

# 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 Guest Editor: From Pipelines to Pathways

By Sherry Yennello, Texas A&M



Sherry Yennello

Looking back, it was clear that Johnny would be a brilliant scientist from the time he was very little. At four he was taking apart radios — and sometimes even putting them back together. In middle school he won the state science fair for the tabletop particle accelerator he built.

By high school he was essentially teaching the AP physics class while he was taking college courses at the local university. After graduation he attended Prestigious Institute of Technology on a full scholarship; he graduated with honors in three years, earning dual degrees in math and physics. He went on to attend graduate school, working under the tutelage of Eminent Scientist. Johnny completed his Ph.D. in four years, won the APS dissertation award in his subfield, and spent the next year as a Prestigious

Fellow at World-class Lab in Europe. From there he was heavily recruited into a tenure-track position at Top5 Institution. Johnny was awarded tenure in four years and promoted to full professor before he was 35.

Thus is the lore of the linear trajectory that people that are “born to be scientists” follow. But what happens if the young student misses one of those milestones? Perhaps the local high school does not have AP science classes, and there is no local university. Perhaps he has not been encouraged to pursue a career in science. Perhaps it is difficult to find two positions for a dual-scientist couple. Perhaps she has a child and must balance work and family. This potential scientist may “leak” out of the pipeline.

There has been much discussion about the leaky pipeline and what we must do to fix it. Some have tried to find the biggest leaks and plug them with Torr Seal<sup>®</sup>. Others have attempted to cover up cracks and reinforce weak parts of the pipeline with duct tape. Still others have pointed to one particular transition point and said there is no problem. What we need to do is to recognize that

*continued on page 2*

## Rebecca Forrest is First Blewett Scholarship Winner

By Sue Otwell, APS Staff



Rebecca Forrest

Rebecca Forrest of the University of Houston has been named the winner of the first M. Hildred Blewett Scholarship for Women in Physics. She was selected from a field of well-qualified applicants by a subcommittee of the Committee on the Status of Women in Physics. Rebecca is currently a Lecturer/Visiting Assistant Professor at University of Houston. She will work at the Naval Research Laboratory investigating the influence of lateral composition modulation on the performance of antimonide-based mid-infrared lasers.

Rebecca earned her Ph.D. in condensed matter phys-

ics from the University of Houston in 1998. She was a postdoctoral researcher from 1998 to 2000 in the Materials Science and Engineering Department at UCLA, when her husband's new job took him to NASA's Johnson Space Center.

The Blewett Scholarship award was made possible by a generous bequest from M. Hildred Blewett, a particle accelerator physicist who died in 2004. Hildred Blewett was passionate about physics and recognized that women who have interrupted their research careers for family reasons can face many obstacles when they try to resume research. The scholarship consists of a one-year award of up to \$45,000 which can be used toward dependent care, salary, travel, equipment, and tuition and fees. Details can be found at <http://www.aps.org/educ/cswp/blewett/index.cfm>

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#### **Publication Information**

The CSWP GAZETTE, a 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 "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, American Physical Society, One Physics Ellipse, College Park, MD 20740-3844 or email to: [otwell@aps.org](mailto:otwell@aps.org)

## **From Pipelines to Pathways, continued from page 1**

there are various pathways by which one's career might progress, and that when someone has "dropped out" of the pipeline they need not be lost.

This notion of pathways has been reinforced for me lately by the M. Hildred Blewett scholarship. While the entire physics community will benefit from Blewett's generous gift, I have personally benefited from being involved in the selection of the inaugural scholarship winner. (see pg 1) (I confess that I have been privileged to follow a fairly linear career trajectory, and my knowledge of the major hindrances to women's scientific careers has been second hand.) The women who applied for the scholarship shared with us their scientific and research aspirations, which were inspiring to read. But they also shared their personal stories of having had to give up their research and their desire to regain and rebuild that part of their careers. These stories were remarkable, heartbreaking, and infuriating all at the same time. Why were there not more avenues for rekindling a scientific career? Although I'm sure some of these women will succeed, I fear others will indeed "leak" out of the pipeline.

In order for the concept of pathways to take root, we will need major changes to both the structure of our institutions and our collective mental models about becoming a scientist. Institutions need to have more family-friendly policies, search/selection committees need to be more enlightened in their practices, and funding agencies need to restructure some of their programs to enable alternate pathways. Physicists need to question their assumptions and reassess their everyday conversations that define our culture.

Universities and industries need to have more family-friendly policies — maternity leave, dependent care leave, flexible tenure and promotion schedules, part time and flex time options. Universities, industries, and funding agencies need to make it clear that taking advantage of the family-friendly policies will not prevent further advancement. (When someone opts into a part time position for family reasons, one should not get stuck and there should not be extensive hurdles for that person to return to a full time position.) Universities and industries need to have easily accessible, affordable, high quality day care. Universities need to learn how to capitalize on two-body opportunities instead of avoiding two-body problems.

Selection committees need to reassess what is meant by "best" when hiring — at all levels from undergraduate admissions to faculty hiring and promotion and awards selections. Does the "best" candidate for a tenure-track position have to be the person with the most prestigious postdoctoral advisor and be under 30? Is the "best" candidate for graduate school the student who has a 3.8 from an Ivy League school and has spent the last two summers doing REU projects at labs in Japan and Europe, or the student who has a similar GPA from a less elite school and "only" did summer research at his home institution because he had to stay close to home and work 20 hours a week all year? Search committees need to actually go out and search for people who may not exactly fit the normal profile, but show great potential. Funding agencies need to fund re-entry postdocs and bridge to faculty positions.

