

# CSWP Gazette

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

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## Letter from the Editor

*Peggy Cebe, Tufts University*

Welcome to the Centennial Preview issue of the CSWP Gazette! As past Chair of CSWP and Unit Liaison for the Centennial, I had the challenge of overseeing the preparations for the CSWP Centennial events. Thanks to the efforts of the Committee members, we now have an excellent program of activities planned throughout the week.

Preparation for the Centennial actually began some time ago. At the Unit Convocation in January 1998, the APS plans for the Centennial were revealed. All APS units presented their tentative plans for the Centennial. A few divisions already had full-size exhibit quality displays which could be recycled from earlier uses. Other units admitted not having even begun to plan their events. But time was short! - only fourteen months remained before the Centennial.

CSWP was in excellent shape, thanks to the work of Prof. Nina Byers and her team at UCLA. Several years ago in anticipation of the Centennial, Byers' team began the research and compilation work which culminated in creation of the web-accessible archive: "Contributions of 20th Century Women to Physics" ([www.physics.ucla.edu/~cwp](http://www.physics.ucla.edu/~cwp)). At the Unit Convocation, CSWP arranged a demonstration of the Archive, using a live computer link. On a large projection screen, I showed several pages of the Archive to illustrate the high quality of the information available there, and the numerous women physicists included. The Archive presently features over 60 full citations of women physicists whose main contribution to the field was made prior to 1975.

After the Unit Convocation, work began in earnest preparation for the CSWP-sponsored events. Marjorie Olmstead, Session Chair (now CSWP Chair), arranged the symposia of invited lectures by prominent women physicists. A review of the Special Centennial Session "Breakthroughs of Women in Physics" appears on p. 3 of this issue. Beverly Berger designed the layout of the CSWP display. Pictures from the Niehls Bohr Library/Emilio Segre Archives as well as contributed photos will highlight the theme of "Women Doing Physics: Past, Present and Future". CSWP with funding from the APS has created a color poster "Celebrating Women in Physics" featuring women physicists at their work. This poster will be mailed to all physics departments in the US, and is available free to individuals (see p. 4). I call on all of you to make sure that the CSWP poster gets positioned prominently in your place of work.

In writing this article, I was reminded of the excitement I felt as a graduate student at Cornell preparing to attend the APS March Meeting. Combing through the thick green abstract book "*Bull. Am. Phys. Soc.*" a major concern was to find the times of the CSWP-sponsored events, so I wouldn't miss anything. No matter what the specific topic, I knew there would be interesting lectures and panel discussions in the CSWP-sponsored symposia. Scores of women physicists attended these sessions: if you wanted a good seat, you had to go early! Later, at the CSWP reception, I could always count on meeting up with my female friends and colleagues. It became obvious to me at this early stage in my career, that there were many women physicists, in all fields of physics and at all stages in their careers. I was not alone.



This connection to other women physicists has been strengthened by CSWP, and it has made me realize the benefits I have had as a female physicist in the latter part of this century. Within this century, the status of women in physics has been altered dramatically. What a different situation was faced by women physicists in the early-to-mid portion of the century. Often they were relegated to menial or tedious jobs analyzing data taken by male researchers, forbidden from faculty jobs by nepotism rules, viewed as distractions, or as "taking a job away from a man". In the present day, we have by no means solved all, or even most, of the problems for women in our field. Women still constitute a small fraction of practicing physicists, child rearing and family issues need to be addressed, job promotion and professional recognition are still more difficult achievements for women physicists. But I am optimistic, that with your support, we will continue the process through the next Century, so that women, like men, can pursue the professional work we love the most. We need continued activism and support for CSWP to keep concern for these issues alive. I encourage you to become an active member of the community of women physicists. Support our efforts on behalf of women in our profession, and take advantage of the opportunity for networking by attending the CSWP-sponsored events at the Centennial.

The Editor for this issue is  
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# CSWP Centennial Display

By Beverly Berger (Oakland University), Centennial Display Chair and 1999 CSWP Vice Chair

As part of the APS Centennial Celebration, each of the society's units, including the CSWP, was invited to develop an exhibit for the meeting. The CSWP display emphasizes "Women Doing Physics: Past, Present, Future" with photographs, a poster, and a link to the "Contributions of 20th Century Women to Physics" web site (<http://www.physics.ucla.edu/~cwp>).

The photographs show a broad range of physics activities from theoretical calculations to equipment assembly by all sorts of women, from Nobel Prize winners to middle school girls. Some photos were obtained from the AIP's Emilio Segre' visual archives with most contributed by the community in response to requests from Sally Dawson (BNL) and Tara McLoughlin (APS). A poster, called "Celebrate Women in Physics," uses some of the contributed photos to create a stunning visual impression of women doing physics. Copies of the poster will be available (free) at the display. The web site, developed by Nina Byers (UCLA) and colleagues, provides biographical information, photographs, and physics links for women, both well-known and now almost forgotten, who have made significant contributions to 20th century physics. We invite all of you to visit the CSWP exhibit in Atlanta!

## CSWP and FIAP to Co-Sponsor Women's Networking Breakfast at Centennial

For the fourth year, the Committee on the Status of Women in Physics (CSWP) and the Forum on Industrial and Applied Physics (FIAP) will co-sponsor the Women in Industrial and Applied Physics Networking Breakfast. The breakfast will take place on Monday, March 22, 1999 in the Swanton Room of the Omni Hotel, Atlanta.

The breakfast will be held from 7:00-9:00 a.m. in order to allow those registered for the meeting to attend the early sessions and to allow participants from the Atlanta area who are not attending the Centennial meeting to get to work on time. Please note: you do not need to be registered for the APS general meeting in order to attend this breakfast.

This breakfast is open to women physicists and students interested in industrial and applied physics. The following is a tentative agenda for the breakfast:

7:00-7:30	Buffet Breakfast
7:30-8:15	Program
Welcome:	Dr. Judy Franz, APS Dr. Shu Chang, Xerox Webster Research Center
Keynote Speaker:	Dr. Laura Smoliar, VP, Research and Development, 3D Technology Laboratories, Inc. "Big Opportunities in Small Companies"
8:15-9:00	Informal Discussion/Networking Time

### CSWP Centennial Display Hours

**Mon., March 22** 10 am - 5 pm

**Tues., March 23** 1 pm - 8 pm

**Wed., March 24** 10 am - 3 pm

The cost for the breakfast is \$15 per person, and pre-registration is strongly recommended.

You may register online at <http://www.aps.org/educ/cswp/breakreg.htm> and then mail your check to the address below.

**Checks should be made payable to the American Physical Society and sent to:**

Arlene Modeste  
American Physical Society  
Education and Outreach Department  
One Physics Ellipse  
College Park, MD 20740  
Tel: 301-209-3232

**Registration is on a first-come first-served basis. Tickets will be held at the door. See you there!**

**Register for the Breakfast  
online at:  
[www.aps.org/educ/cswp/  
breakreg.htm](http://www.aps.org/educ/cswp/breakreg.htm)**

# CSWP to Sponsor Three Sessions at Centennial

By Marjorie Olmstead (University of Washington), Centennial Session Chair and 1999 CSWP Committee Chair

The 1999 Centennial APS Meeting will be an exciting time, with many activities sponsored by the Committee on the Status of Women in Physics (please see page 4 for a full schedule). Featured among these activities are three interesting and informative CSWP-sponsored and co-sponsored sessions.

The first will be the CSWP Centennial Session (Sunday 2-5 pm) on "Breakthroughs of Women in Physics." The five women speakers are all extremely successful in a variety of arenas: academe, industry and government. They include two recipients of major APS prizes (only three living women have received such prizes); three members of the National Academy; and one in a government position confirmed by the Senate. The speakers will describe breakthroughs they have made, both in terms of physics and in terms of succeeding in a largely male field. These women are truly remarkable. Please come to their talks, and then stay to meet them at the CSWP reception following the session.

On Monday, CSWP is co-sponsoring a session with the Forum on History of Physics and the Division of Nuclear Physics on "Men and Women Inside the Atom: A Historical Perspective." We will hear an overview of women who pursued Nobel-quality research in nuclear physics

from Sharon Bertsch McGrayne, with more details about the life and physics of Maria Goeppert-Mayer from Robert Sachs. Also speaking in this session are the husband and son of the late Gertrude Goldhaber – the former talking about life as a student in the 1930's and the latter about Goldhaber's contributions.

On Tuesday, CSWP is co-sponsoring a session with the Division of Astrophysics on "Patching the Pipeline: Issues and Actions." While we celebrate the success of women in our session on Sunday, and their historical contributions to key areas of physics on Monday, the work of CSWP is not yet finished. One talk will discuss the progress of women in astronomy from a historical perspective, while another will discuss the more recent impact of the Baltimore Charter, a statement endorsing the rights of women in astronomy. Last year, CSWP sponsored a survey on two-career families in physics, and the results and recommendations from that survey will be presented. We will also hear a discussion of the climate for women in physics from the former moderator of the *climfys* discussion list.

