50% (see Fig. 22), whereas that of men is near 70%, suggesting that interventions could enhance the completion rate for women, and perhaps at the same time could also improve the completion rates for the men.

Further suggestions that interventions might prove useful for improving the climate for women at universities come form Fig. 23 which show that women tend to internalize deficiencies in their educational experiences, while men tend to blame the professors. Much more data on the issues discussed here can be obtained in the two volumes prepared by the Committee on Women in Science and Engineering of the National Research Council, entitled *Women in Science and Engineering Increasing Their Numbers in the 1990's* and *Science and Engineering Programs: On Target for Women?*

At a previous meeting of the Physics Department Heads three years ago, a resolution was passed that the American Association of Physics Teachers (AAPT) and The American Physical Society (APS) should consider a course of action to improve the climate in the American Universities for women in physics. In response to this challenge, the women's committees of the AAPT and the APS formulated a plan to visit various universities to identify specific situations responsible for the chilly climate for women physicists, and to recommend specific simple steps that could have a significant impact on improving this climate. Each visit was to be carried out by a team of about 5 women physicists, most of whom were of senior stature, and with well recognized accomplishments in physics. A survey for women undergraduate and graduate students was also developed, and intended to canvas a larger net of female and male students than could be interviewed in person. The objectives of these visits (and also of the questionnaire)



[1] No additional engineering subfields are available for 1978.
SOURCE: National Science Foundation, Women and Minorities in Science and Engineering (NSF 90-301), Washington, D.C.: NSF, 1990.

Figure 10. Average annual employment growth rate of scientists and engineers, by field and sex, 1978-1988.

Fig.10

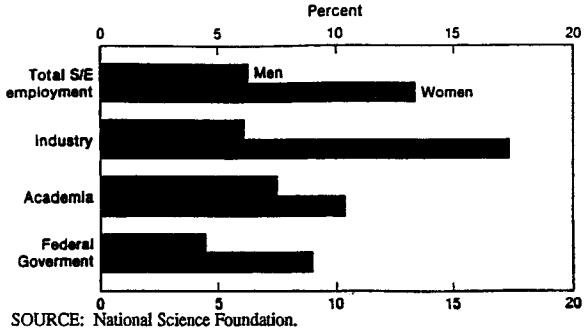
Employed Women Doctoral Scientists and Engineers in Industrial/Self-Employed Positions, 1989

Selected Fields	Total	Women	
		Number	Percent
All Fields	145,148	19,485	12.1
All Science*	103,189	18,148	15.8
Chemistry	25,799	2,200	7.5
Physics	6,243	257	3.9
Mathematics	2,105	285	11.3
Computer Science	11,483	1,318	9.7
Environmental Sciences	6,266	437	5.3
Life Sciences	23,572	4,303	15.9
Engineering	41,959	1,337	2.5

*Includes social sciences and psychology.
SOURCE: Unpublished data, 1989 Survey of Doctorate Recipients, National Science Foundation and National Research Council.

Fig. 9

SOURCE: Office of Scientific and Engineering Personnel, Survey of Doctorate Recipients.



SOURCE: National Science Foundation.

Average annual employment growth, by employment sector and sex, 1976-1987.

Fig. 11

were the following: (1) to identify a set of generic problems commonly experienced by women physicists, (2) to recommend interventions to solve many of these generic problems, and (3) to address problems arising in the particular physics departments visited and to help improve the climate for women in these departments. Five physics departments were visited (see Fig. 24) in a pilot program, sponsored financially by the APS, and carried out collaboratively by the AAPT and APS groups as mentioned above. On the basis of the successes with the pilot program, Professor Judy Franz and I received funds from the National Science Foundation (NSF) for visits to 10 other physics departments. Our NSF grant has also provided partial support for a national survey of undergraduate and graduate students on climate issues. This questionnaire was prepared by Roman Czujko and the results of the survey will be analyzed by Roman

Academic Rank in PhD Physics Departments by Gender, 1985. (a)

	Female N	Male N	Female %
Full Professors	44	2832	1.5
Associate Professors	23	793	2.8
Assistant Professors	33	467	6.6
Other Ranks	33	420	7.3
Total Number	133	4512	2.9

(a) These data are based on the 161 departments that were PhD granting during each of the academic years 1982-83 through 1986-87.

Fig.12

Czujko and others at the American Institute of Physics Statistics Division.

We now review some preliminary findings from the project to date. Our visits showed that the climate for women varied a great deal from one physics department to another, ranging from welcoming to hostile, most being well described as chilly. As the percentage of women physicists increased, the climate generally improved. Some climate issues identified by both women and men as needing attention

PERCENT WOMEN ON FACULTY IN SELECTED FIELDS, 1975 AND 1985.

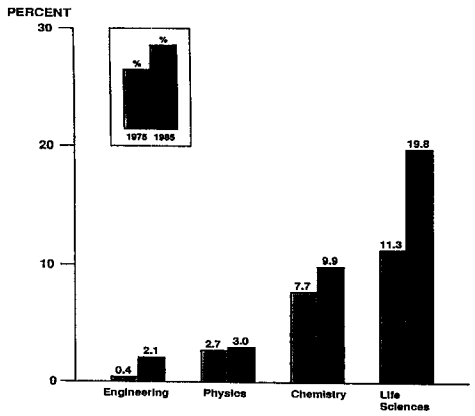
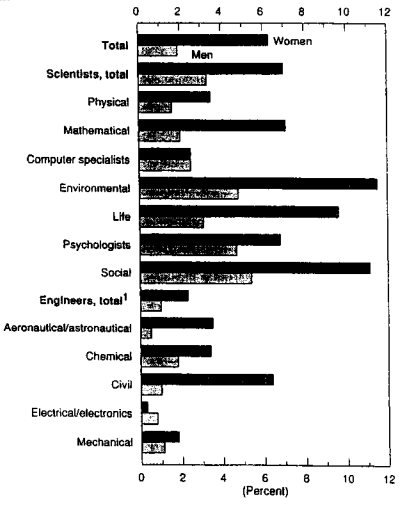


Fig. 13

Source: NSF

included poor teaching, poor mentoring, autocratic attitudes of departmental leaders, and a lack of respect for physics students by physics faculty. A special problem besetting physics students at the present time is the poor job prospects for physics graduates in traditional jobs; physics faculty members were criticized by students for their lack of encouragement in pursuing nontraditional jobs in industry, small companies, education, and other nontraditional possibilities.

Women physics students identified a host of other issues that contributed to the chilly climate, including: (1) the absence of a support net, (2) the absence of an advocate for their special concerns, (3) the absence of a networking group, (4) the absence of communications with the department chair, (5) the absence of welcoming signals such as visibility of women in the physics brochure, or of women faculty members and postdocs, (6) the lack of female role models who have successfully combined a physics career and raising a family, and (7) the lack of successful strategies to respond to a variety of situations, such as an aggressive classroom and research environment, a male-oriented tradition, practices excluding women from depart-

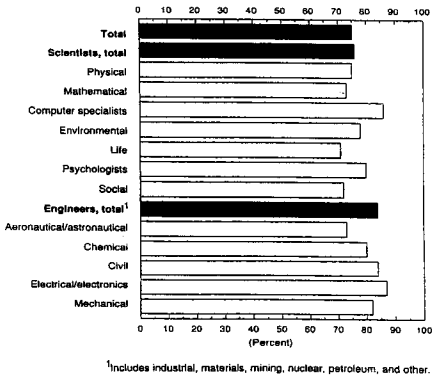


[1]Includes industrial, materials, mining, nuclear, petroleum, and other.

Fig. 14

SOURCE: National Science Foundation, *Women and Minorities in Science and Engineering* (NSF 90-301), Washington, DC: NSF, 1990.

Science and engineering unemployment rates of men and women, by field, 1986.



[1]Includes industrial, materials, mining, nuclear, petroleum, and other.

SOURCE: National Science Foundation, *Women and Minorities in Science and Engineering* (NSF 90-301), Washington, DC: NSF, 1990.

Women's salaries as a percentage of men's salaries, by field, 1986.

Fig. 15

mental activities, sexually-explicit conversations and pictures, offensive personal interactions and male backlash against interventions to improve the climate.

We now offer a few suggestions for steps that can be taken to improve the climate for women in physics. We have classified these suggestions under three headings: undergraduate student/faculty interventions, graduate student/faculty interventions and recommendations for the recruitment and retention of female faculty members.