There are examples of policies along these lines. These all need to be continued and expanded. A great resource for learning about some of the "best practices" for

women in physics is on the CSWP web site at <http://www.aps.org/educ/cswp/>. Every one of us should review those suggestions and identify ways in which we can lower the barriers for women at our own institutions. But then collectively we need to make the transformation in our mental model of the path to being a great scientist. We need to understand that people who get their Ph. D. when they are older are not "over the hill." People who take time off for family reasons can successfully reenter the scientific workforce — if we let them.

To enable multiple pathways to success we will need a cultural transformation in the physics community. And that transformation needs to begin with an examination of the conversations we have every day, for it is these very conversations that both grow out of the culture and help to define the culture. Much of the situation in physics is the result of benign neglect because the stake holders have never been challenged to question their assumptions. They came through the system defined by a certain paradigm, and therefore assume that paradigm is good and doesn't need to be changed. This paradigm is at the center of a cultural web<sup>1</sup> — containing the core beliefs of the community — that manifests itself in the visible artifacts of the organization. Seel<sup>2</sup> contends that culture is the result of all the daily conversations and negotiations between the members of an organization. If you want to change a culture you need to change these conversations.

Change agents need to be identified and challenged to come up with creative solutions to the everyday roadblocks that the women of physics face. They need to rethink the everyday conversations that take place in the field. They then need to make sure that subtle biases do not go unchallenged. The first step in changing the culture is to recognize the underlying paradigm. The next step is to understand the interconnections between the paradigm and the everyday interactions of people in the field. With that new appreciation, a change agent can then begin to improve the culture and hence begin to level the playing field for women in physics. I encourage you to help seed this cultural transformation by becoming a change agent and engaging your colleagues to examine and reformulate the everyday conversations that take place in physics.

While we are transforming our institutions and creating new pathways we need to empower individuals to thrive in the system as it currently exists. M. Hildred Blewett has provided the support that will enable Rebecca Forrest of the University of Houston to blaze a new pathway to a successful scientific career. Hopefully Blewett and Forrest will become an inspiration for others so that we can capitalize on the entire brain pool instead of a select subset.

<sup>1</sup> G. Johnson "Managing Strategic Change – Strategy, Culture and Action". *Long Range Planning*, vol25 no1 pg 28 (1992).

<sup>2</sup> R. Seel "Culture and Complexity: New Insights on Organisational Change," *Organizations and people* vol7, no2 pg2 (2000).

*If you have an inspirational story of a unique pathway to a successful scientific career and would not mind sharing it with others please send an email with your story to [Yennello@comp.tamu.edu](mailto:Yennello@comp.tamu.edu).*

# Should We Tell our Daughters to Become Scientists?

By Talat S. Rahman, Kansas State University

In early 2004 I was chosen as a Sigma Xi Society distinguished lecturer for 2004-2006, and asked to provide a few titles for talks that need not be confined to my area of scientific expertise. Without much deliberation, I chose as one the question that is the title of this article, little suspecting that a counter-answer would soon be provided by the President of Harvard University.<sup>1</sup>

So I'm thankful to Dr. Summers for saying aloud what is on the minds of many, and so flagrantly exhibiting the prejudice that females young and old experience globally. Is it then a wonder that despite three decades of heroic efforts by the international women's movement, the percentage of women in the sciences and engineering has not risen significantly? Women constitute over 50% of the population in any country, but in none can they boast of equal representation in these professions. If you ask why, you can expect to be told one of the following:

- women just do not like math or quantitative subjects;
- women know better than to waste their time on subjects that are not financially lucrative;
- women have broader concerns and hence are unwilling to go into depth in any one specialty;
- women are by nature nurturing and socially inclusive, and not aggressive enough to endure the competitive and cut-throat culture that marks the scientific community;
- women simply cannot commit the time and effort that it takes to be successful in science and engineering.

My response to all of these is that they are just convenient rationalizations for why the power structure in science and engineering — perhaps unconsciously — refuses to diversify itself and break down the walls surrounding it. Of course, a sociologist would point out that the source and force of these “explanations” has to do with the prevailing climate of opinion that extends far beyond the individuals that enjoy the benefits conferred by the power structure itself. Furthermore, one could just as well replace the word “women” by “individuals from historically under-represented groups” and get an explanation for the lack of diversity in science and engineering. The problem then is not that of gender, but that of a social construct, which continues to inhibit minority groups from making their place in the field. What is this construct? Very simply the issue is that of artificial barriers: in making an entry and in surviving in the climate. Individuals like me have obviously made the entry, but even after several decades and some reasonable success as a scientist, there are many times when I wonder if I really fit. Being different (and somewhat on edge) has become second nature to me, and I am not sure I could even handle being part of the majority. But this is not the type of answer that can bring about structural changes or lead to a diverse work force in all areas of intellectual importance. I would argue that the task we confront is not confined to attracting able individuals into the game: we also have to break down barriers on many different fronts and build a level playing field to help retain those who enter. That is, before we tell

our daughters to consider becoming scientists, we need to commit ourselves to ensuring that it would be worth their while, and that they are ready to face challenges that go far beyond their academic abilities.