The titles and speakers for the talks in these sessions are listed below. Abstracts may be found at the websites listed with each session. We invite you to join us for these exciting talks!

## Centennial Symposium:

### *Breakthroughs of Women in Physics* Sunday afternoon, 14:00, Ballroom IV, GWCC

(<http://www.aps.org/meet/CENT99/BAPS/tocB.html#SessBA03>)

#### Talk #1 "Women Physicists in Industry"

Esther Conwell (Chemistry Department, University of Rochester)

#### Talk #2 "Critical Points in My Career"

Johanna M.H. Levelt Sengers (Physical and Chemical Properties Division, NIST, Gaithersburg)

#### Talk #3 "Dancing to the Music of Physics and Politics"

Martha Krebs (United States DOE)

#### Talk #4 "Women in Physics: A Personal Perspective"

Mary K. Gaillard (University of California, Berkeley)

#### Talk #5 "Experiences of a Woman Particle Experimentalist"

Gail G. Hanson (Indiana University)

## Joint CSWP/DNP/FHP Session: *Women and Men Inside the Atom: A Historical Look*

Monday afternoon, 13:15, Room 202E, GWCC

(<http://www.aps.org/meet/CENT99/BAPS/tocF.html#SessFB02>)

#### Talk #1 "Nobel Women in Physics"

Sharon Bertsch McGrayne (Author)

#### Talk #2 "Maria Goeppert-Mayer — Nuclear Physicist"

Robert Sachs (University of Chicago)

#### Talk #3 "A Student at the Cavendish Laboratory in the 1930s"

Maurice Goldhaber (Brookhaven National Laboratory)

#### Talk #4 "Gertrude Scharff Goldhaber: Her Life With Physics"

Alfred Scharff Goldhaber (Institute for Theoretical Physics)

## Joint CSWP/DAP Session: *Patching the Pipeline: Issues and Actions* Tuesday morning, 10:30, Room 312E, GWCC

(<http://www.aps.org/meet/CENT99/BAPS/tocJ.html#SessJB21>)

#### Talk #1 "The Status of Women in Astronomy, 1899-1949: Opportunity versus Drudgery"

Barbara Welther (Harvard-Smithsonian Center for Astrophysics)

#### Talk #2 "The Baltimore Charter and its Impact"

Meg Urry (Space Telescope Science Institute)

#### Talk #3 "The Two-Body Problem: Dual-Career Issues and Solutions"

Laurie McNeil (Univ. of North Carolina at Chapel Hill)

#### Talk #4 "Weather Report: The Climate for Women in Physics"

Priscilla Auchincloss (University of Rochester)

# CSWP Events at APS Centennial March 1999

## At a Glance

### SUNDAY, MARCH 20

#### CSWP Centennial Session: Breakthroughs of Women in Physics

2:00p-5:00p

Ballroom IV

GWCC

FREE\*

#### Joint COM/CSWP Reception

5:00p-6:30p

Omni Hotel

Knollwood Rooms

FREE\*

### MONDAY, MARCH 22

#### Networking Breakfast for Women in Industrial and Applied Physics

(co-sponsored by FIAP)

7:00a-9:00a

Omni Hotel

Swanton Room

\$15 (pre-registration recommended)

#### Joint CSWP/DNP/FHP

**Session:** Women and Men Inside the Atom: A Historical Look

1:15p

Room 202E, GWCC

FREE\*

#### Women in Physics Display

10:00a-5:00p

Exhibit Hall, GWCC

FREE\*

### TUESDAY, MARCH 23

#### Joint CSWP/DAP Session: Patching the Pipeline: Issues and Actions

10:30a

Room 312E, GWCC

FREE\*

#### Women in Physics Display

1:00p-8:00p

Exhibit Hall, GWCC

FREE\*

### WEDNESDAY, MARCH 24

#### Women in Physics Display

10:00a-3:00p

Exhibit Hall, GWCC

FREE\*

*\*Sessions are open to meeting registrants. Exhibits are free and open to the public*

## Order your FREE copy of the "Celebrate Women in Physics" poster!

Simply return this form to APS and receive a free copy of this full-color poster. Single copies are free of charge, please call 301-209-3231 for information on bulk orders.

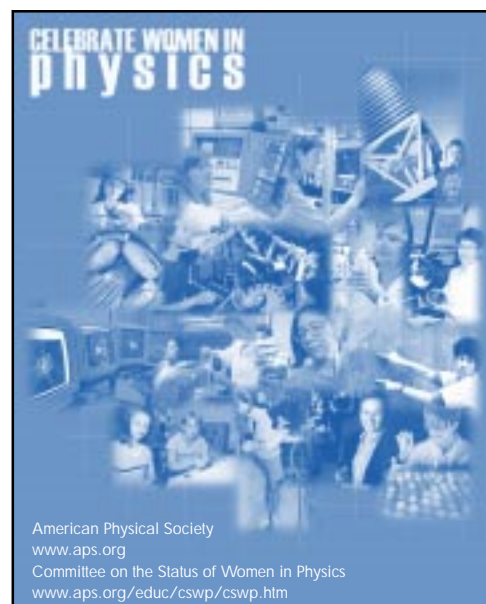
Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Telephone: \_\_\_\_\_

Email: \_\_\_\_\_



**Mail to: Tara McLoughlin • APS • One Physics Ellipse • College Park, MD 20740**



# SWPS Provides Mentoring and Support for Women in Physics at Berkeley

By Monique I. Cuvelier

When Kristine Lang sat down to her first physics class at Georgetown University, she thought she was making a big mistake. “Once I decided to take some classes, I found they were very difficult,” she said. “The words coming out of my professor’s mouth were in a foreign language. I had no idea what the symbols on the board meant.”

As she neared completion of her degree in Science, Technology and International Affairs, Lang, now 27, determined she wanted a Ph.D. in physics. But before she could move on, she needed to get her footing in this new field by taking pre-requisite classes. “When I would come across these situations,” she said, “I could only think that I shouldn’t be here.”

Then she met Dr. Joseph McClure, her faculty advisor cum mentor.

“He would tell me that everybody feels this way, and that’s really important,” she said. “He said, ‘It’s not you, everyone feels like they’re lost.’” Thanks to McClure’s sage advice, Lang is now well into her physics graduate studies at the University of California at Berkeley. Now she wants to pass along this mentoring experience to undergraduate women majoring in the physical sciences at Berkeley. She’s hoping more undergraduate physics students will stick with the program as she spreads encouragement through the group she founded: The Society for Women in the Physical Sciences (SWPS).

Lang’s brainchild is a mentoring service designed to help undergraduate women through their degree in physics, astronomy or geology. Launched in fall semester 1997 with 30 members, SWPS has doubled to 60 active members this year, and it’s likely to keep growing. “I was overwhelmed by the response to the program,” she said. “There are 25 women who are declared physics majors at Berkeley, yet I have 60 in the mentoring program. Clearly there is room for more and I hope to help by keeping these women from leaving physics early on.”

Her idea was to introduce female students to real humans who had been through the same difficult situations and had learned shortcuts. Graduate women lend confidence to undergrads when they think they are failing exams or lost in their classes. “Plus, Berkeley is a huge school and it’s easy for the undergrads to feel lost, even after declaring their major,” Lang said. “I wanted to get rid of the unfriendly feeling and welcome them and encourage them to major in physics.”

SWPS provides two major services to members: mentoring and events. The 13 mentoring groups consist of about 4-5 undergrads and are informally led by a woman graduate student. Groups might take lab tours to learn about physics sub-fields, visit science museums, attend seminars and colloquia, and review for exams. Mentors lend advice on everything from classes to graduate school to finding research positions.

Events are meant to let students socialize and try hands-on activities which are required in classes, but students might not be experienced in, such as handling tools or using the Internet.

“After events, I have people coming up to me in the halls saying, ‘I never knew how to use a drill before last night,’” she said. Events are also meant to allow women to discuss issues that might be of particular interest to them, such as juggling family and a science career.

Lang’s group has garnered popularity at Berkeley and beyond. There is a group modeled after hers which started this fall at the University of Pennsylvania. Lang is all for the expansion. “I’m really glad I did it,” she said. “I love it when someone comes up to me and says she’s decided to stay in class or got a research job because of something we did.”

*Kristine Lang can be contacted at [kmlang@physics.berkeley.edu](mailto:kmlang@physics.berkeley.edu)*

**“I wanted to get rid of the unfriendly feeling and welcome them and encourage them to major in physics.”**

Have you moved? Changed jobs? Changed fields? **Take the time now to update your name/address/qualifications on the Roster of Women in Physics** (this database also serves as the Gazette mailing list). See pages 17-18.

Trying to reach more women and minority candidates for job openings in your department or institution? Consider a search of the **APS Roster of Women and Minorities in Physics** (see [www.aps.org/educ/reqform.html](http://www.aps.org/educ/reqform.html)).

# Women in Physics Group Shares Ideas, Advice

By Amanda Maria Straniero, University of Richmond

Upper-classwomen will be able to pass down valuable information to underclasswomen regarding research experiences, applying to graduate school, and other relevant experiences.