TABLE 5: Degrees to Women in Physics and Women as Physics Faculty (in percent)

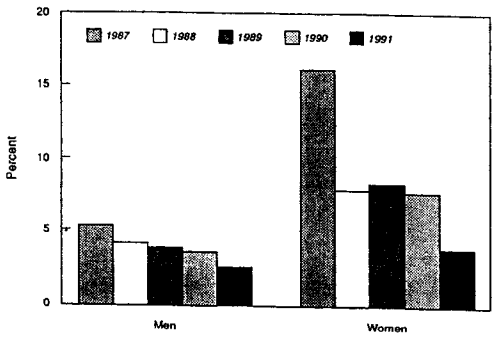
Country	Degrees to Recent Graduates: Bachelor's	Doctorate	Faculty
Belgium	33	29	11
Brazil	24	31	18
Democratic German Republic	12	18	8
France	24	21	23
Hungary	50	27	47
India	25	26	10
Ireland	22	20	7
Italy	29	21	23
Japan	7	4	6
Korea	20	5	3
Netherlands	20	4	6
New Zealand	10	11	6
Philippines	28	60	31
Poland	14	17	17
South Africa	24	21	9
Spain	17	21	16
Turkey	38	17	23
Union of Soviet Socialist Republics	34	25	30
United Kingdom	16	12	4
United States	15	9	3

SOURCE: W. J. Megaw, *Gender Distribution in the World's Physics Departments*, paper prepared for the meeting, Gender and Science and Technology 6, Melbourne, Australia, July 14-18, 1991.

Fig. 16

•UNDERGRADUATE STUDENTS•

With regard to physics undergraduates, several simple efforts could have a significant impact. Documenting with statistics the message that the presence of women physics students does not lower admission or course standards would be helpful to women students, male students and faculty in taking women physics students more seriously. The department head should explicitly express support for good gender and race relations. Women physics undergraduates are anxious to see a woman on the physics faculty, as an existence theorem that there are careers possible for women in academia; women in the tenure ranks can be particularly helpful as mentors and advocates. Nontenured women faculty should not be encouraged to take on the roles of mentoring and advocacy, because of the negative support of such service on tenure positions in physics departments.



SOURCE: Eve L. Menger, *Selected Employee Retention Efforts at Corning Incorporated*, presentation at the National Research Council conference on "Science and Engineering Programs: On Target for Women?," Irvine, CA November 4-5, 1991.

Fig. 17 Attrition rates at Corning Corporation, 1987-1991, by sex.

Since many American physics departments are low in women faculty members, it is recommended that women colloquium speakers be invited as part of the annual list of colloquium speakers. The APS sponsors the Travel Grants for Women Colloquium Speakers program which covers the travel expenses of women invited to give colloquium talks. Other opportunities to meet women physics professionals for mentoring and career counseling should be encouraged. Some physics departments have a welcoming party for newly arrived women physics majors and graduate students; also present at this welcoming party are women students already enrolled in the program. Such a welcoming party is often effective in establishing a support net for women students. Some physics departments have an orientation program for physics teaching assistants, where teaching methods are reviewed, as well as rules and sensitivities for personal conduct toward women and minority students. The dedication of a study room for undergraduate physics majors, including women majors, is a useful approach for improving the climate for physics students. The opportunity for women science majors to live in a special residence has in some cases worked out very well (e.g., the women science residence hall at Rutgers University). Articles in the university or student newspaper documenting the academic success and achievements of current women students and graduates could go a long way in recruitment and retention of women physics students in the undergraduate program. Finally, the encouragement of an undergraduate physics club and the participation of women in this club could be helpful for improving the academic and social climate for women. It is particularly important that the department chair emphasize that deviations from fair and equal treatment of all students will not be tolerated. Mechanisms should be in place to back up this statement.

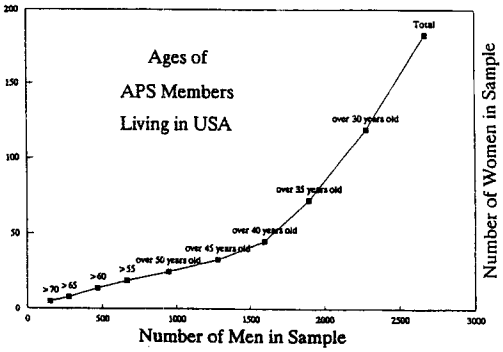


Fig. 18

•GRADUATE STUDENTS•

To improve the climate for women physics graduate students many of the same strategies are relevant, including the welcoming party for women graduate students, an informal lunch or pizza party between the department head and women graduate students at least once per semester, the encouragement by the department head of identifying an advocate for women physics graduate students, mentors for them, the appointment of women faculty members, the arrangement of women physics colloquium speakers, the scheduling of

Percentage Distribution of Primary Sources of Support of Doctorate Recipients, by Sex and Broad Field, 1989

Source/Gender	Year	Total Fields	Phys. Scncs.	Engrng.	Life Scncs.	Social Scncs.	Human.	Prof/ Educ.	Other
Personal									
Men	1989	34.1	13.7	15.3	22.3	49.1	48.0	74.6	53.5
Women	1989	51.1	13.0	12.5	27.3	59.5	48.0	77.6	57.2
Federal, Non-R.A.									
Men	1989	5.3	4.1	4.1	13.0	4.0	2.3	2.7	2.1
Women	1989	5.7	4.3	10.4	15.1	5.2	1.5	1.9	1.3
R.A., Fed. & Univ.									
Men	1989	27.2	45.4	49.7	34.4	9.2	1.5	3.0	7.2
Women	1989	15.1	42.8	50.5	30.8	8.5	1.5	3.8	9.2
Teaching Assistant									
Men	1989	17.5	25.9	12.1	10.9	21.7	31.5	5.9	21.2
Women	1989	15.7	29.5	10.0	11.8	14.6	35.4	6.4	19.1
Fellowship									
Men	1989	6.0	4.7	4.7	7.7	7.6	11.3	2.4	4.9
Women	1989	6.0	4.9	9.7	8.1	7.1	9.1	2.4	5.2
Other Sources									
Men	1989	9.9	6.2	14.1	11.6	8.4	5.4	11.3	11.1
Women	1989	6.4	5.4	6.9	6.8	5.2	4.4	7.7	8.0

SOURCE: Delores H. Thurgood and Joanne M. Weinman, *Summary Report 1989 Doctorate Recipients from U.S. Universities*, Washington, D.C.: National Academy Press, 1990.

Fig. 19

NSF Graduate Fellowship Program Applications and Awards, by Sex, 1985 and 1992

Discipline	1985		1992		1985		1992	
	M	W	M	W	M	W	M	W
	Total Applicants				Total Awards			
N	2776	1614	4387	3336	362	178	450	290
%	63.2	36.8	56.8	43.2	67.0	33.0	60.8	39.2
Biochem*	246	167	268	268	32	16	26	23
	59.6	40.4	50.0	50.0	66.7	33.3	53.1	46.9
Biology	298	274	364	499	32	40	27	46
	52.1	42.9	42.2	57.8	44.4	55.6	37.0	63.0
Chemistry	219	118	293	160	32	9	39	8
	65.0	35.0	64.7	35.3	78.0	22.0	83.0	17.0
Earth Sci	151	88	125	87	20	9	12	7
	63.2	36.8	59.0	41.0	69.0	31.0	63.1	36.9
Appl Math/ Statistics	80	39	106	89	14	1	13	3
	67.2	32.8	54.3	45.7	93.3	6.7	81.2	18.8
Mathematics	105	43	175	83	19	1	23	3
	70.9	29.1	67.8	32.2	95.0	5.0	88.5	11.5
Physics and Astronomy	309	44	394	93	39	6	35	12
	87.5	12.5	80.9	19.1	86.7	13.3	74.5	25.5
Behavioral Sciences**	397	436	791	935	50	50	77	65
	47.7	52.3	45.8	54.2	50.0	50.0	54.2	45.8
Biomedical Sciences	154	208	192	279	15	28	14	25
	42.5	57.5	40.8	59.2	42.5	57.5	35.9	64.1
Computer Science	182	54	302	90	27	3	30	2
	77.1	22.9	77.0	23.0	90.0	10.0	93.8	6.2
Engineering	635	143	1377	753	82	15	154	96
	81.6	18.4	64.7	35.3	84.5	15.5	61.6	38.4

* Includes biochemsitry, biophysics, and molecular biology.
**Prior to 1991, this field included psychology, economics, and sociology. Becasue the disaggregation of behavioral sciences—into (1) anthropology, sociology, and linguistics; (2) economicis, urban planning, and history of sciences; (3) political science, international relations, and geography; and (4) psychology—did not occur until 1991, a single category is used here.
SOURCE: National Resource Council, Office of Scientific and Engineering Personnel, Fellowships Office.

Fig. 20

women professionals as visitors, the encouragement of the formation of networking and support systems for women graduate students, and the establishment of clear and workable procedures to deal with sexual harassment. The importance of keeping communication channels open between the department head and the women graduate students cannot be overemphasized. The sponsorship of career workshops and discussion groups is important for all students, but even more important for women students. Also of mutual benefit are close interactions between women physics undergraduate and graduate students. Above all, women physics students need signals that the department head and faculty care about them and want to see them progress well through the degree program. Attention to improving the climate for women students will inevitably have a positive impact on improving the overall climate for all students.