Before turning to some concrete suggestions, it would be useful to look at some reasons that have already been given for why there are so few women in science. This question was asked by Alice Rossi four decades back.<sup>2</sup> Since then various institutions and academic units eager to enhance the participation of girls and women in science-related courses have carried out a number of surveys,<sup>3,4</sup> whose analyses lead to similar conclusions about the factors inhibiting female participation: unfriendly climate, abstract teaching methods, uninviting reputation, lack of self-confidence, and unsupportive attitudes on the part of teachers and classmates, which further erode self-confidence. Of course, added to the individual's personal experience in a given area are constant reminders that science is a male activity and that the demands of a scientific career may not be compatible with a “normal” family life — as if the key to one lay solely in the hand of the woman. With regard to issues of family life and raising children, I continue to be amazed at how little progress we have made. Naïvely, I had thought that this battle was behind us and that the establishment and maintenance of a healthy family life was recognized as a joint responsibility of men and women, so that prevailing ideas about sound family life were no longer a threat to a woman's career, and vice versa.

In talking to many young women worldwide, though, I find that lack of adequate childcare is a major factor leading to the discontinuation of a women's (not the male partner's) career. I expect that systematic investigation by sociologists would confirm this dismal impression.

It appears, then, that if we do want to tell our daughters to become scientists we also need to find ways to adequately address the three points raised above: lack of self-confidence; negative climate at the work place; lack of reliable childcare. Consider first self-confidence. From where do some get self-confidence? Perhaps from being encouraged to take big steps early in life, perhaps from growing up amongst those who had big expectations of you, and perhaps from being exposed to toys, games, and playmates that presented challenges and raised curiosity. Setting aside the controversies over the narrowness of gender cultivation associated with Barbies®, it is hard to imagine that they arouse the same kind of curiosity as a mechanical toy truck or a Lego® ensemble. At the same time, there is no reason boys should not be playing with toys that are traditionally feminine: in fact, a bit of “nurturing personality” in boys, if so induced, could help change the working climate for men and women alike. Certainly there is no reason to suppose that nurturing sensitivities are inconsistent with anyone's — boys' or girls' — development of self-confidence.

Beyond toys is the factor of elementary education, where a teacher with a solid background in math and science can make a difference. Since a large fraction of these teachers are female, their confidence and knowledge in the workings of toys and the world around them will

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Women constitute over 50% of the population in any country, but in none can they boast of equal representation in these professions.

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## Should we tell our daughters to become scientists?, continued

go a long way in undermining the stereotype that science and mechanical/electrical design are “for males.” As educators and scientists, we have the responsibility to make scientific discovery — and education in science and math — accessible, comprehensible, and thus confidence-building to teachers at all levels. Our aim, though, must be more ambitious: it is through the demystification of scientific knowledge that we can remove barriers for all citizens. Since the majority of those excluded from scientific discovery and knowledge are women and minorities, it is easy to see that they would reap the greatest benefit from broader outreach programs. I am thus delighted that the National Science Foundation explicitly designated “broader impact and outreach” as a funding criterion. This is not just lip service. From my experience in NSF review panels, there appears to be a genuine interest in seeing that this criterion is not only met in the proposed projects but that the project directors also have a track record of its implementation. There is thus a clear expectation that project directors will take the results of the research into high schools, middle schools, and grade schools — to teachers and directly to students. The more accountability is built into integration of research with education and outreach, the larger will be the benefit to society.

To many the issue of chilly climate in the work place is the most important reason for the low representation of women in the sciences and engineering. I do not disagree, and all efforts should be made to understand factors that contribute to the chill and find ways to remove/minimize them. However, I have come to understand (after many a grey hair) that what women (and minorities) consider chilly may appear normal routine to members of the dominant group. We are really talking then about changing the culture of the work place, and that should come about with increasing diversity. As an educator my hope is that the issue of climate will become secondary as we succeed in providing a solid foundation in scientific concepts and practices to all individuals. This takes us back to the issue of building educational systems that naturally infuse self-confidence. But self-confidence does not come from thin air. It comes from the changes in “the air” in the classrooms that can come about by outreach and by more serious attention on the part of professional scientists to undergraduates in the primary and secondary teaching curriculum. Of course, these necessary changes run particular risks of being stifled in a hierarchical, patriarchal system. If we want to dismantle barriers for individuals to enter any arena, we first have to accept that they can succeed. I cannot enumerate how many times I have been told, by strangers, what a surprise it is that I am in physics — and given the statistics, how can I blame them?

The importance of reliable childcare facilities is obvious. It is heartening to see we have come a good way, with

such care becoming more available. It is still not always affordable, and that must be addressed in our various social structures. It is a prerequisite to increasing the number of women in any concern. There are examples from which we can learn: the Scandinavian countries, where reliable and affordable childcare is seemingly a part of daily life, come to mind.

So am I asking for utopia to emerge before women take their places in scientific circles? Absolutely not. Much is already happening, and lots more can happen, at all levels. The more women — and minorities — that are able to get over the structural/social/psychological barriers, the more diversified the field becomes, and the more structural changes ensue from within. I am also encouraged by several remarkable developments in scientific research and methodology. For one, barriers between various disciplines are becoming less rigid. Interdisciplinary and multidisciplinary research is in vogue. Physicists are teaming up with biologists, chemists, mathematicians, computer scientists and others to attempt the so-called “grand challenge” problems like tailoring efficient and cost-effective materials for pollution control. The advent of nanoscience and nanotechnology has opened the way for new ideas, diverse approaches, and applications of special sorts of expertise. The traditional disciplines are giving way to novel methodologies. It is an opportune time for newcomers and nontraditional thinkers. As a colleague remarked, “The good thing is that there are no stupid questions in nanoscience, since no one knows the answers.” That alone helps to keep a certain kind of noxious hierarchy at bay!