A study done by the American Institute of Physics in 1991 showed that the percentage of women in a physics curriculum significantly drops from college to graduate school, resulting in only ten percent of all doctorates of Physics being awarded to women in the US. This is only one statistic, of many, that proves the well-known fact that there are significantly fewer women in the field of physics. Many believe that it is a lack of mentors and role models that contributes to the loss of women in physics. This has been cited in several papers such as "Athena Unbound: barriers to women in academic science and engineering" written by Henry Etzkowitz et al.

In response to these papers and a class I am taking, Women in Science, I decided to start a new organization on campus. As a senior physics major at the University of Richmond, I have initiated a "Women in Physics Group." This group is for women in college who are interested in physics or are pursuing a physics major or minor. The purpose is to explore and discuss women in the world of science, particularly physics. Also, it will provide a support system for the women involved. Upperclasswomen will be able to pass down valuable information to underclasswomen regarding

research experiences, applying to graduate school, and other relevant experiences. It is an open arena for discussion of ideas, problems, and concerns. Participants will be exposed to new ideas regarding woman's position in the world of science, especially physics, through the presentation of noted literature on the subject. These goals will be accomplished through monthly meetings. Other plans for the group include scheduling a female physicist to speak about her experiences and planning a workshop or presentation for high school girls about science, highlighting physics.

My proposal was met with enthusiasm from our all-male physics department and my female classmates. The first meeting was successful, and I am currently planning the next one. We all agree that this group is a beneficial addition to our physics department and will strive to maintain it in future years. I strongly encourage you to create a similar program at your institution because groups of this kind are sorely needed. Please contact me if you have any questions or comments.

Amanda Maria Straniero can be reached at: [astranie@richmond.edu](mailto:astranie@richmond.edu)

## 1999 MGM Award to Andrea Ghez

The 1999 MARIA GOEPPERT-MAYER AWARD was bestowed on Dr. Andrea Mia Ghez of UCLA "for her use of speckle interferometry to obtain very high-resolution images with the Keck telescope and for her presentations to astronomers and the general public that sparkle with enthusiasm. Her research has shed new light on how stars form and on the nature of the massive black hole at the center of the Milky Way."



Dr. Andrea Mia Ghez

The Award, endowed in 1985 by the General Electric Foundation (now the GE Fund), is intended to recognize and enhance outstanding achievement 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 in the spirit of Maria Goeppert-Mayer.

The annual award consists of \$2,500 plus a \$4,000 travel allowance to provide opportunities for the recipient to give lectures in her field of physics at four institutions of her choice, and at the meeting of the Society at which the award is bestowed; and a certificate citing the contributions made by the recipient.

### Rules & Eligibility:

This award is to be given to a woman during the early years of her career, not later than ten years after the granting of the Ph.D. degree for scientific achievements that demonstrate her potential as an outstanding physicist.

The award is open to any female US citizen or permanent US resident. The lectures must be given at institutions within the United States or its possessions within two years after the award is made.

Nominations are active for three years. The nominee's Ph.D must have been received after 1 September 1989.

### Nomination Deadline:

The deadline for submission of nominations for the 2000 Prize is: **JULY 1, 1999.**

Nominations should be sent to the Chair of the 2000 Selection Committee:

Katherine Gebbie  
B 160 Physics  
NIST  
Rte 270 & Quince Orchard Road  
Gaithersburg, MD 20899  
Phone (301) 975-4201  
email: [gebbie@nist.gov](mailto:gebbie@nist.gov)

# British Women Physicists: Organizing for Change?

By Dianne Millen

School of Education, University of Cambridge (cdm1003@cus.cam.ac.uk)

Why do women join professional societies in science, and do the services on offer suit their particular needs? Not only are women under-represented in the physical sciences, but professional relationships such as those fostered through professional societies are crucial to scientists' career success. This article reports some empirical research I conducted in the UK on women's needs from selected professional institutions, with particular reference to the experiences of physicists. To protect anonymity, names of certain institutions and individuals have been omitted or changed.

The 'Physics Society' (PS) claims to be "both a professional body and a learned society", i.e. a resource for professional development and a representative body responsible for maintaining the public face of physics. Membership leads to the award of Chartered Status - and indeed 35% of the physicists initially surveyed cited "professional credibility/Chartered status" as their main reason for joining. Later interviews suggested a particular need for female physicists to 'shore up' their professional credibility by membership of a public body such as the PS which legitimates scientific attainment: not only does having this additional status help in the competitive job market, but several respondents reported feeling marginalized within a male-dominated professional culture where it was assumed that they were less committed or competent until they proved otherwise by hard work.

Another popular reason for joining the Society was access to information and services (31% of answers). Again, this may be of particular importance to women, who can find entry to professional networks more difficult than men. Within the institution itself, and in the scientific world in general, several women reported thinly veiled hostility to their presence, or a reaction of surprise when men learned that they were full members of the PS (something of no surprise to any woman who has had others assume her male partner is the physicist!). If women can access the networks which the PS facilitates, this can, as optics researcher "Helen" pointed out, "enable you to get to meet people who are important in your field". But it seems that this is not necessarily easy for women even in the 1990s.

To counteract such difficulties, the PS set up a Committee for Women Physicists (CWP) to support women physicists and increase their numbers "by presenting physics as

an attractive career option to schoolgirls", a twofold strategy of *representation* and *retention* involving networking activities, school visits and a newsletter for female members. A contradictory picture emerged, however, of the success of these efforts. Whilst the percentage of female members increased from 5.7% to 12.0% in the nine years of the CWP, only 15% of them subscribed to the newsletter. And whilst the women studied here made positive suggestions about what the group could do such as outreach to schools and support for career breaks, women members in general felt (according to the CWP Chair) that women's difficulties were those of a decade ago and don't exist now". Lack of participation seemed, however, to be down to lack of time and opportunity rather than hostility to the idea of women organizing: in fact, women physicists were the most positive towards women organizing (see Table 1). They were also comfortable with the idea of being supported specifically as women physicists with "problems that male physicists don't have" ("Sarah", safety assessor) rather than insisting that their gender was irrelevant: they were quick to point to the need for cultural, *systemic* change in a profession where women were still too often seen as "imminent mothers and potential lovers" rather than seeing the situation in terms of individual women's difficulties.

As the CWP restructured itself to accommodate the decrease in interest, representation and retention were still the core strategy, but the emphasis had shifted to monitoring women's position within the PS rather than changing physics, which was seen as too large a problem for the CWP alone to solve. However, women's organizing within the PS had kept women's particular issues on the agenda, and provided a mechanism for ideas about women's experiences and gendered change to be circulated around an institution still dominated by men. The question for the future is whether some members' enthusiasm for women-only activism can be capitalized upon to bring about structural change for women in physics : otherwise efforts to increase women's representation and retention may be never-ending.

*Dianne Millen recently received her PhD on organizations' ideas about change for women in science, and women scientists' responses to feminist ideas, from Cambridge University. She is currently a freelance researcher participating in several British and European projects relating to gender and schooling.*

**Women's organizing within the PS had kept women's particular issues on the agenda, and provided a mechanism for ideas about women's experiences and gendered change to be circulated around an institution still dominated by men.**

## Women scientists' views on women organizing (n=61)

Discipline	In Favor	Not in Favor	No Response
Biology	6	10	1
Chemistry	8	3	3
Engineering	5	3	2
Physics	14	2	4
All	33	18	10

# In Memoriam, Gertrude Scharff Goldhaber, 1911-1998

Goldhaber was a founding member of Brookhaven Women in Science in 1979, and she often lent her energies to education and to attracting women to the sciences.

Gertrude Scharff Goldhaber, a renowned nuclear physicist and the first woman PhD hired by Brookhaven National Laboratory (BNL), passed away in Patchogue, New York, on 2 February, 1998, after a long illness.

Born in Mannheim, Germany, on 14 July 1911, Trude Scharff began her physics career in 1935, when she earned a PhD from the University of Munich. From 1935 to 1939, she lived in England, where she held a postdoctoral position at the University of London's Imperial College.

Having married Maurice Goldhaber, who was then a physics professor at the University of Illinois, she immigrated to the US in 1939 and became a research physicist in the same department as her husband. There, in 1942, she discovered that spontaneous fission is associated with the emission of neutrons—a discovery kept secret until World War II ended. In 1948, she and Maurice established the identity of beta particles with atomic electrons.

That same year, she was made a research assistant professor. However, her further advancement was blocked by the university's antinepotism rules. To avoid them, she and Maurice moved in 1950 to BNL. An associate physicist at first, she was promoted to physicist in 1958 and senior physicist in 1962.

From the early 1950s onward, Trude directed her scientific research toward systematizing the properties of nuclear levels across the entire periodic table. It was a time of rapid development in both experimental techniques and nuclear structure theory. Independent particle and collective motion models were proposed to describe nuclear excitations, but the regions of applicability of each class of model were largely unknown. For instance, the Mayer-Jensen shell model appeared to contradict what was known about the short-range saturated nuclear forces, with their implied pronounced nucleon clustering. There was speculation that the forces that were known to act between free nucleons were somehow modified in dense nuclear matter and that shell structure existed only for ground states. Evidence for shell closures in heavier nuclei lacked experimental evidence.