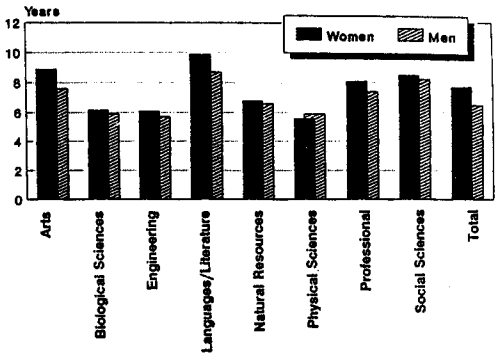
More specific suggestions are appropriate to individual physics departments, involving such issues as providing more clear information about the requirements and mechanics for passing the qualifying exams, and providing adequate office/study areas of research supervisors to give equal opportunities to women students regarding presentations at professional society meetings, the publication of research papers, and recommendations for employment opportunities.

•FACULTY•

With regard to the appointment of women physics faculty, affirmative action policies are appropriate especially in cases where there are no tenured women faculty members or less than two women faculty members. Since the academic pressures on women physics faculty members are greater than average in terms of committee service, mentoring and other responsibilities, the department head and faculty mentor should be sensitive toward providing the environment necessary to achieve tenure and remain at the cutting edge professionally. Sensitivity to the extra family responsibilities that young women faculty often have to assume in their early careers would be imperative. Generally speaking, sensitivity to the big picture regarding each and every faculty member's needs is vital for achieving a welcoming climate for the students. In the absence of the possibility of appointing at least two women faculty members, one of whom is senior, additional sensitivities by male faculty members to the well-being of junior women faculty members are needed.

In the recruitment of women physics faculty members, sensitivity is needed about the opportunities for satisfactory employment opportunities for the spouse, and the availability of satisfactory child care arrangements. Explicit attention to the mentoring of women faculty is needed, since a number of channels

Please see *Chilly* on pg. 24



SOURCE: Maresi Nerad, *Using Time, Money, and Human Resources Efficiently and Effectively in the Case of Women Graduate Students*, paper prepared for conference on "Science and Engineering Programs: On Target for Women?," Irvine, CA, November 4-5, 1991.

Mean time to doctoral degree, University of California-Berkeley, 1986-1991, by sex.

Fig. 21

Gender Politics *(Observations by a Feminist Outsider to Science)*

by Sheila Tobias

Sheila Tobias, who has written five books about math and science avoidance and anxiety, is currently at work on a history of the New Feminism in America, which she describes as an "overview" and "introductory primer" for people who did not have a chance to take women's studies in college. It is called ***Gender and Politics Redefined: The Legacy of the New Feminism in America*** *and will be published in 1994 by W. W. Norton.*

Today, in science as in other high-status professions, discrimination on the basis of gender per se is not as widespread as it used to be. (Partly because it's illegal). However, women scientists still find themselves being excluded, mistreated or overlooked because of some other category they inhabit: because they are married; because they are mothers; because they are pre-menopausal; because they are post-menopausal. In short, because they are not simply younger versions of the men they will one day replace.

Most of these "ancillary" biases are just that: "biases" and beliefs, though they are often rationalized in terms of age-old patterns of achievement in science. One particularly pernicious belief, hallowed by historians of science, is that breakthroughs in science are made only by very young (usually) males at the outset of their careers. The reason this shibboleth needs to be confronted head on by feminists is that, given the climate of low expectations in which many American girls are still being reared, and the different roles women will play in their adult lives, it is not always possible for them to make comparable contributions to their fields if compared to their age cohorts, not even to be as competitive when young as they later become.

Many science departments have learned to be open and welcoming of single graduate women who arrive to do their advanced work when in their early twenties, but the same faculty will show reluctance to admit or to fund more senior married or unmarried women (mothers among them) who first think about graduate school when in their thirties. Why? A combination of what psychologists call "cognitive dissonance" — fear and discomfort in the face of people who do not fit into familiar slots; false notions as to who is worth investing in and who is "too old."

But in fact, like so many shibboleths about science, the "they-must-be-young-to-make-a-contribution" theory is riven with exceptions. One historian of science, Stuart Gilmor, has gone so far as to counterclaim that the only reason history seems to confirm that the scientists did their best work when young is that many of them died young. Older scientists, when healthy, continued to be very productive. The freshness of the younger [man] has more to do rather with a variable Gilmor calls "newness to the field" than it has to do with youth.

> "...we have to work a little harder and be a little angrier than we have been over the past few years."

From this perspective, an older married mother, starting graduate school in her thirties would, once trained, be just as "new" to the field as some younger male. It would be enormously helpful if women physicists could gather data about productivity by age since Ph.D. to counter the commonly-held belief that, in the physical sciences in particular, chronologically young scientists are "better" than their seniors.

Gender Politics II

From a feminist perspective, despite the election of pro-choice, Bill Clinton, and his professional wife, Hillary Rodham Clinton, the nation remains, as regards women's equality, in a quasi-backlash situation. (We don't need Susan Faludi to tell us that.) That means we have to work a little harder and be a little angrier than we have been over the past few years. But also the times are rich in opportunity, as American institutions are beginning to look critically at themselves. They see this as a time for reassessment: of American industrial productivity, of industrial policy, of science and engineering education. Whether or not you buy into the anticipated "shortfall" of scientists and engineers, everyone agrees that something is amiss. The demonstration of this is that people like ourselves who have been working on women's issues for ten and twenty years mostly talking to each other are now being asked to help the "establishment" figure out what to do....

So, in conclusion, I have a wish-list of four for women scientists and their supporters:

• I think the time has come to stop trying to adapt women to existing structures and to negotiate, instead, for changes in established courses, institutions, and the work place, to fit women.[1]

• Second, We must be looking not just for palliatives but for more radical action.

• Third, it saddens me that on a lot of campuses undergraduate and graduate women in science don't discover their feminist roots or their feminist histories until they're in trouble. It's when they go to the "sexual harassment" office and are told it is not in their interests to "make waves" that they pick up the campus directory and start looking for the women's studies office on campus. We need to encourage young women in

science and engineering to appreciate what we've done for them and to acknowledge that they must be *tithed* to support the next generation by being assertive, activist, and feminist.

• And fourth, we should not expect to have to accomplish all this alone. This is a propitious time for coalition building. With so much going on in science and engineering more generally, the search for an industrial policy, we ought to be able to find willing and powerful allies in new places.

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[1]See Marcia Matyas and Shirley Malcom, *Investing in Human Potential: Science and Engineering at the Crossroad*, AAAS, 1991. See also the *Baltimore Charter*, a declaration of sentiments on women's issues, prepared and disseminated by women astronomers meetings at the Hubble Space Telescope Center in 1993.

OOOOOOO

WIPHYS is moving!

Effective May 1, 1994, the WIPHYS (Women in Physics) e-mail network is moving from the NYSERNET node to the APS node.

If you are currently a subscriber, your name will automatically be switched to the new node.

To become a WIPHYS subscriber, send a message to **listserv@aps.org**. The subject line of your message should be blank and the text of the message should be: **subscribe wiphys**.

To send mail to the new WIPHYS, send a message to **wiphys@aps.org**. Your message will be sent to all WIPHYS subscribers by the APS moderator.

Please note: sending a "reply" message to a message you received from WIPHYS will send your reply to everyone on the list. If you wish to reply to the sender only, simply send a message directly to his/her e-mail address.

To find out more about WIPHYS or its services, see the January or August 1993 issues of the *Gazette*, or contact Tara McLoughlin at tara@aps.org.

Feminist Resource Guide available on the Internet

Laura Hunt, an Information Specialist at both the Center for the Education of Women and the Interdisciplinary Program in Feminist Practice at the University of Michigan, Ann Arbor has compiled *A Guide to Sources for Women's Studies and Feminist Resources on the Internet*, which is available in two locations on the Internet. It is accessible to Gopher, Telnet, e-mail File Transfer, and FTP. The guide reads somewhat as an encyclopedic treatise on the resources available on the Internet which might be of interest to those in Women's Studies or those interested in feminist issues. It contains brief descriptions of what sort of "tools" are available on the Internet, as well as sample addresses/contacts for many of these resources. The bulk of the guide consists of the great variety of listserv addresses available for women's (and men's) electronic discussions.

The guide is available through the University of Michigan's Clearinghouse of Subject-Oriented Internet Resource Guides:

Anonymous FTP
host: una.hh.lib.umich.edu
path: inetdirsstacks
file: women:hunt

Gopher
=> University of Michigan
=> Library Resources
=> Clearinghouse of Subject-Oriented Internet Resource Guides
=> Guides to the Social Sciences

Gopher-link File
Name= Women's Studies, Feminism, L.Hunt, v3 2/94
Type= 0
Port= 70
Path= 0/inetdirsstacks/women:hunt
Host= una.hh.lib.umich.edu

It is also available through the University of Maryland's InforM Gopher Women's Studies Database:

Telnet or Gopher to
INFORM.UMD.EDU
Use either arrow or number keys to select
=> 4. Educational Resources
=> 16. Women's Studies
Then follow the path:
Computing Resources/Guides to the Internet/guide by hunt
The gopher interfact has a feature that allows you to send files to your e-mail account. When you are in a file, type "q" (for quit), then "m" (for mail), and provide your e-mail address. The file will come to you as an e-mail message.