Am I proposing that all our daughters take up careers in science and engineering? Not really. I would just like to see the opportunity to be there, and for science to be accessible to all. I firmly believe this would be a better place to live if the rational and analytic thinking science cultivates were more widely at work in the general culture. It would be a shame to deny such opportunity to the majority of people.

So, yes, we should tell our daughters to dare to become scientists. And we should dare to make it possible for that to happen.

<sup>1</sup> *New York Times*, January 23, 2005 on Larry Summers.

<sup>2</sup> A. Rossi, *Science* 148, no. 3674, May 28, 1965.

<sup>3</sup> Some of the points mentioned here were taken from a survey of undergraduates in the College of Engineering at Kansas State University.

<sup>4</sup> S. C. Brainard, and L. Carlin, *J. Engg. Edu.* October 1998, 369

Have you moved? Changed jobs? Changed fields?

Take a moment to update your name/address/qualifications on the Roster of Women in Physics.

This database also serves as the Gazette mailing list. See pages 14–15.



## Rey is First Woman to Win DAMOP Thesis Award

By Ernie Tretkoff, APS Staff

Ana Maria Rey is the recipient of the 2005 award for outstanding doctoral thesis research in atomic, molecular, or optical physics. She received the award for her research on Bose-Einstein condensates in an optical lattice.

The purpose of the DAMOP thesis award is to “recognize doctoral thesis research of outstanding quality and achievement in atomic, molecular, or optical physics and to encourage effective written and oral presentation of research results.” Rey is the first female recipient in the 13 year history of the award. She is only the second theoretical physicist to win the award.

Rey received her Ph.D. from the University of Maryland in 2004 with a thesis on Bose-Einstein condensates in optical lattices. The topic of optical lattices caught Rey’s interest near the end of her first year in graduate school, after she had done some research in plasma physics. “At this time optical lattices were especially interesting, and the Mott insulator transition had been measured. These systems had also been proposed for implementing quantum computing,” Rey explains. Rey was intrigued, and wanted to study the properties of these systems. Working at the NIST with supervisor Charles Clark, she developed theoretical methods for analyzing the dynamics of atoms loaded in optical lattices. She applied methods that have been used in other fields of physics, including cosmology and particle physics, to develop a formalism capable of dealing with non-equilibrium states, where approaches commonly used by atomic, molecular and optical physicists fail.

Rey has spent the past year continuing her research at NIST while her husband, a mathematician who studies chaos, finishes his Ph.D. at the University of Maryland. Starting this fall, Rey will take a postdoctoral position at the Harvard–Smithsonian Institute for Theoretical Atomic, Molecular, and Optical Physics. She plans to continue her research on cold atoms in optical lattices, further extend-

ing some of the techniques used to describe these systems. In particular, she notes that in strongly interacting regime, there are techniques that do describe the system, but these techniques only work for one-dimensional systems. “I want to extend this to higher dimensions,” she says. Rey believes her work will also help establish connections between atomic physics and condensed matter physics.

Rey first became interested in physics in high school in Colombia, where she grew up. “Since high school, one of the things I loved was the connection between formulas and the real world. It was really interesting that you could predict things. I wanted to learn more,” she says. Rey majored in physics at the Universidad de los Andes, in Bogota, and completed a bachelor’s thesis on propagation of electromagnetic radiation in Kerr’s metrics, earning her degree in 1999. After graduating, Rey and her husband both moved to the United States to attend graduate school at the University of Maryland.

She says she has never been bothered by the fact that there are few women in physics. As an undergraduate in Colombia at the Universidad de los Andes, in Bogotá, there were not that many people studying physics at all, so it didn’t seem strange to be the only woman in a group of only a few physics students, Rey says. “I was accustomed to few people in physics. In Colombia, physics is not a popular area of study, so there were very small classes. When I came to the US, I was surprised by many people studying physics.” She says she noticed that women made up a small fraction of the physics students, but it didn’t bother her. “In my case it has not been any different to be a woman,” she says.

The key to her success is hard work and love for the subject, she says. “I think that probably a key to succeed is how much work and interest you put into what you are doing. You have to like what you do.”



Ana Maria Rey

## Two Women APS Members Elected to NAS

By Patricia Mooney, Simon Fraser University

The National Academy of Science recently elected 72 new members and 18 foreign associates “in recognition of their distinguished and continuing achievements in original research.” Two of these are APS members Deborah Jin and Ellen Williams, each a recipient of the APS Maria Goepfert-Mayer (MGM) Award in 2004 and 1991 respectively. The MGM Award recognizes outstanding achievements by a woman physicist in the early years of her career. Jin, who is NIST Fellow, JILA Fellow and Adjoint Associate Professor at the University of Colorado, is the 2005 recipient of the APS I.I. Rabi Prize in Atomic, Molecular and Optical Physics. Williams, who is Distinguished Professor of Physics at the University of Maryland, received the APS David Adler Lectureship Award in Materials Physics

in 2001. Each was the first woman to receive that Prize or Award.

This year a record number, 19, of the new members and foreign associates of the National Academy of Science are women. Other new women NAS members working in closely related fields are Barbara Romanowicz, who is Professor of Geology and Geophysics and Director, Berkeley Seismological Laboratory, University of California, Berkeley, and Jocelyn Bell Burnell, who is Fellow, Mansfield College and Visiting Professor of Physics, University of Oxford (UK).

CSWP extends warm congratulations to the new women NAS members and foreign associates.