Trude's research at that time was devoted to resolving these apparent contradictions. In 1953, she demonstrated the existence of shell structure in excited nuclear states by conducting a detailed and comprehensive survey of the energy of the first excited states of even-even nuclei as a function of neutron number. Her conclusions included the important finding that the excitation energy increases strongly at the shell closures. A few years later, she and Joseph Weneser noted that the ratio of excitation energy of the second excited state to the first in nuclei in the region where  $38 < N < 88$  significantly differs from that in the adjacent region where  $90 < N < 108$ . The value in the lower region is near the ratio of 2 identified with phonon excitation in spherical nuclei, whereas the value in the upper region is near 10/3, which signals an abrupt change in the spacing of excited states characteristic of rotating deformed nuclei.

In 1957, Trude reported the remarkable isomerism in the deformed nucleus, hafnium-180, with its implied retardations of  $10^{16}$  and  $10^9$  for the E1 and E3 transitions, respectively, thereby dramatically verifying the predictions of K forbiddenness in electromagnetic transitions of deformed nuclei.



Photo courtesy Brookhaven National Lab

Over many of the following years, Trude with various collaborators developed the phenomenological variable moment of inertia model and was able to smoothly parameterize the energy ratio of the first  $4^+$  to  $2^+$  states of the even-even nuclei over most of the periodic table with values ranging from about 2.2 to 10/3.

Taken as a whole, Trude's work played an integral part in unfolding the story of nuclear structure, alerting experimentalists to important regions of the periodic table and confronting theorists with the realities of nature. For her contributions to nuclear physics, she was elected to the National Academy of Sciences in 1972 (becoming only the third female physicist so elected).

In addition to her science, Trude also had a major impact on life at BNL. In 1960, she started the Brookhaven lecture series, which continues today to introduce BNL scientists and others to research by their lab colleagues. She was a founding member of Brookhaven Women in Science in 1979, and she often lent her energies to education and to attracting women to the sciences.

Having retired in 1977, Trude continued her association with BNL as a research collaborator until 1990. She also held adjunct professorships at Cornell University and Johns Hopkins University in the 1980s. She served on several committees, including the American Physical Society's committee on the status of women in physics, the National Research Council's human resources committee on the education and employment of women in science and engineering and the National Academy of Sciences' committee on human rights.

Trude made important contributions to science and was an inspiration to many women as a pioneer in a field dominated by men. She was devoted to improving science education at all levels, and was an avid hiker, swimmer, tennis player and skier. Her contributions to both BNL and the science community were important and long lasting.

**PETER D. BOND  
CHELLIS CHASMAN**

*Brookhaven National Laboratory  
Upton, New York*

*(obituary reprinted with permission from the July 1998 issue of Physics Today, Vol 51, No. 7)*



# Committee for Women in Physics Launched in Germany

By Brenda Winnewisser, *Physikalisch-Chemisches Institut, Justus-Liebig-Universitaet*

At the November 14, 1998 meeting of its governing body, the German Physical Society (Deutsche Physikalische Gesellschaft, DPG) approved the formation of a new division/forum, the "Committee for Equal Opportunity" (Arbeitskreis Chancengleichheit). The successful application of the group for recognition was jubilantly announced at a plenary session during a conference organized in Hamburg by and for female physicists, "German Woman Physicists Conference '98" (Deutsche Physikerinnentagung '98), which had as its motto, like a similar meeting last year in Berlin, "Kiss the Future".

This year's meeting attracted 170 physicists, mostly young women: undergraduates, masters and doctoral students, instructors and women at the beginning of industrial careers. The program offered a broad spectrum of state-of-the-art physics as well as presentations concerned with specific issues relevant for women in physics. Presentations included invited lectures, contributed lectures and posters, workshops and a podium discussion. Sessions were held at the University of Hamburg and at DESY, the accelerator facility near Hamburg. The entertainment included a cabaret put on by a high-school girls' physics class, which added the perfect light but accurate perspective.

The Committee was formed in response to a resolution drawn up at the German Woman Physicists Conference '97. A commission was elected to negotiate with the DPG.



*Executive Committee of the newly-formed DPG Women's Committee.*

The response to this resolution ultimately led to a very constructive meeting between a group of seven women with the current president of the DPG, Prof. Alexander Bradshaw, in July. A formal application was then made, and was approved by the DPG in November, as noted above, with little discussion. At the plenary session of this year's "Kiss the Future" conference, twelve women were promptly elected to an executive committee chaired by Corinna Kausch, Hamburg.

The Committee plans to collect statistics concerning women physicists in the universities and in industry. Such statistics are sorely lacking in Germany. For example, women physics teachers comprise currently only about 10% of physics teachers in secondary schools. Once accurate statistics are compiled, a program of measures to try to increase the realization of equality of opportunity can then be formulated.

A web page has been launched, local and national networks are sprouting, and physics education in the schools will be addressed. One of the tasks dear to the hearts of the members of the new Committee is the continuation of the series of German Woman Physicists Conferences, although this will now be supplemented by sessions or workshops to be offered during the transitional meetings of the DPG. It is expected that the formal recognition of the women's group within the DPG will give impetus to various informal efforts, as well as opening the opportunity to initiate programs on a national scale to improve the situation of women physicists in the academic and industrial landscape.

This news may not sound new to CSWP members in the United States, but it is very new in Germany. The German group will be looking carefully at the achievements of the CSWP for inspiration.

*Brenda P. Winnewisser (Brenda.Winnewisser@phys.chemie.uni-giessen.de) is one of the founders of the Committee for Equal Opportunity in the DPG. The German CSWP website is [www.dpg-physik.de/fachgremien/akc](http://www.dpg-physik.de/fachgremien/akc)*

**It is expected that the formal recognition of the women's group within the DPG will open the opportunity to initiate programs on a national scale to improve the situation of women physicists.**



**PLEASE RETURN THIS FORM TO:**

The American Physical Society  
One Physics Ellipse • College Park, MD 20740-3844

The 1998-1999 Women Speakers List (WSL) of Women in Physics (pictured to the left) is published by 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 WSL serves as a resource for middle school, high school, university and general audiences. Information on the speakers is listed by state and by field for easy reference. To receive your free copy, please complete this form and return it to APS, or access the forms on-line ([www.aps.org/educ/wip-csl-front.html](http://www.aps.org/educ/wip-csl-front.html).)

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Institution: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Email: \_\_\_\_\_

# Girls Fly High at University of Maryland Summer Physics Program

By Pam Solomos, UMCP

## For More Information

For further information and an application for the 1999 program, please contact:

**Bernadine Kozlowski**  
301-405-5949

The University of Maryland's Annual Physics Summer Outreach Program for Middle School Girls is now in its tenth year. The award-winning program was conceived in 1990 to combat the paucity of women in physics-related careers. "Girls tend to shy away from physics when they reach the age of 13 and 14," said Chuan Sheng Liu, former chair of the Physics Department at Maryland. "A lot of times girls don't want to be portrayed as too smart," noted one of the teaching assistants. This reflects the fact that the interest of pre-teen girls in science is equal to that of pre-teen boys. Yet it drops off as the girls get older, as do their scores in standardized math and science tests, according to National Science Foundation statistics.

This was brought to Liu's attention in 1989 attention during a site visit to the department by members of the APS's Committee on the Status of Women in Physics. "I mentioned to [associate chair for educational affairs] Angelo Bardasis," continued Liu, "how nice it would be to have a program for young girls." Bardasis took it upon himself to organize the program until his death in 1995. It is now coordinated by Bernadine A. Kozlowski and organized by a science teacher from a local middle-school.

The 13- and 14-year-old girls are selected from middle schools in Maryland, Northern Virginia and Washington, D.C. Selection is based on a short essay and letters of recommendation from teachers. The main criterion used, however, is interest rather than merit. The program has grown so popular that two consecutive programs are presently offered, and still the demand cannot be met. Some 40 girls were turned away last summer for lack of space.

The two-week summer camp creates a non-competitive, highly motivating and mentally stimulating environment in which the girls can absorb the principles of physics. Each morning, they are given thought-provoking demonstrations. These are followed by afternoons of hands-on labs that reinforce difficult physics concepts. The labs give the girls access to equipment that they might not have seen in their own schools. The program culminates in an airplane ride in which the girls find out about the physics of flight.



John E. Horne

*Learning about dry ice.*

The program, which won the 1994 Distinguished Program, Award of Merit, from the Maryland Association for Higher Education, aims to increase the girls' confidence in math and science by providing professional female role models, according to Kozlowski. Since the program's inception, the teachers, assisted by female graduate and undergraduate students, have all been women employed in the science and math fields.

"All the way through both high school and university I certainly was never exposed to anything that made me think I would grow up to be a physicist, to anything that even caused me to like physics," remembered Professor Ellen D. Williams, a native of Wisconsin, who has now been a physics faculty member at the University of Maryland for 16 years. She also heads the department's Materials Research Science and Engineering Center, which, in conjunction with the NSF, has co-sponsored the program for the past two years.