FTP to INFORM.UMD.EDU
Login as "anonymous" and use your e-mail address as a password. Choose the InforM directory by typing "cd info". The commands "dir" or "ls" will display a list of files in that directory. Use the command "get <filename>" to download a file into your account. The directory path name for the Women's Studies Database is "inforM/ Educational_Resources/Women's Studies"

Laura Hunt intends to continue to update this guide, and would appreciate any new resources which could be included in the next version. She welcomes everyone to download and distribute the guide, and asks only that you leave her name on it and contact her at **lahun@umich.edu** to let her know for what purposes you wish to use it. She also welcomes any comments or suggestions for the formatting and content of the guide.

of people who are not trained in physics. You will also develop skills in areas such as management or public speaking.

4. Don't be afraid to take a calculated risk. Starting your own business requires hard work, but it also represents a careful gamble on your own abilities and with your finances. Careers in business are not for those afraid to take such risks.

Finally, I urge all of you who are in graduate school studying physics to consider working in a small hi-tech business. Not only is it fun, it can also be psychologically and financially rewarding.

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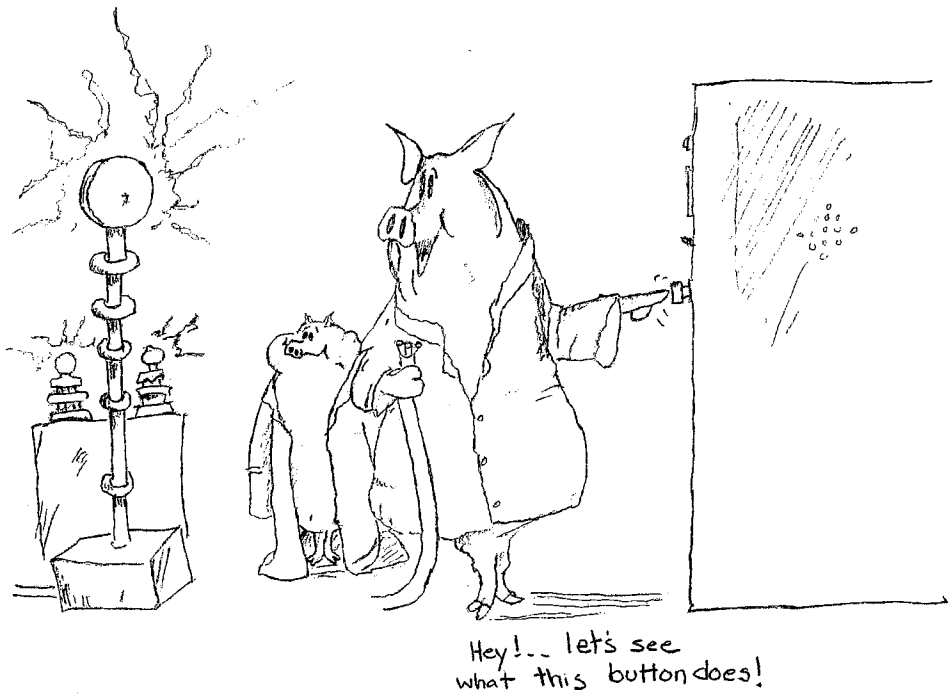

Glenn R. James

THE
COLLOQUIM/
SEMINAR
SPEAKERS
LIST

LECTURE TOPICS BY WOMEN PHYSICISTS

The American Physical Society
Committee on the Status of Women in Physics
1993-94

Please return this form to:
The American Physical Society, One Physics Ellipse, College Park, MD 20740-3844

The 1993-1994 Colloquium/Seminar Speakers List (CSSL) of Women in Physics (pictured to the left) is now available from The American Physical Society. This list, compiled by the Committee on the Status of Women in Physics, contains the names of over 200 women physicists who are willing to give colloquium or seminar talks. The CSSL serves as a resource for middle school, high school, university and general audiences. Information on the speakers is ordered by states and by field for easy reference. The APS Committee on Minorities maintains a similar list of minority speakers in physics. To receive your free copy of either list, please complete this form and return it to APS.

Name: _____

Institution: _____

Address: _____

City: _____ State:_____ ZIP:_____

Phone: _____

❒ Women's CSSL ❒ Minority CSL

**please note: The 1994-95 CSSL will be available in late Aug. 1994*

Report on 1993 Women APS Fellows

by Tara McLoughlin, APS

This year twenty-one of the 198 Fellows of the APS were women, the largest number of women fellows in a single year in the history of the Society. Since 1984, the CSWP has maintained statistics on the number of women APS Fellows and has lobbied Division and Forum chairs to nominate more women. CSWP Chair Luz Martínez-Miranda stated that although she is delighted that there were twenty-one women fellows this year, she said, "I feel somewhat discouraged that it takes letter writing to get women nominated — these nominations should come 'naturally'. It is very encouraging, however, that the average age for women in the APS is about mid-thirties, because as this group of women reaches maturity, the process should be much easier for them than for their predecessors."

Over the last ten years, the number of women APS Fellows has been as low as two in 1988 to this year's peak of twenty-one. The Divisions and Forums with the best track records for nominating women are the Forum on the History of Physics (18.2%), the Division of Computational Physics (16.7%) and the Laser Science Topical Group (11.5%).

The following are this year's women Fellows of the APS, as well as their divisions and citations. The CSWP congratulates these women on their great achievements.

DAMOP
Carolyn Denise Caldwell
"For the first experimental demonstration of atomic alignment in photoionization, continued scholarly exposition of atomic alignment, and the elucidation of autoionization decay processes on approaching inner ionization thresholds"

Katharine B. Gebbie
"For pioneering spectroscopic and theoretical studies of radiation transport and departures from local thermodynamic equilibrium in stellar atmospheres. For leadership in strengthening ties between pure and applied atomic physics"

Division of Astrophysics
Jean Hebb Swank
"For pioneering studies in establishing the nature of X-ray burst sources and leadership in developing the powerful X-ray Timing Explorer (XTE) mission, a major upcoming guest observer facility"

Chemical Physics Division
Barbara Jane Garrison
"For pioneering computational molecular dynamics to explore the basic mechanisms of surface chemical processes associated with reactions, growth, etching and desorption which are amenable to experimental verification"

Division of Computational Physics
Elaine Surick Oran
"For innovations using cutting edge computers to model and explain important physical mechanisms involving fluid dynamics, chemistry and nonequilibrium material properties in complex reacting flows ranging from laboratory to astrophysical systems"

Division of Condensed Matter Physics
Ora Entin-Wohlman
"For contributions to the theory of granular superconductivity, fractons, strong localization and mesoscopic pieces"

Laura H. Greene
"For work on the physics of novel materials, in particular physical properties of high-temperature superconductors and artificially-layered thin-film structures"

Kristl B. Hathaway
"For elucidating the relationships between magnetism, structure, and the elastic properties of amorphous and crystalline materials"

Please see Fellows on pg. 17

1994 Maria Goeppert-Mayer Award to Laura H. Greene

Dr. Laura H. Greene of the University of Illinois at Urbana-Champaign is the winner of the 1994 Maria Goeppert-Mayer Award. Dr. Greene was cited "for her work on the physics of novel materials, in particular, studies of the effects of oxygen and atomic substitutions on the physical properties of bulk high-temperature superconductors, and for research on superconductivity proximity effects and tunneling in artificially layered superconducting magnetic and heavy-fermion thin-film structures." Dr. Greene was also named as a Fellow of the APS for 1993 in the Division of Condensed Matter Physics (see the above article on 1993 APS Fellows) and serves on the APS Council.

The Award, sponsored by the General Electric Foundation, was established in 1986. Its purpose is to recognize and enhance outstanding achievements by a woman physicist in the early years of her career, and to provide opportunities for her to present these achievements to others through public lectures. The Award provides a stipend of $2000 and a travel and living allowance of $3000 to support lectures by the recipient at four institutions of her choice. The Award was bestowed at the March 1994 meeting of the American Physical Society in Pittsburgh, PA.

If you wish to nominate someone for the 1995 Maria Goeppert-Mayer Award, please send the name of the proposed candidate and supporting information to MGM Award Committee Chair Professor Richard Furnstahl, Department of Physics, The Ohio State University, 174 West 18th Avenue, Columbus, OH 43210. **The deadline is September 1, 1994.**

Vera Rubin Awarded National Medal of Science

Astronomer Vera Rubin of the Carnegie Institution Department of Terrestrial Magnetism, Washington, D.C., received the National Medal of Science in a White House ceremony on the 30th of September, 1993. The Medal is the nation's highest scientific honor bestowed by the President of the United States.