## Millie Dresselhaus Wins Heinz Award

By Laurie McNeil, University of North Carolina



Millie Dresselhaus

Millie Dresselhaus, Institute Professor at MIT and former Chair (1991) of CSWP, is the 2005 winner of the Heinz Award for Technology, the Economy and Employment. The citation says it all: “For a body of scientific scholarship that has advanced the world’s understanding of the multi-faceted field of carbon science and blazed a trail of opportunity and inspiration for women in science.” The “body of scientific scholarship” has led to many honors in the world of science, including the National Medal of Science, election to the American Academy of Arts and Sciences, the National Academies of Engineering and of Sciences, and honorary degrees from 21 universities around the world. The “trail of opportunity and inspiration for women in science” speaks more directly to her long association with CSWP.

As just one example, consider the Climate for Women Site Visit program. Together with Judy Franz and Bunny Clark, Millie created this program in response to a resolution from a conference of physics department chairs asking for ways to encourage the full participation of women and minorities in physics. Under the program, teams of senior female physicists visit physics departments to examine their climate for women and make suggestions for its improvement. Millie has participated in 10 of the 38 visits conducted to date. There are too many more examples of the ways in which Millie has promoted the participation and advancement of women in science to list here, but it is safe to assume that Millie has had a hand in any program that is helping to advance women in physics.

A more personal aspect of her service to women in science was captured in the citation for the APS Nicholson Medal for Humanitarian Service awarded her in 1999: “For being a compassionate mentor and lifelong friend to

young scientists; for setting high standards as researchers, teachers and citizens; and for promoting international ties in science.” Everyone who has been part of Millie’s group understands what this means. Millie sees her role as mentor as a lifelong project for all of her protégés. Even after a person has left her group, she continues to promote her or his career by providing suitable opportunities. She has an uncanny understanding of what kind of a new challenge each person needs (and merits!) at every stage, and what contributions that person could make to the task at hand. This is especially important for young women, who frequently get overlooked when it comes to opportunities to participate in professional activities that can offer visibility, leadership development, and recognition. I have had many conversations with her in the two decades since I left her group, in which she has said something like: “Once you are finished with [whatever important project I have been telling her about], it will be time for you to [engage in some new form of professional service].” She has always been right (whether or not I understood that at the time), and she has always seen to it that I had the opportunity to do the things she felt I can and should do. Of course, this is simply a reflection of Millie’s own attitude toward public service. She has often noted that the very good education she received at public expense is what enabled her to have her extraordinary career, and so she felt herself obligated to pay that back. Those of us who have had Millie as part of our education carry a very large obligation indeed, but it is certainly worth it. We are delighted that the Heinz Foundation understands this, too.

*Laurie McNeil was a postdoc in Millie Dresselhaus’ group at MIT in 1983-84. She is currently Chair of the Department of Physics and Astronomy of the University of North Carolina at Chapel Hill.*

## Professional Skills Development Workshops Offered

By Sue Otwell, APS Staff

*“A life-changing set of lessons.”*

*“I got to see that my situation is not unique and that many other female faculty members encounter similar situations.”*

*“[The workshop] got me to think about many issues and how I interact with colleagues.”*

These quotes were some of the reactions to the two Professional Skills Workshops offered by APS prior to the annual meetings in March (Los Angeles) and April (Tampa) 2005.

The workshops combined theater training, leadership training and faculty development in an interactive format designed to enhance women’s abilities and confidence in challenging situations. The goal was to enable senior women faculty to develop persuasive communication, negotiation and leadership skills and to become more effective whether leading a meeting or participating in a discussion.

The thirty women physicists spent a day in hands-on sessions covering communication and negotiation skills. Under the guidance of facilitators Lee Warren and Nancy Houfek (Harvard), Barbara Butterfield (University of Michigan) and Jane Tucker (Duke), women participants at each event had an opportunity to discuss case studies and role play scenarios that included negotiating job offers, and communicating with difficult individuals.

They learned the value of BATNA — “best alternative to a negotiated agreement” — and, with a coach, practiced various approaches to various challenging situations as suggested by members of the group. At lunch and at the reception following the workshops, everyone networked and socialized, building valuable contacts for mentoring each other in the future.

Similar workshops will be offered March 12, 2006 in Baltimore and April 21, 2006 in Dallas. These workshops will be aimed at junior, non-tenured women faculty. Details will be posted this fall on the CSWP’s website at <http://www.aps.org/educ/cswp/skills/>. In 2007, a workshop will be offered for women physicists at labs and research facilities, date and location to be determined.

The series of workshops for women physicists is made possible by a grant from the National Science Foundation. Organizers are Judy Franz, Executive Director of the American Physical Society, and Aihua Xie, CSWP Chair 2005, of Oklahoma State University.

## Physics in the Family: Yuri Suzuki Wins MGM Award

By Ernie Tretkoff, APS Staff

Yuri Suzuki, of the Materials Science and Engineering department at the University of California, Berkeley, is the recipient of the 2005 Maria Goeppert-Mayer award, which recognizes outstanding achievement by a woman physicist in the early years of her career. Suzuki received the award for her research in epitaxial oxide thin films, nanostructures and devices with tailored magnetic, electronic and optical properties.

Suzuki says she drifted gradually into her area of research. “It was sort of by chance,” she says, “Part of it was serendipity.” Physics runs in her family — her father is a professor in the physics department at UC Berkeley, and Suzuki grew up just down the street from her current office. But although she was interested in science in high school, Suzuki did not want to go into the same field as her father. Not sure what she wanted to do, she initially majored in applied math at Harvard University. But after taking a course in physics that she especially liked — with a professor who reminded her of Einstein — she decided to switch her major to physics. Suzuki chose to continue on to graduate school in physics after graduating in 1989 in part because she didn’t want to become an investment banker — a very popular career choice among Harvard students at the time, she says.