The organizers of this program hope that there will be at least 55 young women each year in the Baltimore-Washington Metropolitan area who will not have similar recollections of their adolescence.

*Pam Solomos is a publications specialist in the Physics Department at the University of Maryland, where she has been a staff member since 1978.*

Interested in activities for industrial/applied physicists?

- Check out the Forum on Industrial and Applied Physics website at <http://www.aps.org/FIAP/index.html>
- Access the Industrial and Applied Speakers' list at [www.aps.org/FIAP/speakers.html](http://www.aps.org/FIAP/speakers.html)

Get exposure for yourself and your research while serving as a role model for women in physics! Add your name to the Women Speakers List at <http://www.aps.org/educ/cslwip.html> or see page 19 of this issue!

# Women Fellows of the APS Announced

The CSWP salutes the following women who were elected as APS Fellows in 1998.

## **Berger, Beverly K.**

Oakland University

*Gravitational Topical Group*

For her pioneering contributions to global issues in classical general relativity, particularly the analysis of the nature of cosmological singularities, and for founding the Topical Group on Gravitation of the APS.

## **Carter, Emily Ann**

U.C.L.A.

*Chemical Physics*

For her pioneering development and applications of ab-initio methods to energetics, kinetics and dynamics studies of surface reactions.

## **Centrella, Joan Mary**

Drexel University

*Astrophysics*

For her original contributions to numerical relativity, cosmology, and astrophysics, in particular for her studies of large-scale structure in the universe and sources of gravitational radiation.

## **Deleplanque, Marie Agnes**

Lawrence Berkeley National Laboratory

*Nuclear Physics*

For her groundbreaking work in the studies of nuclear structure at the highest angular momenta and important contributions to the developments of gamma-ray detector arrays.

## **Farrow, Robin F. C.**

IBM Almaden Research Center

*Materials Physics*

For pioneering the development of molecular beam epitaxy to grow and study epitaxial semiconductors, metastable phases, dielectrics, magnetic elements and alloys.

## **Glendinning, Sharon Gail**

Lawrence Livermore National Laboratory

*Plasma Physics*

For clear and illuminating experimental investigations of ablation-front Rayleigh-Taylor instability, laser imprinting, and nonlinear hydrodynamic instabilities related to inertial confinement fusion, high energy-density physics and astrophysics.

evant to inertial confinement fusion, high energy-density physics and astrophysics.

## **Krisch, Jean Peck**

University of Michigan

*Forum on Education*

For leadership and national contributions to the Society of Physics Students, effective and innovative undergraduate physics teaching, including to preservice elementary teachers, and for successful mentorship of women graduate students.

## **LeGoues, Françoise K.**

IBM T. J. Watson Research Center

*Materials Physics*

For insightful contributions and creative use of electron microscopy in determining mechanisms of strain relaxation in heteroepitaxial growth of semiconductor thin films.

## **Nelson, Ann E.**

University of Washington

*Particles & Fields*

For contributions to the theory of CP violation, kaon condensation, baryogenesis in the early Universe and supersymmetry breaking.

## **Rahman, Talat Shahnaz**

Kansas State University

*DCMP (Condensed Matter)*

For theoretical studies of surface dynamics.

## **Thomas, Valerie**

Princeton University

*Forum on Physics & Society*

For her efforts to build an active interface between the science of materials and pollutants, and the avenues mechanisms necessary to build sound management strategies, and to build international networks of environmental science and policy researchers.

## **Urry, C. Megan**

Space Telescope Science Institute

*Astrophysics*

For pioneering studies of the nature of Active Galactic Nuclei through multi-wavelength observational campaigns and the elucidation of unified models.

## Awards

### **ERNEST O. LAWRENCE AWARD**

**Laura H. Greene**, Professor of Physics at University of Illinois at Urbana-Champaign, received the 1998 Ernest O. Lawrence Award in the Materials Research category for her research in novel materials, including her pioneering experiments on tunneling and proximity effects in superconductors, and for elucidating the origin of fundamental surface effects in high-temperature superconductors, including the zero-bias conductance anomaly in high-temperature superconductors.



*Laura H. Greene*

The Ernest O. Lawrence Award is administered by the US Department of Energy and is given annually to scientists and engineers for their exceptional contributions to the development, use, or control of nuclear energy (broadly defined to include the science and technology of nuclear, atomic, molecular, and particle interactions; and their effects).

### **LUISE MEYER SCHUTZMEISTER AWARD**

**Ms. Olga Bakajin**, a graduate student in the Princeton University physics department, is the recipient of this year's Luise Meyer Schutzmeister Award. The \$500 award, sponsored by the Association for Women in Science, is given annually to an outstanding physics graduate student. For further information on the award, please contact AWIS at [http://207.8.153.45/html/ed\\_foundation.html#graduate](http://207.8.153.45/html/ed_foundation.html#graduate)

# Nominate a Woman for APS Fellowship!

The Committee on the Status of Women in Physics encourages APS members to nominate a woman for fellowship in the APS. You can easily check and see if someone is already a fellow by searching on their name in the APS online member directory at [www.aps.org/memb/enter-directory.html](http://www.aps.org/memb/enter-directory.html). Fellows are clearly marked "[Fellow]" after their name.

The APS Fellowship Program was created to recognize members who may have made advances in knowledge through original research and publication or made significant and innovative contributions in the application of physics to science and technology. They may also have made significant contributions to the teaching of physics or service and participation in the activities of the Society. Each year, no more than one-half of one percent of the then current membership of the Society are recognized by their peers for election to the status of Fellow in The American Physical Society.

*All APS Members are eligible to nominate, and all APS members are eligible for nomination.*

## To Submit Nominations:

- Insure nominee is a member of the Society in good standing.
- Obtain signatures of two sponsors who are members of the Society in good standing.
- Submit signed Nomination Form, Curriculum Vitae, and Supporting Letters prior to unit deadline as a complete packet to:

Executive Officer  
The American Physical Society  
One Physics Ellipse  
College Park, MD 20740-3844  
ATTN: Fellowship Program

Although there is no required number of supporting letters for each nomination, typically 2 - 3 letters from individuals outside the nominee's institution who are familiar with the nominee's work are submitted.

**Note:** Nomination forms may be obtained by:

- writing the above address,
- sending an email message to: [fellowship@aps.org](mailto:fellowship@aps.org),
- telephoning: (301) 209-3268 or faxing: (301) 209-0865,
- downloading electronic version of the nomination form from <http://www.aps.org/fellowship/form.html>

Supporting letters should be included with nomination forms to insure attachment to the correct nomination package.

## Nomination Process:

1. Submit nomination to the APS prior to unit deadline.
2. Nominations reviewed at the Unit level by the Unit Fellowship Committee. **(By July 1)**
3. Recommendations reviewed by the APS Fellowship Committee. **(By September 1)**
4. Final approval given by full APS Council. **(By November 31)**
5. Notification of newly elected fellows as well as sponsors of nominees deferred or dropped.
6. General announcement of new fellows in March issue of the APS News.

## Further Nomination Information

For further information regarding Fellowship Nominations, please email: [fellowship@aps.org](mailto:fellowship@aps.org) or telephone: (301) 209-3268.

Further information on the nomination process can be found online at <http://www.aps.org/fellowship/index.html>

## 1999 APS Fellowship Nomination Deadlines

### APS General

APS General Nominations 06/01/99

### Divisions

Astrophysics 05/01/99

Biological Physics 06/01/99

Chemical Physics 02/15/99

Computational Physics 03/15/99

### DAMOP

(Atomic, Molecular, Optical) 02/15/99

DCMP (Condensed Matter) 01/30/99

Fluid Dynamics 03/15/99

High Polymer Physics 01/15/99

Laser Science 04/01/99

Materials Physics 02/15/99

Nuclear Physics 04/01/99

Particles & Fields 04/01/99

Physics of Beams 03/15/99

Plasma Physics 04/01/99

### Forums

Forum on Physics & Society 04/01/99

Forum on History of Physics 04/01/99

Forum on International Physics 04/01/99

Forum on Industrial and Applied Physics 02/20/99

Forum on Education 12/01/98

### Topical Groups

Few Body 04/01/99

Fundamental Constants 04/01/99

Precision Instruments & Measurements 04/01/99

Shock Compression 04/01/99

Gravitation 04/01/99

Magnetism and Its Applications 03/30/99



# Ladies in the Laboratory? American and British Women in Science, 1800-1900: A Survey of Their Contribution to Research

By Mary R.S. Creese, Scarecrow Press, Inc. Lanham, MD and London, 1998.

Review by Deborah Franke, Research Triangle Institute

Using a popular 20th century measure, “publish or perish”, Dr. Mary Creese has provided us a view of the contribution of women to 19th century science. Dr. Creese began studying women’s contributions to scientific work after almost thirty years as a research chemist, currently at the University of Kansas. She used the London Royal Society’s Catalogue of Scientific Papers, 1800-1900, a 19-volume index, to develop a bibliography. There were nearly 1,000 women authors who produced about 3,400 articles. That was less than 1% of the total entries in the Catalogue. Of these women, 41 % were American and 26% were British, with the rest mostly from other European countries. She divided the sciences into disciplines and then looked separately at American and British authors. Long biographies were provided for a few women in each chapter, with short biographies for the rest. The focus was on their work and their publications, but some of the long biographies included more personal life.