Rubin is best known for determining, with co-worker Kent Ford, that visible matter — i.e., matter seen at optical and radio wavelengths, such as stars and luminous gas -- provides only a fraction of the overall mass of the universe. From this realization has come a worldwide wave of investigations seeking to understand the form of the nonluminous, or dark, matter, whether black holes, stars too small to shine, or neutrinos or some other basic particles. The nature of dark matter remains a continuing uncertainty upon which virtually all else relating to our understanding of the cosmos depends.

Vera Rubin is universally identified as the individual who pinned down dark matter's existence. With Carnegie Institution's Kent Ford, Rubin in the 1970's obtained spectral observations of many spiral galaxies, measuring their rotation at different radii. From the basic laws of mechanics, it had been expected that star orbital velocities about the center of a galaxy should decrease rapidly with distance from the center, as required by the decreasing density of mass suggested by the galaxy's visible appearance. But the new observations, reinforced by observations by radio astronomers, unmistakably showed that orbital velocities remain high to the visible limits of galaxies. Rubin concluded that most of the mass of the galaxies, perhaps as much as 90 percent, is composed of nonluminous matter, and that much of the nonluminous mass is situated in the outer regions, largely beyond the visible limits. This result became the acknowledged "discovery" of dark matter.

Vera Rubin is congratulated by President Clinton and Vice-President Gore.

Rubin's many other contributions in research have ranged widely over cosmology and the study of galaxies. She offered early evidence on the large-scale motion of our own region of the universe in relation to the universe's overall expansion. She has studied motions of galaxies within clusters and compact groups, and has collaborated in countless investigations of galaxy evolution and dynamics, including studies to apply rotational measurements in distance determinations. She has remained a leader in the quest to understand dark matter, thus participating in the intellectual revolution she herself began.

Vera Cooper Rubin grew up in Philadelphia, the daughter of Philip and Rose A. Cooper. She attended the city's public schools, and despite encouragement to study something "more practical, like mathematics," she never wavered in pursuing her girlhood fascination, astronomy. She earned degrees in astronomy from Vassar College (B.S., 1948), Cornell University (M.S., 1951) and Georgetown University (Ph.D., 1954), where her thesis advisor was the renowned George Gamow of George Washington University.

She served on the faculty of Georgetown for the next decade, periodically obtaining observations at various major observatories. Some of her work measuring rotational velocities across the images of galaxies matched an area of growing interest at Carnegie Institution's Department of Terrestrial Magnetism (DTM), led by Merle Tuve. At DTM, astronomer Kent Ford and others were pioneering in developing electronic devices intensifying the images obtained at optical telescopes. Rubin joined the DTM staff in 1965, and in that year became the first woman to observe at the Palomar Observatory, California. With Ford, she began long-term observing programs at the Lowell Observatory and the Kitt Peak National Observatory, Arizona, and introduced the new Carnegie Image Tube, forerunner of today's charge-coupled devices (CCD's), at the world's major telescopes. Their

systematic observations of spiral galaxies led to the determination for which they are best known — that most of the mass in spiral galaxies is in the form of nonluminous matter.

Rubin's latest career has been marked by growing public roles. She has been active on many panels and study groups examining matters of science policy. A skillful communicator, she is sought after as a lecturer and spokesperson for science and especially on the roles of women in science. She has received many and diverse honors, including election to the National Academy of Sciences (1981). She has been mentor to a stream of postdoctoral fellows at DTM, several of whom have become leaders in their profession. She has contributed much time and effort to education in the schools of Washington, D.C., and has helped countless young women toward careers in science.

She and her husband, Robert, a physical chemist, enjoy travelling widely and collecting rare books, charts, and artifacts bearing on the early history of astronomy. All four of their children earned Ph.D. degrees and are now professional scientists.

OOOOOO

Fellows, cont'd from pg. 15

Lia Krusin-Elbaum
"For fundamental work on the magnetic properties of high temperature superconductors"

Lynn Frances Schneemeyer
"For critical contributions to the understanding of collective phenomena in sliding charge density wave compounds and of high temperature superconductivity by the growth and characterization of single crystals"

Fluid Dynamics Division
Andrea Prosperetti
"For basic contributions to two-phase flow models, bubble oscillations and entrapment, underwater rain noise, and cavitiation"

High Polymer Physics
Anna Christina Balazs
"For her innovative application of theoretical methods to describe and predict the effect of sequence distribution on the miscibility of polymer containing mixtures and their absorption onto surfaces and interfaces"

Division of Materials Physics
Julia M. Phillips
"For her contributions to the understanding of the growth mechanisms and properties of epitaxial heterostructures involving structurally and electrically dissimilar materials"

Divisions of Particles and Fields
Melissa E.B. Franklin
"For contributions to the study of gauge bosons produced in proton-antiproton collisions"

Catherine Barbara Newman-Holmes
"For contributions to the study of the W and Z bosons with the CDF detector, and to the observation of new mesonic states in J/Ø decays"

Physics of Beams Division
Nannette Phinney
"For her many contributions to the successful development and operation of the Stanford Linear Collider"

Division of Plasma Physics
Bimla Buti
"For pioneering and distinguished studies of nonlinear and chaotic plasma processes and for developing mathematical models for the proper interpretation of intriguing observations in space and astrophysical plasmas"

Laser Science Topical Group
Elsa M. Garmire
"For contributions in nonlinear optical semiconductor effects, interactions and devices"

Marsha I. Lester
"For her seminal contributions to both the spectroscopy and the understanding of predissociation dynamics in weakly bound clusters of reactive molecular species"

Geraldine L. Richmond
"For seminal contributions to the understanding of dynamics at interfaces accomplished by innovative applications of nonlinear optical phenomena"

Forum on History of Physics
Lillian Hartman Hoddeson
"For organizing and providing written records of 20th century history of physics through projects and conferences covering solid state physics, particle physics and national laboratories"

OOOOOO

A Review of Sharon Bertsch McGrayne's *Nobel Prize Women in Science*

by Joan Valles,
University of Washington

In *Nobel Prize Women in Science: Their Lives, Struggles and Momentous Discoveries*, author Sharon Bertsch McGrayne notes that physicist Chien-Shiung Wu was absolutely right when she observed, "Never before have so few contributed so much under such trying circumstances". Not long ago, even when women did manage to succeed in science, they could expect a public response such as these headlines, "La Jolla mother wins Nobel Prize" (Maria Goeppert Mayer, 1963); or "Nobel Prize for British wife" (the *Daily Mail*, Dorothy Crowfoot Hodgkin, 1964). The youngest woman featured in McGrayne's book, Jocelyn Bell Burnell, discovered pulsars as a 24-year-old graduate student in 1967, but did not get a full-time permanent professorship until 1991. Soon after getting her doctorate, she left to get married and followed her husband around Britain taking part-time jobs. It did not occur to her until years later that she had any other choice. No one had taken her aside and said, "Do you realize what you're giving up?"

In her book, published in 1993 by Birch Lane Press, McGrayne portrays the lives of 14 extraordinary women scientists who either won a Nobel Prize or who were crucial to the success of a Nobel Prize-winning project. Of the 14, five are physicists (Marie Sklodowska Curie, Lise Meitner, Maria Goeppert Mayer, Chien-Shiung Wu and Rosalyn Sussman Yalow), one was a graduate student in physics (Irène Joliot-Curie) and one became a professor of physics (Jocelyn Bell Burnell). Each chapter is a short biography of vibrant human life and scientific achievement often despite physical, mental and emotional hardship, intellectual obstacles, discrimination and societal pressure. The keys to these women's survival, McGrayne found, were that they were so passionately in love with their science and had such strong personalities that they could survive even the fiercest discrimination.

McGrayne chose women in science as the topic for her first book for a number of reasons. First, she was curious as to why there were proportionately more women in the physical sciences in southern Europe and India than in United States and northern Europe. In addition, she wanted to dispel this misperception in the public mind that Marie Curie was the only world class woman scientist. Also, she was curious as to why only nine of Nobel Prizes in the sciences (or 3% of the total) went to women. The germ of the idea for her book came from a 1988 calendar put out by the Detroit area chapter of the Association of Women In Science which featured Nobel Prize winning women. "I thought if I picked Nobel Prize winners or those who worked on Nobel Prize research, I could inform the public and get them over their misconceptions; then I could tell what these women were like on a human level," McGrayne says.

> "(These women) were so passionately in love with their science and had such strong personalities that they could survive even the fiercest discrimination."

She discovered that some of the women she had selected were virtually unknown, since nothing had ever been written about them. "Even if they were well known," she says, "I wanted something fresh on every one of them. I talked to the seven who were alive then, and as many of their family members, colleagues, graduate students, friends or competitors as I could find." Many of these people were quite elderly. Several have died since she interviewed them. "There was a whole treasure trove of intellectual history that would have disappeared with them. I think they realized that they knew things that had to be imparted to future generations." What she uncovered, she describes as "plums, just plums, great stuff."