Suzuki went to graduate school at Stanford University. At the time, high temperature superconductors had recently been discovered, setting off a flood of research on the topic. Wanting to get in on this exciting field, Suzuki completed her thesis on high temperature superconductivity, and earned her Ph.D. in applied physics in 1995.

Some of her recent work on complex oxide thin films grew out of that early work on superconducting materials, she says. “I slowly gravitated towards materials science,” she says. From 1994 to 1996, she held a postdoctoral position at Bell Labs, where she carried out materials science research. Suzuki then joined the Cornell University faculty in Materials Science and Engineering (1997-2003). In 2003, she returned to Northern California to become an associate professor in the Materials Science and Engineering department at UC Berkeley.

At no point in her career has she ever really felt bothered by being one of the few women in physics and engineering, perhaps in part because she always had at least a few female peers in physics whom she knew well, she says. “It’s not really an issue,” she says. “It never deterred me. It was never a part of the consideration.”

Suzuki’s research focuses on developing magnetic materials with novel properties. The materials could eventually be useful for new magnetic data storage or logic applications, and she has even built some prototype devices. But her main goal is first to better understand the relationship between structure and property in these novel materials. In her lab at UC Berkeley, “we do everything from actually growing the films to making devices,” she says.

Suzuki and her colleagues produce the thin-film complex oxides by pulsed laser deposition, a process in

which a laser is used to vaporize a solid block of the target material. Under very controlled conditions, the released material then floats down to land on the substrate, forming a thin layer, which can be as thin as one atom. Suzuki likens this process to throwing a bunch of bricks and having them form a nice, ordered wall. She can control the film’s thickness and doping, and can tailor the film’s properties by growing the material on different substrates.

Very thin films, such as the ones Suzuki produces, often have very different properties from the bulk material. Different substrates might squeeze or stretch the material, altering its properties. In addition, interfaces between two materials can behave in unexpected ways. For instance, she says, you can put two insulators together, and in some cases the interface might act as a conductor. Suzuki’s research aims to explore all these effects further. “There’s a lot of rich physics here” she says. “We’re trying to use various knobs to tune the structure. That’s a good way to learn the relationship between structure and properties,” she says.

In addition to her research on magnetic materials, Suzuki’s lab has a smaller effort in photonics, developing silicon-based optical devices. Although Suzuki doesn’t have much background in optics, she has been able to work with and learn from other researchers who do have more expertise in that area. “That’s what I like about collaborative research” she says. “It’s nice to branch out.”

For the past several months, however, Suzuki’s main project has been spending time with her son William, now about seven months old. She goes into her lab one or two days a week, and works from home. So far, balancing work and family has worked out well for her, she says. “I think my department has been very supportive, and that’s been extremely helpful,” she says. She appreciates the flexibility of the university, where, unlike in many professions, she doesn’t have to be in the office from nine to five every day, and she was able to take time off to be with her son.

Nonetheless, “things are different when you have a baby,” she says. “With a baby, you see that certain things are more important.” Her life revolves more around the baby’s schedule than anything else right now, she says. In March, she and her husband, who is also a physicist, took baby William along with them to the APS March Meeting in Los Angeles. “That was our son’s very first physics conference,” she jokes. Suzuki will soon transition to going back to work full time with the baby in day care. “It will be an experiment like anything else,” she says.

After she returns to work full time, Suzuki plans to continue her research on the properties of new materials, including exploring materials other than oxides, such as selenium- and sulfur-based materials, which have very different chemistries. She is also planning to work to merge her optics and magnetics efforts, with the goal of developing new types of magnetophotonic materials.



Yuri Suzuki

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At no point in her career has she ever really felt bothered by the being one of the few women in physics and engineering.

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## Physicists from Around the World Meet to Address Issues Faced by Women in Physics

By Ariel Michelman Ribeiro, NIH/NICHD



Members of the U.S. delegation, invited speakers (Xie, Ivie, Green), and a member of the Working Group on Women in Physics (Gebbie). Back row, left to right: Yevgeniya V. Zastavker (Franklin W. Olin College of Engineering), Mia Ong (Harvard University), Richard Hazeltine (University of Texas, Austin), Jami Valentine (Johns Hopkins University), Juana Rudati (Argonne National Laboratory), Barbara Whitten (Colorado College). Middle Row: Aihua Xie (Oklahoma State University), Laura Kay (Barnard College, Columbia University), Ariel Michelman Ribeiro (Boston University), Aprieli Hodari (The CAN Corporation), Rachel Ivie (American Institute of Physics), Katharine Gebbie (National Institute of Standards and Technology), Elvira Williams (Shaw University), Theda Daniels-Race (Louisiana State University). Bottom row: K. Renee Horton (University of Alabama), Beverly Hartline (Heritage University), Kimberly Budil (Lawrence Livermore National Laboratory), Karen Daniels (Duke University), Laura Green (University of Illinois at Urbana-Champaign), Melissa Eblen-Zayas (Carleton College), Luz Martinez-Miranda (University of Maryland).