This book would be an excellent educational resource. Life, physical, mathematical and social sciences are all represented in the book. Thus, teachers of college, high school or even advanced middle school science classes could assign reports on women in appropriate fields. The extensive bibliography of the papers would allow college students to study the original papers.

The book would also be valuable to others doing research on women’s contributions to sciences because of the background information provided. The introduction discusses the distribution of papers by discipline and by country. Each chapter provides statistics on the number of authors and the number of papers for each decade in the century.

Most of the papers are from the last twenty years (1880-1900). Material within the chapters and in the book summary discuss where the women studied and where they worked. This is useful as one can see how momentum builds when there are women within a program at a given school.

The book works well at another level: it is very enjoyable reading. I thought I would skim the book for this review. Instead, I found that whatever chapter I picked, I was fascinated by the women described in the long biographies. They were amazing people. One example for aspiring physicists is Phoebe Sarah (Hertha) Marks Ayrton (1854-1923), who studied at Cambridge. With her husband (and after his death), she studied the electric arc which led to new technology for cinema projection lamps and for searchlights. Watching sand on the beach led to studying formation of ripples in sand. Later this led to study of vortices in fluids, including the Ayrton fan, a hand-operated device for deflecting waves of poison gases from the trenches of First World War. She was a friend of Marie Curie’s and a strong advocate of women’s rights. She is still the only woman to have received the Royal Society’s Hughes Medal for original work in the physical sciences and was nominated to the Society, but not elected. She was the first female member of the Institution of Electrical Engineers and active in many prominent women’s organizations. The bibliography lists three mathematics papers published in the 1880s when she was teaching math and then 24 physics papers published between 1895 and 1900. The footnotes also provide references for several of her publications after 1900. Her daughter Barbara Ayrton Gould was chairman of the Labour Party and Member of Parliament.

## Reviews

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# Lost Talents, Women in the Sciences

By Sandra L. Hanson (Temple University Press, 1996)

Review by Minna Mahlab, Grinnell College

In *Lost Talents, Women in the Sciences*, Sandra Hanson offers compelling evidence for rethinking the metaphor of the “science pipeline”. Used to describe the relative access of men and women to careers in science, the image of the pipeline perhaps has structured the methodology of most research designed to answer the question: why do so many talented women leave the field of science? Such research has examined single experiences in the science tracks of women at a single point in time. Using a dynamic, multidimensional approach, Hanson investigates the patterns and trajectories that women experience in science as well as the resources that are associated with those trajectories. These patterns provide a view of the entire

process leading to success in the sciences in addition to an understanding of the complexities of that process.

Hanson defines four elements of experience in both math and science: achievement (as measured by course grades and standardized exam scores); access (course taking); attitudes; and activities (use of computers, calculators, etc.). She analyzes not only these four dimensions but their interrelationships as well. In creating a conceptual framework for lost talent, Hanson considers causal influences of gender on the science experience; how individual and social factors interact to affect the science experience; and the relationships between gender, race, and social class and their effect on the

## Reviews

The goal of the editors of this compilation of essays is “to kill the myth that Marie Curie was the one and only woman working in the field.”

science experience. The research also explores how the individual experiences of women in science reflect gender differences in power at a structural level.

On the complexity of her model for lost talent, Hanson comments: “The conceptual framework...is one that stresses structural barriers or selection processes that directly affect science achievement through gender discrimination but that also indirectly affect science achievement through the transmission of ‘gendered’ socialization and unequal allocation of resources in family and school environments.”

Some of Hanson’s results reflect those of previous studies: girls fall behind in science achievement before math achievement; girls have more negative attitudes about science by the tenth grade. However, when deconvolved from overall science experience into separate trajectories, some of Hanson’s findings are surprising: for example, young

women represent the largest group in the science achievement pipeline. Yet this success does not translate into the other pipelines (access, attitude), nor does it guarantee that they will stay in this pipeline. Hanson shows that allocation of resources cannot be directly related to achievement, access, or attitude, a result that will be of interest to policy makers and educators alike.

Unfortunately, the prescriptions Hanson offers for creating equity for women in science are hardly groundbreaking: getting women into science courses, further study of gender differences in teaching, more parental involvement in school and schoolwork, different teaching and learning environments. At the postgraduate level, Hanson calls for flexible work environments, family leave policies and the elimination of differential treatment on the basis of gender. As these are the same solutions offered twenty years ago, it is indeed not surprising that we continue to suffer from lost talent.

## *A Devotion to Their Science: Pioneer Women of Radioactivity*

By *Marelene F. Rayner-Canham and Geoffrey W. Rayner-Canham* (Chemical Heritage Foundation, McGill-Queen’s University Press, Philadelphia, 1997)

Review by *Kimberly A. Shaw, Southern Illinois University at Edwardsville*

As a professional student of physics and an amateur student of history, I was pleased to find in *A Devotion to Their Science* a set of biographical essays about a mostly unknown generation of women involved in the birth of radioactivity studies and atomic science. The goal of the editors of this compilation of essays is “to kill the myth that Marie Curie was the one and only woman working in the field.”

Indeed, most students of science history do very well to find references to women other than Curie, her daughter Irene Joliot-Curie, and Lise Meitner. Reading most history also gives one the impression that any women such as Curie were not only rare, but were often working in isolation from the scientific community as well.

In fact, the editors use these biographical essays not only to bring to light the history of these women, but also to draw a common thread of experiences among this “invisible college of women”. The editors have chosen to organize this book around the three main geographical groups investigating the new fields of radioactivity and the exploration of atomic structure: the British group, focusing around Ernest Rutherford, the French group founded by Marie and Pierre Curie, and the Austro-German group centered around Lise Meitner and Otto Hahn. Several of the women had ties to more than one of these groups, and were categorized in the text according to their main association. Because of the interaction of the research groups, many of these women either knew each other, or knew of one another.

A typical biographical essay treats the life of Norwegian scientist Ellen Gleditsch, who was a cornerstone of this invisible college. Gleditsch was the eldest in a large family in which both learning and liberal activism were encouraged. She graduated from a private coed school at the

top of her class. As a girl, she was not eligible to take the university entrance exams. She moved to Oslo to work (in an unpaid position) with a chemistry professor, but was forced to tutor in chemistry on the side to support herself, spending less time in the lab. In 1905 and 1906 she was able to take the university entrance exams, and was finally admitted, as universities began to be opened to women. In the Curie labs in Paris, Gleditsch made the acquaintance of many of the other women radioactivity researchers. Her initial contacts with American researchers, in her efforts to utilize a research fellowship there, were revealing of the commonly held biases about women in research positions, especially the view of women scientists as mere husband-seekers. During the World War I years, like many women, she took over industrial chemistry work, and but unlike many others did not lose her job after the war ended and men returned to those jobs. Gleditsch remained single throughout her life. Her view was typical of the time: that for women, family life and research were almost always mutually incompatible.

Many of the common experiences of the women scientists of this generation were demonstrated in the biography of Dr. Gleditsch. They often left science after a few years, either for marriage or other family reasons. All went into science out of love for the subject, and were always part of families that encouraged learning for women. Married women were not a common occurrence in the labs, either by choice or due to lack of available positions. Women were expected to maintain the marital home, not work outside it. Paying jobs were reserved for men. Women were also seen by some as husband-seekers and second rate workers, and to be avoided if possible in the lab due to the possible distraction. Many of these women stayed to help develop science departments in their mother countries, and were rarely published in any but their native languages. Many of these women worked together at some point, and

formed a support network to encourage each other's work. This support network assisted several women in their quest for research positions, and helped several women researchers escape from the Nazis during WWII. The support network also helped these women develop a sense of self-confidence about their work, allowing them a place to take credit for their achievements. Some women who stayed active in radioactivity research later died from related radioactivity diseases, but many also lived to very old age. This volume brings to light the lives of many physicists and chemists who might otherwise be lost to

history. Indeed, some of the women discussed here can only be known through their short publication records, along with one or two mentions by fellow researchers. Although this text is not as detailed as it might be for the most well known scientists, it attempts to paint as informed a portrait as the record allows for the remainder of this forgotten generation of women scientists. It was an enjoyable read, focusing on the common experiences of these women, including the common outlook that it is not the troubles one faces getting the science done (either in or out of the lab) but the science itself that is important.

## Re-Engineering Female Friendly Science

By Sue V. Rosser (New York: Teachers College Press 1997)

Review by Anne-Marie Schmoltnner

Sue V. Rosser is one of very few women who are equally at home in science and science pedagogy, as well as women's studies research. Bridging this gap is essential for the development of successful programs to enhance the participation of women in the science and technology enterprise. In her latest book, Dr. Rosser revisits the topic of science curriculum transformation with the goal of making science inclusive. The focus is on gender, but the author also addresses the intersections of gender with race and class. The thoroughly researched and documented sections of this book are informative and thought-provoking, although not tightly related. The extensive and up-to-date bibliography should be of great help for all who want to know more.