The life of Emmy Noether, a mathematician whose theorem underlies many developments in modern physics and mathematics, underscores some of the hardships facing the pioneers among women scientists. In the beginning of her academic career, Noether had to delay her education for a decade until laws were changed so she could study at a university. After graduation, she worked for her father, a mathematician, for ten years, because it was illegal for her to give lectures in German universities before World War I. When she did lecture, she was forced to speak under mathematician David Hilbert's name, and any articles she wrote had to be submitted by someone else for publication. Even after she became a professor in a German university and headed the most prestigious mathematics program, she earned no salary. In 1922, she was finally given a title, "Unofficial Extraordinary Professor," largely through the influence of Albert Einstein and David Hilbert. Being a Jew, she was one of the first professors fired by Hitler. She then fled to the United States, and although she was the most important mathematics professor in the world, she could get only a part-time position at Bryn Mawr College. Even after enduring these hardships, she was not angry or embittered. She was simply devoted to doing mathematics. She was a joyous personality. And yet, McGrayne says, "The only thing some people tell about her is she was very overweight — so many scientists told me that."

Barbara McClintock, the geneticist who won the Nobel Prize in medicine and physiology in 1983, hated the fame the prize brought her. Nevertheless, she agreed to talk with McGrayne; she had agreed to be interviewed only once before. "But as she got to know me, I think she got to like the idea that she could set things straight," McGrayne says. At age 34, McClintock had been warned by the

University of Missouri that she would be fired immediately if she ever got married. This experience affected her deeply; years later, she was still so offended that she recounted the story to McGrayne on four different occasions. She eventually quit that job and decided she would never work for a university again.

Gerty Cori, a biochemist who shared a Nobel Prize with her husband Carl in 1947, did not become a professor until the year she won the prize. At Washington University in St. Louis, her husband had been hired as a professor while she was hired as a research associate at one-fifth of his salary. Even at this, they could be considered "lucky," as Washington University, a private institution, was one of the few in the U.S. that would even hire husband-wife scientists. In her laboratory, Gerty Cori trained six Nobel prize winners.

What kept these women going in the face of illness, stress and acute discrimination? McGrayne isolated three factors common to many of these scientists. First, all of the women had the support of one key individual in their lives, be it a colleague, mentor, parent or husband. Second, religious values played an important role; a disproportionate number of these successful women had backgrounds in the Jewish or Quaker faiths, religions which stress the importance of education and rational thought. But most important, McGrayne maintains, these women shared a passionate love for their science, a love that beside which all difficulties paled in comparison. But despite these common traits, each of the inspiring women scientists described in *Nobel Prize Women in Science* stands on her own, vivid in her individuality.

To order a copy of *Nobel Prize Women in Science*, call Birch Lane Press at (800) 447-BOOK (2665)

OOOOOOO

A Review of *A Hand Up: Women Mentoring Women in Science*

by Charlotte Elster, Professor of Physics, Ohio University

The Association for Women in Science (AWIS) is an organization dedicated to the advancement of women in science and technology and to the encouragement of young women in the study of mathematics and science. In 1990, the Alfred P. Sloan Foundation gave AWIS a three-year grant to facilitate the development of activities designed to increase the number of women in science. One component in this project is a book entitled *A Hand Up: Women Mentoring Women in Science*. This volume highlights the ways in which women in science form a community. It is designed to serve as a source of support for women interested in pursuing careers in science, even if they are geographically or socially isolated.

In the preface, Dr. Bernadine Healy, former Director of NIH, eloquently describes the inequities in career advancement for women in the sciences. She calls for more mentors for young women in science and mathematics, female mentors who understand the specific difficulties a young woman will face during her career. She explains that *A Hand Up: Women Mentoring Women in Science* is a positive step for women in science, as it provides guidelines, resources and advice both for those seeking mentors and for those willing to serve as guides.

The first part of the book contains interviews with 37 women scientists, postdoctoral fellows and students. These women offer their thoughts on what encouraged them to enter the sciences, what they found there, and what helped them to persevere in atmospheres that are sometimes hostile to women. These scientists explain what it was like starting out in new fields, and they describe their experiences in college and beyond, in fellowships, and on their first jobs. Many tell of their life in the workplace, how it began, how it changed, and how they successfully organized their personal and professional priorities. These fascinating interviews share a common theme; nearly all of these women found themselves in environments that were not sensitive to the special issues a woman in science may face.

The second part, "Advice from the Field," is composed of 20 essays by women scientists and educators, which cover many concerns of vital importance to all women in science. The topics span a wide range, from the specific problems women face in science, such as discrimination faced when applying for fellowships and grants, to more general topics like gender issues in our society. All essays contain useful references for those who are interested in learning more about a specific topic.

The final chapter of *A Hand Up: Women Mentoring Women in Science* contains an extensive directory of national and federal organizations that support women in science. This listing includes organizations, contact persons, addresses, telephone numbers, and relevant publications. In addition to this directory, there is an updated, revised version of an essay on job hunting from the Association of Women in Cell Biology. Finally, AWIS reprints its widely praised feature on how to compile, analyze and check letters of recommendation.

In summary, *A Hand Up: Women Mentoring Women in Science* is a valuable "paper mentor" for women in all fields of science. Almost all issues that a woman may encounter throughout her career are addressed. The compilation of resources at the end of the book is particularly valuable and informative. While no book can replace the vitality of the human interaction of a mentor, this book will inspire and advise women at all stages of their careers in science.

To order a copy of *A Hand Up*, please contact AWIS at 1522 K Street, NW, Suite 820, Washington DC 20005, telephone (202) 408-0742.

Review of *Mothers and Daughters of Invention* by Autumn Stanley

by Cherrill Spencer, SLAC

Cherrill M. Spencer is an experimental physicist who currently designs and builds electromagnets and the Stanford Linear Accelerator Center in Menlo Park, CA. She helped to invent a machine to measure the elemental composition of coal on a conveyor belt and a novel MRI magnet.

Did you know that Isabella Cunio invented wood engraving, Harriet Frasier invented a snow plow and Barbara Askins invented a method to enhance faint X-ray photos? Would you doubt that women invented cooking, basket-weaving, medicine, pottery and agricultural tools? In a 1,116 page book, scholar Autumn Stanley fully documents the lives and inventions of 1,870 women inventors. Ten years of research confirmed her intuition that women inventors had been ignored by historians and publishers. *Mothers and Daughters of Invention* (Scarecrow Press, 1993) is an enormously useful reference work that is entertaining and readable as well.

Stanley concluded that the history of technology needed to be revised. In well-reasoned detail, she redefines technology and, to the usual criteria that define significant technology, that is, technological and economic impact, she adds human impact, "the effect on comfort, convenience, and quality of daily life as well as on human welfare in a more general sense." Stanley shows how pre-historical inventions were foundations of later technology, as cooking, fermentation, dyeing and tanning were of chemistry.

One of the five mega-chapters documents women's contributions to agriculture, health and medicine, sex, fertility and anti-fertility technologies. Twenty fascinating pages are devoted to menstrual technology. All of the chapters provide a detailed and fully documented account of the history of the technology, women's contributions to it, information on each individual inventor and details on the author's sources of information.

In this excellent book, Stanley explains the main reasons why so few women inventors are known. First, she states that invention is often equated with patenting. However, women have suffered from the patenting process, as they often have neither the time or money to file for a patent, and have less access to technical training. Second, she notes that women are more socialized to be giving, and may pass on ideas rather than profiting from them. In addition, historians have distorted or under-reported women's achievements in non-domestic arenas, and "technology" has been defined to exclude "women's work". *Mothers and Daughters of Invention* is an excellent start to the job of revising the history of technology to show and recognize that women invent.

> "Historians have distorted or under-reported women's achievements in non-domestic arenas, and 'technology' has been defined to exclude 'women's work'."

A short version of this review first appeared in the November 1994 newsletter of the Women's Heritage Museum (San Francisco).

Franz, cont'd from pg. 1

Gazette: *You have been an active participant in physics for a number of years. Have you seen any significant changes in the environment for women in physics?*

Judy Franz: There have been dramatic changes in the environment for women in physics, but, of course, these always occur much more slowly that we would like. When I first attended the APS March meeting, I would sit in a plenary session with perhaps 1000 attendees and see at most one other woman in the entire room; there were no women invited to speak and almost no contributed talks by women. Now the March meeting has a large, lively group of women participants, and few people show surprise when a woman gets up to give an invited talk. I would hope that this is true at other physics meetings as well. Unfortunately, many of our students still receive their education in physics departments that have no women faculty members, so they don't get to experience this change.

G: Many of us have noticed that women in our field are given positions of responsibility such as yours, which is wonderful! But do you think that we are taken more seriously as physicists than we were ten years ago?

JF: Definitely. To be taken seriously by physicists you have to produce good physics or control the money. We are doing both. It would be difficult today to find any field of physics where women are not making major contributions. And Arati Prabhakar at NIST and Martha Krebs at DOE, to name just two, are in control of a lot of money.