In 1999 the International Union of Pure and Applied Physics (IUPAP) created the Working Group on Women in Physics (WGWIP). One of the charges of this group is to make recommendations to IUPAP for how to attract, retain, and increase the participation on all levels of women in physics. In order to determine what the most pressing issues are and how best to address them, WGWIP convened the First IUPAP Conference on Women in Physics in 2002 in Paris, France. This was an important conference because it was the first attempt on a world-wide scale to benchmark the situation of women in physics. The benchmark report, recommendations that grew out of the conference, and the conference proceedings can be found on the IUPAP WGWIP website (<http://www.iupap.org/wg/wip/index.html>). This May, the second IUPAP Conference on Women in Physics took place in Rio de Janeiro, Brazil (<http://www.if.ufrgs.br/~barbosa/conference.html>). The goals were to assess the progress in each country since the last conference, make new recommendations to IUPAP, and to provide an opportunity for the attendees to network by sharing their research through scientific posters.

The conference, co-organized by WGWIP chair Professor Marcia Barbosa and Professor Elisa Baggio-Saitovich was by all accounts a huge success. Approximately 150 delegates attended from 42 countries, including 18 delegates from the U.S., who were funded by the National Science Foundation, Lawrence Livermore National Laboratory, Louisiana State University, the American Institute

of Physics (AIP), the National Society of Black Physicists, and Franklin W. Olin College of Engineering. There were four additional Americans who attended either as invited speakers or members of WGWIP.

The agenda of the conference included a round table discussion on "Research Funding and Women in Physics," several plenary talks, a poster session on issues of women in physics in each country, a poster session on research by the individual delegates, an afternoon of sightseeing, and meetings of discussion groups each day on various topics. A conference proceedings (edited by Beverly K. Hartline and Ariel Michelman Ribeiro) will be published by December 2005, including research abstracts, articles on the discussion groups, articles on the plenary talks, and papers from each country on the status of women in physics in their country (even from countries whose delegates were not able to attend the conference).

The opening ceremony included panelists Nilcéa Freire, the Brazilian Minister of the Secretary of Women, Martial Ducloy, President of the European Physical Society, Yves Petroff, President of IUPAP, Sergio Rezende, President of the Brazilian Financer of Studies and Projects, Ricardo Galvão, Director of the Brazilian Center of Physical Research, and Pedricto Rocha Filho, President of the Foundation of Support for Research of the State of Rio de Janeiro. They each welcomed the delegates and spoke about why this conference is important to the organizations they represent.

The panelists of the roundtable discussion were Alice Abreu, Director of the Office of Education, Science, and Technology of the Organization of American States (OAS), Rene Clair, Director of Programs on Women, Science, and Technology for UNESCO, Nilcéa Freire, the Brazilian Minister of the Secretary of Women, and Eiko Torikai, physics professor at the University of Yamanashi, Japan. They spoke about funding programs from their organizations for women in science, obstacles for women in accessing funding, and new programs and activities to increase participation of women in science.

The plenary talks were given by delegates from the US, the UK, Tunisia, and China. Rachel Ivie, of the AIP, gave an overview of the statistics of women in physics in the US, highlighting recent data from the AIP report "Women in Physics and Astronomy, 2005" (<http://www.aip.org/statistics/trends/gendertrends.html>). Ivie is conducting a follow-up survey, funded by AIP, of women in physics all over the world. Anne Marks, Chair of the Women in Physics Group of the Institute of Physics of the UK spoke about progress in the UK in addressing the issues of women in physics since the last meeting in Paris. Aihua Xie, Chair of CSWP and physics professor at Oklahoma State University, spoke on "The Status of Women in Physics in the USA: Progress and New Actions." Zohra Ben Lakhdar, physics professor at the University of Tunis Elmanar of Tunisia and 2005 recipient of the L'OREAL-UNESCO For Women in Science Award (Africa region), spoke about her own personal experiences

*continued on page 10*



# Advancing the Status of Women in Science and Engineering Through Theater: The University of Michigan ADVANCE Program and CRLT Players

By Elizabeth Beise, University of Maryland

*Picture this: A faculty search committee, after interviewing many candidates, is now meeting to decide between two finalists for a new junior faculty appointment. New hires are not made often in this small but prestigious department, so the stakes are high. Both candidates are outstanding, but there are differing views about priorities within the department, so a somewhat tense, but collegial, discussion ensues as the strengths and weaknesses of each candidate are considered.*

This may sound like rather dry fare for a theater production. But it held the captive attention of many of us on the day that I saw this interactive production by the University of Michigan's CRLT Players at the National Science Foundation. This theater troupe at the Center for Research on Learning and Teaching specializes in recreating some of the more subtle dynamics that take place in academic situations such as faculty meetings, classrooms, and student group activities, particularly those that can inadvertently lead to feelings of exclusion or to an unwelcoming environment for under-represented groups. The "Faculty Meeting" sketch, as well as another on Faculty Mentoring, is part of the U-M's ADVANCE project, which is designed to develop best practices in the recruitment and retention of women faculty in science and engineering.

The sketch that we saw consisted of six members of a computer science department, including one senior woman and one junior African-American man. The two candidates under discussion were a young woman with outstanding credentials and well-recognized "up-and-coming" potential in a relatively new research area, and a slightly more senior, accomplished man with an existing research grant and a proven track record in an area closely related to that of other members of the department. What to do? As each of committee members expressed their views, we discovered existing alliances, learned of deals made prior to the meeting, and learned who was the "alpha male" of the group. After listening to the meeting for a while, we had a chance to ask each of the "characters" more probing questions in an attempt to uncover more about their background, their alliances, their histories. This method of interactive theater gave us opportunity for substantive discussion about the dynamics of a group meeting. It also makes for a unique experience each time, both for the audience and the players. Several of my colleagues agreed that this type of performance should be required viewing for any department chair, group leader or other manager who is interested in understanding some of the more subtle biases that can creep into any discussion as soon as there is something significant at stake.