Projections of women and minorities accounting for the majority of the growth in the science and technology workforce were widely publicized and provided the motivation for many efforts to increase diversity in science. However, the urgent need for encouraging more young women to consider scientific or technical professions goes beyond demographics. For instance, among high school graduates without further training, men and women predominantly enter traditional careers, with men clustering in the technical professions - which pay, on average, one third more than women's traditional jobs. Chapter 4 discusses efforts - only partially successful - to include gender-related language into the School-to-Work Opportunities Act of 1994. As a result, only very few of the publicly supported programs focus on encouraging young women to enter better-paying careers, and thus alleviate the economic hardship many women and their dependents face.

In the Introduction, the author summarizes the Phase Model that she presented in detail in her earlier book "Female Friendly Science" [1]. This model describes the stages of awareness and resulting strategies from "The absence of women is not noted" (stage 1) to "Inclusion of all" (stage 6). It provides an excellent framework for interpreting the actions of individuals as well as departments, organizations, or projects. The stages have to be reached in succession, and an organization can only reach a particular stage, if the majority of the individuals have reached it. Many activities can be characterized as representing stage 2: recognition that most scientists are male and that science may reflect a masculine perspective, even though a few women have achieved highest success by the standards of the discipline. The corresponding strategy is

"add women and stir" - without fundamental changes in the science itself, the scientific method, or the pedagogical approach. Women are taught to adapt to the traditional system. The author warns of the danger of confusing stage 2 with stage 6 - particularly in times of decreasing resources and political support for special programs aimed at women.

In Stage 3, barriers to the advancement of women are identified and strategies devised for addressing these issues. According to the author, most curriculum transformation projects fail to reach beyond stages 2 and 3. In order to reach stages 4 (Search for women scientists and their unique contributions) and 5 (Science done by feminists/women), more fundamental changes in the pedagogy and practice of science are needed. New perspectives result when women become the focus.

For detailed recommendations for a female-friendly pedagogy, the reader is referred to the author's earlier book "Teaching the Majority" [2], which presented extensive material for a large variety of science disciplines. These general strategies, which are at the very core of the issue and probably of great interest to the reader, are unfortunately only briefly summarized in "Re-Engineering Female Friendly Science". They include, for example: increase the number of and expand the kinds of observations used; provide more hands-on experience with various types of laboratory equipment; de-emphasize potential military application and explore more problems of social concern; approach problems in a more holistic scope; use a combination of qualitative and quantitative methods in data gathering; foster more interactive methods and less competitive models; use precise, gender-neutral language.

The only topic discussed in further detail in this book is the use of group work in science and engineering instruction (chapter 2). Group work facilitates learning for individuals traditionally underrepresented in science and engineering, however, knowledge of group dynamics is needed for the proper use of this tool. For instance, attempts to create diversity in all groups can lead to the isolation or even exclusion of individual women or men and women of color.

In chapters 1 and 7, Sue Rosser describes in detail her own projects at the University of Wisconsin and the University of South Carolina Systems where she, as the project leader,

## Reviews

In her latest book, Dr. Rosser revisits the topic of science curriculum transformation with the goal of making science inclusive. The focus is on gender, but the author also addresses the intersections of gender with race and class.

## Reviews

sought to encourage and train faculty members to apply techniques of female-friendly science pedagogy. This reviewer found those sections of the book less interesting, since they focus more on particular projects than on lessons of a more general nature.

Chapter 3 is entitled "Fruitful dialogues: What single-sex and coeducational institutions can tell each other about women in science". Data indicate that female-only institutions are more successful in attracting and retaining women in the sciences. (Similarly, by the way, historically black colleges and universities have produced a much higher percentage of African American scientists than have integrated institutions of higher learning.) They offer a female-only living situation and female-only study groups, which can lead to the isolation of women. Instructors give full attention to all students, the curricular content considers women's experiences, and the absence of males changes the dynamics among the students. Avoidance of certain majors because they are "nontraditional" does not occur. The question arises, however, how best to prepare these students for the coeducational environment. The author offers various suggestions, but also points to the need for more research on this issue. Women who drop out generally have grades as good as or better than their male colleagues, and leave for reasons unrelated to talent or interest in science. Efforts to retain them in graduate school would therefore help to increase quality of the pool of scientists!

Chapters 5 and 6 present an enlightening discussion of different feminist theories, as applied to the question of women and science. Specific projects supported by the NSF Program for Women and Girls are analyzed in this light to illustrate the concepts. Liberal feminism holds that women are suppressed in contemporary society and demands that everyone receives equal consideration. However, no special privileges for women are sought or the content and method of science questioned. Socialist feminism emphasizes class interests and rejects the notion that science can be objective and value-free, rather it reflects the interests of the dominant class. African American/ethnic feminism is based on a critique of a

Eurocentric approach to knowledge. It also rejects the objectivity and value neutrality accepted by liberal feminism. Essentialist feminism focuses on biological differences between men and women, concluding that these differences between the sexes might imply superiority and power for women in some arenas. Programs to improve skills where women are seen as inferior or to utilize women's preferred ways of learning could be based on this perspective. Existentialist feminism suggests that differences between women and men are not based on biology, but rather on socialization and sex-role stereotyping. Similarly, psychoanalytic feminism postulates that girls and boys develop contrasting gender roles because of their different psychosexual development. Men are seen as more comfortable with independence, distance, and autonomy, traits typically identified with a scientist. Women, on the other hand, are socialized to value connections - hence the value of female mentors for women. Radical feminism rejects most scientific theories, data, and experiments unless they are developed by women and validated by women's experiences. Finally, postmodern feminism "dissolves the possibility that women may speak in a unified voice or that they may be addressed universally. Race, class, nationality, sexual orientation, and other factors prevent such unity and universality". Recent programs for women in science recognize that not all strategies work for all women; "no panacea will be found to make science, mathematics, and engineering attractive to all women and girls."

Sue Rosser's books are no easy read for the ordinary physical scientist. However, they are highly recommended for all those who want to explore in any depth strategies for a true integration of both women and men in the science and technology enterprise, as well as the theories that can guide these efforts. Armed with this knowledge, we all can attempt to help individuals as well as institutions reach a new stage towards the true inclusion of women in science.

[1] S. V. Rosser, *Female Friendly Science: Applying Women's Studies, Methods, and Theories to Attract Students*. New York: Teachers College Press, 1990.

[2] S. V. Rosser, *Teaching the Majority*. New York: Teachers College Press, 1995.

Order online and save, and help the APS at the same time! Purchase *Nobel Prize Women in Science* from Amazon.com through the APS/Amazon website (<http://www.aps.org/memb/amazon>). You will save nearly \$4 off the list price, and Amazon.com will donate a portion of the purchase price to the APS.

## Nobel Prize Women in Science available in paperback

Sharon Bertsch McGrayne's book *Nobel Prize Women in Science: Their Lives, Struggles, and Momentous Discoveries* (reviewed in *The Gazette* in the Spring '94 issue), has finally been published as a paperback. The paperback edition includes a new chapter about the latest woman to win a science Nobel.

Christiane Nuesslein-Volhard, a German developmental biologist, won the Nobel Prize in Physiology or Medicine in 1995 for her discovery of the genes that govern the embryo's early development. Her work with fruit flies helps explain the genetic origin of human health problems from spontaneous abortions and birth defects to cancerous tumors.

The book is a collection of biographies of 15 women who either won science Nobels or played crucial roles in a Nobel Prize-winning project. McGrayne personally interviewed all the featured women who were alive at the time and approximately 250 of their colleagues, associates, and family members. Barbara McClintock, for example, granted personal interviews to only two writers during her lifetime, and McGrayne was one of them.

Of the 15 women in the book, ten worked in the physical sciences: Marie Curie, Lise Meitner, Irene Joliot-Curie, Maria Goeppert Mayer, Dorothy Crowfoot Hodgkin, Chien-Shiung Wu, Gertrude Elion, Rosalind Franklin, Rosalyn Yalow, and Jocelyn Bell Burnell.

ISBN 0-8065-2025-6. \$19.95. 451 pages. Illustrated. Carol Publishing.