G: Many of us who are very interested in giving women and minorities full participation in the profession are often asked why we should encourage young people to enter the field when opportunities are so scant. Why should we continue to encourage young people to go into physics?

JF: I don't think that I would encourage

anyone to go into physics, or any other field, unless they showed a real interest. Instead of encouraging young people to go into physics, we should ensure that all young people get a chance to know what physics is and share with them our excitement and fascination with it. Those who show ability and enthusiasm for physics should be encouraged to continue their studies no matter what their career plans.

G: *The ways in which science and mathematics are being taught has been somewhat ineffective in bringing women and minorities into the field. What are your strategies for improving this situation, and how do you think that APS can best assist in this effort?*

JF: This is not an easy question. I have been working for 20 years in various ways to encourage more girls to give science a try and more women to continue their study of physics. If I had the answer, the problem would be solved! The pressures of society, which are much stronger than most of us acknowledge, work against women and minorities entering physics. Sally Ride had a very large impact on young women, and Jan Davis, an astronaut who graduated from UAH, is having that effect in Huntsville. So role models are very important. APS has supported CSWP and COM and will continue to do so. Certainly CSWP has had a large, positive impact on women in physics over its 20 year history. The APS/AAPT program to study the climate for women in research physics departments has been taken seriously by physics department chairs across the country. The NSF grant we obtained to help with this program has allowed us to gather a lot of information that I think will be of help to the physics community. We all need to keep working on these issues.

G: *Now that the APS, the AAPT and the AIP are all located in one central place, how would you facilitate the interaction among these organizations for the betterment of science?*

JF: Once you bring the societies together in one building, the rest has to be done by individuals interacting with each other. I will do everything that I can to foster such interactions. Bernie Khoury, the executive officer of AAPT is a close friend. From everything I know, it will also be a pleasure to work with Marc Brodsky, the Executive Director of AIP.

Judy Franz joined the Treasurer and Editor-in-Chief at the helm of the American Physical Society on April 4th, 1994. Regarding Dr. Franz's acceptance of the position of Executive Officer, APS President Burton Richter commented, "The APS is gratified and proud that a physicist of Judy Franz's stature, experience and commitment will serve as one of its operating officers." The CSWP is pleased that someone with a lifelong commitment to encouraging women in science will be leading the Society. The Committee joins the Council and Executive Board in welcoming Judy Franz to the APS.

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The Roster of Women and Minorities in Physics
(*Gazette* mailing list)
is used by institutions wishing to announce job openings to women and minorities. This list is kept confidential - APS sends out all mailings. If you wish to receive such announcements, fill out the Roster Enrollment form (page 25) and place a check next to "employment announcements." If you are already listed on the roster, take this opportunity to update your address, credentials, current interests and work status.

Author Sharon Bertsch McGrayne Speaks at October DNP Meeting

Photos by Tara McLoughlin

At the October 1993 Meeting of the Division of Nuclear Physics, the CSWP sponsored a lecture by author Sharon Bertsch McGrayne. McGrayne gave an inspiring talk on her new book, *Nobel Prize Women in Science: Their Lives, Struggles and Momentous Discoveries* (reviewed this issue, page 18). Below are some photos from this enjoyable event.

CSWP Chair Bunny C. Clark announces the speaker.

Sharon Bertch McGrayne lectures on her book: *Nobel Prize Women in Science*

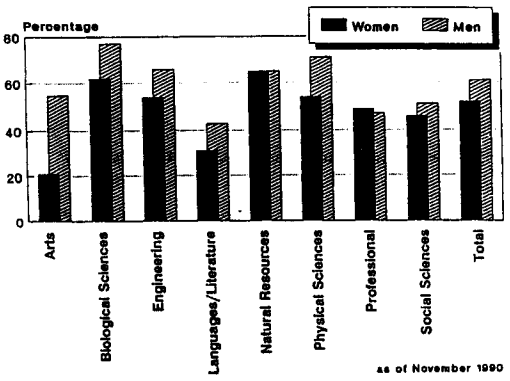
COE members Cherrill Spencer (l) and Lillian McDermott (r) at the reception.

Tom Clark (husband of Bunny) plays bartender at the reception.

l-r: Arlene Modeste, Warren Buck, Michelle Shinn and John Mateja enjoy the reception.

Sharon Bertch McGrayne gets a chance to socialize after her talk.

Chilly, cont'd from pg. 9



Doctoral completion rates, University of California-Berkeley, 1978-79 cohort, by sex.

Fig. 22

commonly used for mentoring women faculty in general do not seem to take place in the case of women faculty, unless explicit attention to these matters is provided. Good practices regarding the "care and feeding" of all faculty members are generally effective for creating a good environment that stimulates the best performance from women faculty, students and staff.

Our visits to physics departments thus far indicate that attention to keeping communication channels open, with sensitivity to the special needs and concerns of women students and faculty go a long way in improving the climate for women physicists. The same sensitivities seem to also improve the environment for men. While these conclusions are still preliminary and await analysis of the formal study now in progress under NSF sponsorship, the results obtained thus far should provide useful guidance to physics department chairs and others anxious to improve the academic environment for physics students.

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TABLE 3-2: Student Perceptions of Problems in Undergraduate Teaching Methods, by Sex (in percent)

	Men	Women
Impersonality	12	20
Professors don't care about you	0	30
Can't develop relationship with professors	25	10
Professors have no time for students	12	20
Large classes have negative effect on grades	25	0
Too competitive, and too fast a pace	13	10
No time for questions in class	0	10
Faculty don't know how to teach	13	0

SOURCE: Nancy M. Hewitt and Elaine Seymour, *Factors Contributing to High Attrition Rates Among Science, Mathematics, and Engineering Undergraduate Majors,* Boulder, CO: University of Colorado, 1991.

Fig. 23

SITE VISITS

- Pilot Program
  - U. of Maryland
  - U. of Pennsylvania
  - Bryn-Mawr College
  - U. of Virginia
  - Rensselaer Polytechnic Institute (RPI)
- NSF-Funded
  - University of Illinois (Urbana)
- Invitations
  - Michigan State
  - SUNY Stony Brook
  - U. of New Mexico
  - U. of Texas (Austin)
  - Iowa State

Fig. 24

The American Physical Society - ROSTER ENROLLMENT FORM

The Roster is the basis for statistical reports on women and minority physicists; mailing lists corresponding to announcements, and publications of the APS Committee on the Status of Women in Physics (CSWP) and Committee on Minorities (COM); and confidential searches. The Rosters will not be made available to commercial or political organizations as a mailing list, and all information provided will be kept strictly confidential. Although the Roster is employed to serve women and minority physicists, enrollment is open to anyone interested in issues affecting these groups. Please give a copy of this form to others who might be interested in joining the Roster, or in receiving the newsletters.

Please complete all entries on BOTH SIDES OF THE FORM and indicate changes if this is an update of a previous entry. After completing this form, please return to:

The Roster of Women and Minorities in Physics ◆ The American Physical Society ◆ One Physics Ellipse ◆ College Park, MD 20740-3844

Please indicate whether you are interested in receiving:

❒ **The *Gazette,* CSWP (women's) newsletter**

❒ ***C.O.M....MUNICATIONS* (minorities) newsletter** ❒ **Employment Announcements**

Is this a modification of an existing entry?:

❒ **yes** ❒ **no** ❒ **not sure**

NAME: _____
(last) (first) (middle)

Previous last name (if applicable): _____ Date of Birth ____/____/____

GENDER:
❒ Female
❒ Male

Ethnic Identification

❒ Black
❒ Hispanic
❒ Native American
❒ Asian or Pacific Islander
❒ Caucasian (Non-Hispanic)
❒ Other (please specify) _____

Mailing Label Information (Foreign addresses: Use only the first three lines, abbreviating as necessary.)

In this section, please print information exactly as it is to appear on your mailing label. Where boxes are provided, print one character within each box, abbreviating where necessary.