# Gazette/Roster of Women in Physics Enrollment Form

The Roster is the basis for statistical reports on women and minority physicists; mailing lists corresponding to announcements, 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**

<b>Please indicate whether you are interested in receiving:</b> <input type="checkbox"/> <i>The Gazette</i> , CSWP (women's) newsletter <input type="checkbox"/> <i>C.O.M....MUNICATIONS</i> (minorities) newsletter <input type="checkbox"/> Employment Announcements	<b>Is this a modification of an existing entry?:</b> <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> not sure
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NAME: _____ <div style="display: flex; justify-content: space-around; width: 100%;"> <span>(last)</span> <span>(first)</span> <span>(middle)</span> </div> Previous last name (if applicable): _____ Date of Birth ____/____/____	<b>GENDER:</b> <input type="checkbox"/> Female <input type="checkbox"/> Male
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## Ethnic Identification

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

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Daytime Phone	<div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <span style="margin: 0 5px;">-</span> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <span style="margin: 0 5px;">-</span> <div style="border: 1px solid black; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px;"></div>
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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)

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Department/Division: \_\_\_\_\_

Position: \_\_\_\_\_

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FIELD OF PHYSICS		CURRENT WORK STATUS (Check One)	TYPE OF WORK ACTIVITY
<b>Current Interest</b> (check up to 4 in each column)	<b>Highest Degree</b>		
1 ___	1 ___	1 ___ Full-time Studies	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) _____
2 ___	2 ___	2 ___ Part-time Studies	
3 ___	3 ___	3 ___ Part-time Studies/Employment	
4 ___	4 ___	4 ___ Post Doc./Res. Assoc.	
5 ___	5 ___	5 ___ Teaching/Precollege	
6 ___	6 ___	6 ___ Faculty, tenured	
7 ___	7 ___	7 ___ Faculty, non-tenured	
8 ___	8 ___	8 ___ Long-term/Permanent Employee	
9 ___	9 ___	9 ___ Inactive/Unemployed	
10 ___	10 ___	10 ___ Retired	
11 ___	11 ___	11 ___ Self-employed	
12 ___	12 ___	12 ___ Other (please explain) _____ _____	
13 ___	13 ___		
14 ___	14 ___		
15 ___	15 ___	<b>TYPE OF WORKPLACE FOR CURRENT OR LAST WORK</b>	
16 ___	16 ___	1 ___ University	
17 ___	17 ___	2 ___ College - 4 year	
18 ___	18 ___	3 ___ College - 2 year	
19 ___	19 ___	4 ___ Secondary School	
20 ___	20 ___	5 ___ Government	
21 ___	21 ___	6 ___ National Lab	
22 ___	22 ___	7 ___ Industry	
23 ___	23 ___	8 ___ Non-Profit Institution	
24 ___	24 ___	9 ___ Consultant	
25 ___	25 ___	10 ___ Other (Please explain) _____ _____	
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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.

# Women Speakers List (WSL)

## Enrollment/Modification Form 1999

Additions/Modifications may also be made on the Internet at [www.aps.org/educ/cslwip.html](http://www.aps.org/educ/cslwip.html)  
 An online copy of the WSL is available at [www.aps.org/educ/wip-csl-front.html](http://www.aps.org/educ/wip-csl-front.html)

The *Women Speakers List* is compiled by The American Physical Society Committee on the Status in Physics (CSWP). The list is updated continuously online and published each summer. Comments, questions and entries should be addressed to:

**Women Speakers List -APS -One Physics Ellipse -College Park, MD 20740-3844 -301-209-3231**

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

**Title/ Name**  Dr.  Prof.  Mrs.  Ms. \_\_\_\_\_ **Date** \_\_\_\_\_

**Institution** \_\_\_\_\_ **Telephone** \_\_\_\_\_

**Address** \_\_\_\_\_ **Fax** \_\_\_\_\_

\_\_\_\_\_ **Email** \_\_\_\_\_

**City** \_\_\_\_\_ **State** \_\_\_\_\_ **Zip Code** \_\_\_\_\_

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**New Entry**     **Modification**

**For which audiences are you willing to speak? (Please check all that apply)**

Middle school     High school     General Audiences     Colloquium

To register a new title, give the title as you want it to appear in the left column below. Then check the section(s) where it is to be inserted. To delete a title, indicate the title and check the appropriate box below. A limit of four total entries will be imposed. You may use additional pages if you are submitting more than four modifications. **PLEASE TYPE OR PRINT LEGIBLY PAYING PARTICULAR ATTENTION TO FORMULAS. WE REGRET THAT WE ARE UNABLE TO INCLUDE ILLEGIBLE ENTRIES.**

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2. <input type="checkbox"/> Add this title <input type="checkbox"/> Delete this title	<input type="checkbox"/> Accelerators <input type="checkbox"/> Education (pedagogy etc.) <input type="checkbox"/> Interface/Device <input type="checkbox"/> Astrophysics <input type="checkbox"/> Environmental/Energy <input type="checkbox"/> Molec/Polymer <input type="checkbox"/> Atomic <input type="checkbox"/> Fluid <input type="checkbox"/> Nuclear/Particle <input type="checkbox"/> Biological/Medical <input type="checkbox"/> General <input type="checkbox"/> Optics/Optical <input type="checkbox"/> Chemical/Statistical <input type="checkbox"/> Geophysics <input type="checkbox"/> Plasma <input type="checkbox"/> Computational <input type="checkbox"/> History <input type="checkbox"/> Condensed Matter <input type="checkbox"/> Industrial
3. <input type="checkbox"/> Add this title <input type="checkbox"/> Delete this title	<input type="checkbox"/> Accelerators <input type="checkbox"/> Education (pedagogy etc.) <input type="checkbox"/> Interface/Device <input type="checkbox"/> Astrophysics <input type="checkbox"/> Environmental/Energy <input type="checkbox"/> Molec/Polymer <input type="checkbox"/> Atomic <input type="checkbox"/> Fluid <input type="checkbox"/> Nuclear/Particle <input type="checkbox"/> Biological/Medical <input type="checkbox"/> General <input type="checkbox"/> Optics/Optical <input type="checkbox"/> Chemical/Statistical <input type="checkbox"/> Geophysics <input type="checkbox"/> Plasma <input type="checkbox"/> Computational <input type="checkbox"/> History <input type="checkbox"/> Condensed Matter <input type="checkbox"/> Industrial
4. <input type="checkbox"/> Add this title <input type="checkbox"/> Delete this title	<input type="checkbox"/> Accelerators <input type="checkbox"/> Education (pedagogy etc.) <input type="checkbox"/> Interface/Device <input type="checkbox"/> Astrophysics <input type="checkbox"/> Environmental/Energy <input type="checkbox"/> Molec/Polymer <input type="checkbox"/> Atomic <input type="checkbox"/> Fluid <input type="checkbox"/> Nuclear/Particle <input type="checkbox"/> Biological/Medical <input type="checkbox"/> General <input type="checkbox"/> Optics/Optical <input type="checkbox"/> Chemical/Statistical <input type="checkbox"/> Geophysics <input type="checkbox"/> Plasma <input type="checkbox"/> Computational <input type="checkbox"/> History <input type="checkbox"/> Condensed Matter <input type="checkbox"/> Industrial

# The American Physical Society 1998-1999 Travel Grants for Women Speakers Program

The APS Committee on the Status of Women in Physics (CSWP) is pleased to announce that the "Travel Grants for Women Speakers" Program is entering its seventh year. This program is designed to increase the recognition of women physicists.

Funding Still Available for the  
1998-1999 Academic Year!  
Apply online at [www.aps.org/  
educ/women-app.html](http://www.aps.org/educ/women-app.html)

**Purpose** The program is intended to expand the opportunity for physics departments to invite women colloquium/seminar speakers who can serve as role models for women undergraduates, graduate students and faculty. The program also recognizes the scientific accomplishments and contributions of these women physicists.

**Grant** The program will reimburse U.S. colleges and universities for up to \$500 for travel expenses for one of two women colloquium/seminar speakers invited during the 1998-1999 academic year.

**Qualifications** All physics and/or science departments in the United States are encouraged to apply. Canadian and Mexican colleges and universities are also eligible, provided that the speakers they invite are currently employed by U.S. institutions. Invited women speakers should be physicists or in a closely related field, such as astronomy. Speakers should be currently in the U.S. The APS maintains the Women Speakers List which is available online ([www.aps.org/educ/wip-csl-front.html](http://www.aps.org/educ/wip-csl-front.html)) or from the APS. However, selection of the speaker need not be limited to this list. Neither of the two speakers may be a faculty member of the host institution.

**Guidelines** Reimbursement is for travel and lodging expenses only. Honoraria or extraneous expenses at the colloquium itself, such as refreshments, will not be reimbursed.

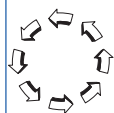
**Application** The Travel Grants for Women Speakers Application Form ([www.aps.org/educ/women-app.html](http://www.aps.org/educ/women-app.html)) should be submitted to APS identifying the institution, the names of the two speakers to be invited and the possible dates of their talks. Please note that funds for the program are limited. The Travel Grants for Women Speakers Application Form should be submitted as early as possible, even if speakers and dates are tentative, or if the speakers are scheduled for the spring semester. The application form will be reviewed by APS, and the institutions will be notified of approval or rejection of their application within two weeks. Institutions whose applications have been approved will receive a Travel and Expense Report Form to submit for reimbursement.

**For Further Information:** *Travels Grants for Women Speakers Program*  
Attn: Tara McLoughlin  
The American Physical Society • One Physics Ellipse • College Park, MD 20740-3844  
Tel: (301) 209-3231 • Fax: (301) 209-0865 • Email: [tara@aps.org](mailto:tara@aps.org)

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