NAME AND TITLE

ADDRESS Line 1:

ADDRESS Line 2:

ADDRESS Line 3:

CITY/STATE/ZIP

Daytime Phone - -

Fax or e-mail Number: _____

Educational Background

Degrees	Year Received (or expected)	Name of Institution
BA or BS	_____	_____
MA or MS	_____	_____
Ph.D.	_____	_____
Other _____	_____	_____

Thesis Title (Highest Degree) (Abbreviate to 56 characters total)

_____

PLEASE REMEMBER TO COMPLETE SIDE II OF THIS FORM

Current Employment Information (28 Characters per line)

Employer: _____

Department/Division: _____

Position: _____

Professional Activity Information

FIELD OF PHYSICS

Current Interest (check up to 4)	Highest Degree (check up to 4)	
1 ___	1 ___	Astronomy & Astrophysics
2 ___	2 ___	Acoustics
3 ___	3 ___	Atomic & Molecular Physics
4 ___	4 ___	Biophysics
5 ___	5 ___	Chemical Physics
6 ___	6 ___	Education
7 ___	7 ___	Electromagnetism
8 ___	8 ___	Electronics
9 ___	9 ___	Elementary Particles & Fields
10 ___	10 ___	Geophysics
11 ___	11 ___	High Polymer Physics
12 ___	12 ___	Low Temperature Physics
13 ___	13 ___	Mathematical Physics
14 ___	14 ___	Mechanics
15 ___	15 ___	Medical Physics
16 ___	16 ___	Nuclear Physics
17 ___	17 ___	Optics
18 ___	18 ___	Plasma Physics
19 ___	19 ___	Physics of Fluids
20 ___	20 ___	Thermal Physics
21 ___	21 ___	Solid State Physics
22 ___	22 ___	General Physics
23 ___	23 ___	Condensed Matter Physics
24 ___	24 ___	Space Physics
25 ___	25 ___	Computational Physics
26 ___	26 ___	Accelerator Physics
27 ___	27 ___	Superconductivity
28 ___	28 ___	Surface Science
29 ___	29 ___	Non-Physics
30 ___	30 ___	Quantum Electronics
99 ___	99 ___	Other (please specify)

_____

CURRENT WORK STATUS (Check One)

1 ___ Full-time Studies
2 ___ Part-time Studies
3 ___ Part-time Studies/Employment
4 ___ Post Doc./Res. Assoc.
5 ___ Teaching/Precollege
6 ___ Faculty, tenured
7 ___ Faculty, non-tenured
8 ___ Long-term/Permanent Employee
9 ___ Inactive/Unemployed
10 ___ Retired
11 ___ Self-employed
12 ___ Other (please explain)

_____

_____

TYPE OF WORKPLACE FOR CURRENT OR LAST WORK

1 ___ University
2 ___ College - 4 year
3 ___ College - 2 year
4 ___ Secondary School
5 ___ Government
6 ___ National Lab
7 ___ Industry
8 ___ Non-Profit Institution
9 ___ Consultant
10 ___ Other (Please explain)

_____

_____

TYPE OF WORK ACTIVITY

Please check four numbers from the list below of the activities in which you engage most frequently.

1 ___ Basic Research
2 ___ Applied Research
3 ___ Development and/or Design
4 ___ Engineering
5 ___ Manufacturing
6 ___ Technical Sales
7 ___ Administration/Management
8 ___ Writing/Editing
9 ___ Teaching - Undergraduate
10 ___ Teaching - Graduate
11 ___ Teaching - Secondary School
12 ___ Committees/Professional Org.
13 ___ Proposal Preparation
14 ___ Other (please specify)

_____

_____

DEGREE TYPE (Highest)

1 ___ Theoretical
2 ___ Experimental
3 ___ Both
4 ___ Other (please explain)

_____

_____

APS Membership Information

Are you an APS member?: ❒ No Check here if you wish to receive an application - ❒
❒ Yes Please provide your APS membership number, if available, from the top left of an APS mailing label: ___ ___ ___ -- ___ ___ ___ ___ ___ ___

APS Membership (please specify): Divisional Affiliation(s) _____

Topical Group Affiliation(s) _____

Forum Affiliation(s) _____

Thank you for your participation. The information you have provided will be kept strictly confidential and will be made available only to CSWP and COM members and APS liaison personnel. Please return this form to the address on the reverse side.

Colloquium/Seminar Speakers List (CSSL) of Women in Physics Enrollment/Modification Form ◆ 1994-1995

The *Colloquium/Seminar Speakers List of Women in Physics* is compiled by The American Physical Society Committee on the Status of Women in Physics (CSWP). The list is updated annually and published in August. Comments, questions and entries should be addressed to :

Colloquium/Seminar Speakers List ◆ APS ◆ One Physics Ellipse ◆ College Park, MD 20740-3844

To enroll or update your current entry, please fill out this form and return it to the address above. Please print clearly or type.

Name _____ Telephone _____

Institution _____ FAX _____

Address _____ E-Mail _____

_____

City _____ State _____ Zip Code _____

❒ New Entry ❒ Modification of Existing Entry

To register a new title, give the title as you want it to appear (first word and proper nouns capitalized) in the left column below. Then check the section(s) where it is to be inserted, and the audience(s) for which it is suited. Also check the box above if this is a MODIFICATION of an existing entry. If more than four talks are registered, please use an additional copy of this form, stapling them together. A limit of seven total entries (check in right hand column) will be imposed.

TALK TITLE	PHYSICS SUBFIELD		AUDIENCE
1.	❒ Accelerators ❒ Astrophysics ❒ Biological/Medical ❒ Chemical/Statistical ❒ Condensed Matter ❒ Education ❒ Environmental/Energy	❒ Fluid Plasma ❒ Geophysics ❒ Interface/Device ❒ Molec/Polymer ❒ Nuclear/Particle ❒ Optics/Optical	❒ Colloquium/Seminar ❒ General Audiences ❒ High School ❒ Middle School
2.	❒ Accelerators ❒ Astrophysics ❒ Biological/Medical ❒ Chemical/Statistical ❒ Condensed Matter ❒ Education ❒ Environmental/Energy	❒ Fluid Plasma ❒ Geophysics ❒ Interface/Device ❒ Molec/Polymer ❒ Nuclear/Particle ❒ Optics/Optical	❒ Colloquium/Seminar ❒ General Audiences ❒ High School ❒ Middle School
3.	❒ Accelerators ❒ Astrophysics ❒ Biological/Medical ❒ Chemical/Statistical ❒ Condensed Matter ❒ Education ❒ Environmental/Energy	❒ Fluid Plasma ❒ Geophysics ❒ Interface/Device ❒ Molec/Polymer ❒ Nuclear/Particle ❒ Optics/Optical	❒ Colloquium/Seminar ❒ General Audiences ❒ High School ❒ Middle School
4.	❒ Accelerators ❒ Astrophysics ❒ Biological/Medical ❒ Chemical/Statistical ❒ Condensed Matter ❒ Education ❒ Environmental/Energy	❒ Fluid Plasma ❒ Geophysics ❒ Interface/Device ❒ Molec/Polymer ❒ Nuclear/Particle ❒ Optics/Optical	❒ Colloquium/Seminar ❒ General Audiences ❒ High School ❒ Middle School

ANNOUNCEMENTS

CALL FOR PAPERS:
The **Women's Research Institute at Virginia Tech** is calling for papers for its **Journal of Women in Science and Engineering**. The purpose of the Journal is to publish original, peer-reviewed papers that report innovative ideas and programs, scientific studies, and formulation of concepts related to the education, recruitment, and retention of underrepresented groups in science and engineering. The Editor of the Journal is Dr. Carol Burger. For more information, or a sample copy, please contact Kathy Wager, Editorial Assistant, tel: (703) 231-6296 or e-mail: jrlwmse@vtvm1.cc.vt.edu.

SPEAKERS LIST NOW AVAILABLE:
The 1993-1994 **Colloquium Speakers List of Women in Physics (CSSL)** is available from APS. To order your copy, please fill out the form on page 14, or send an e-mail message to Tara McLoughlin at APS (tara@aps.org). You may add your name to the list by filling out and returning the form on page 24.

Are you participating in this year's **Take Our Daughters to Work program**? Contact us here at the *Gazette* and let us know how your day went. (301) 209-3231 or tara@aps.org.

The **Center for the Advancement of Public Policy (CAPP)** is developing an integrated multimedia system on CD-ROM for use by students in grades 6-12 which: 1) highlights the current accomplishments and history of women in science, math and computer science, 2) shows pictures and graphics of women engaging in science, math and computer science activities, 3) gives information about careers, and, 4) presents technical information about the topics with examples featuring contemporary women. The system will be designed to run on computers commonly found in the schools. Persons with suggestions about the system should contact Martha Burk or Arwen Donohue at CAPP, 1735 S Street, NW, Washington, DC 20009, Tel: (202) 797-0606.

Cornell University seeks a Vacuum Scientist for its Laboratory of Nuclear Studies. A master's degree with experience in vacuum science is required. Interested candidates should contact Chairman, Accelerator Physics Search Committee, c/o search@LNS62.LNS.cornell.edu, tel: (607) 255-4951, fax: (607) 254-4552. Or write: Newman Lab, Cornell University, Ithaca, NY 14853-5001. Cornell is an Affirmative Action/Equal Opportunity Employer.

The University of New Orleans announces the **Louisiana Education Quality Support Fund Graduate Fellows Scholarship Program** This fellowship will support a superior graduate student pursuing the MS degree in Physics at UNO beginning with the full 1994 semester. The fellowship includes a stipend of $13,200 per year, an allowance of $1,500 for presentation of research results at scientific meetings and a payment of $500 to help with moving expenses. Interested persons may contact UNO Physics Chair, Milton Slaughter at (504) 286-6341. The UNO Department of Physics especially welcomes women, minorities and handicapped applicants for this fellowship.

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