The six characters were Terrence, Marc, Marlene, Brad, John and Frank. Terrence, a full professor and department chair, ran the meeting although he was perceived by the audience to be a bit weak and not in full control of the meeting. Marc, the most senior, and most aggressive member of the committee, came in late, was

clearly annoyed to have to waste his time in this meeting when the decision (to him) was obvious, and was anxious to leave the meeting in order to talk to the dean about his new lab space. Frank, an associate professor and chair of the search committee, was very much interested in hiring someone whose research was closely related to his own and was thus strongly in favor of hiring the male candidate. John, the one African American in the department, was an assistant professor currently undergoing tenure review. While he tried hard not to show it, he was interested in making sure he did nothing to make waves that could risk his tenure decision. When we, the audience, interacted with John "in private," he reluctantly revealed that he had experienced some bias and a sense of isolation in the department and was thinking of leaving. Brad was the open-minded junior faculty member with the least committee experience. He found a mentor in Marlene, the one senior woman in the department, because of her approachability, breadth of experience, and interest in teaching.

Marlene was the key character and certainly the one on whom the audience discussion was focused. She was articulate, respected by her colleagues, and was a central figure in the department, but at the same time was a bit reserved. She was interested in improving the diversity of the department, both gender and research, and was thus an advocate for the female candidate. In her view, the female candidate was someone who showed significant, if not yet established, promise in a new research area that would broaden the research strengths of the department. But she also felt that she would not be able to persuade her colleagues of this fact if she were too aggressive in trying to make her case. Furthermore, she was hesitant to put at risk the respect and goodwill she currently had from her colleagues by focusing too strongly on the issue of diversity. As she attempted to present her carefully reasoned arguments, she was frequently interrupted by Marc and Terrence, which she responded to with resignation rather than anger. Over the course of the discussion, she became aware that Terrence and Frank had already decided that they would make an offer to the male candidate prior to coming to the meeting, which again left her exasperated, but resigned.

We later learned that while Marlene felt she had a very rewarding career, particularly through her interactions with students, she also felt she had sacrificed a great deal in her personal life in order to gain the respect of her colleagues. She learned over the years to accept the bad with the good, and developed a network of friends beyond the computer science department that helped her deal with the isolation she felt among her own colleagues.

What was particularly impressive about this performance was the realism of each of the characters, and subtlety of the performance. The players evoked a wide range of points to discuss in the interactive segment. What were "gender-based" behaviors, and what were not? How did the makeup of the group influence their final decision? How could Terrence have been a stronger department

The casts Steiger directs are an interesting mix of professional actors, amateurs and students.

## Advancing women in science & engineering through theater, continued from page 9

chair, and how could he have better brought the search committee to consensus without excluding or dismissing those who did not agree with him? How could he better handle a dominant colleague and keep him from “hijacking” the decision process? Was Brad risking his own chances for tenure by aligning himself with the one senior female faculty member rather than with Marc, the “alpha male?” Was Frank focusing too strongly on his own personal research interests rather than the broader interests of the department, and, if so, why? How does a department balance the need for diversifying its faculty with the need for a strategic hiring plan? Discussion of all of these points by our group led to a productive discussion on how to encourage open hiring practices and how to foster an inclusive environment.

To find out a little bit more about how the CRLT players came into being, I contacted the director, Jeffrey Steiger. His work began five years ago, when he developed an interactive sketch called “Gender in the Classroom” through a grant from the Sloan Foundation. He was asked to get involved not so much because of his topical expertise but because of his reputation for doing “non-traditional” theater. After a while, he came to the opinion that the subtler aspects of interactions in academic settings makes for both good theater and an excellent learning opportunity for the development of best practices in creating a welcoming and inclusive campus environment. The CRLT players were then able to partner with the University of Michigan’s ADVANCE Institutional Change grant to develop sketches that address improving the climate for women faculty. They now have a set of about a dozen sketches that are performed both on the Michigan campus and around the country. The topics range from the specific

sketches developed as part of the ADVANCE program to ones geared towards helping teaching assistants deal with various classroom issues such as student conflicts, performance in group activities, gender and disabilities.

The casts Steiger directs are an interesting mix of professional actors, amateurs and students. The actors learn the technical and cultural aspects of science and engineering departments from the amateur participants, while the amateur actors learn techniques in voice projection and character development. While the basic plot line is the same in each performance for each sketch, the actors are encouraged to use their own personalities to build the characters they play. As a result, when combined with the audience participation, each performance becomes unique. This can result in a very diverse set of reactions by the audience, sometimes even opposite reactions. As he states, “In some ways, the actors have some of the same personality traps that the characters do, and so they need to become aware of their own biases and behaviors and work with them, rather than play specific characters exactly as written.”

The University of Michigan’s Center for Research in Learning and Teaching, directed by Prof. Constance Cook since 1993, was founded in 1962 and was the first such university centers in the country. The NSF-funded ADVANCE program provides grants to institutions and individuals to develop creative strategies for increasing the participation of women in academic science and engineering careers. More information about CRLT can be found at <http://www.crlt.umich.edu>, and the details of the NSF-ADVANCE program can be found under the cross-cutting link at the NSF website.

## Physicists from around the world meet, continued from page 8

of the challenges of building a laboratory in a developing country. Ling-An Wu, physics professor at the Chinese Academy of Sciences, spoke about the new challenges for female physicists in the rapidly changing social structure of China. Laura Green, physics professor at the University of Illinois, spoke about her research on high-temperature superconductors and broken symmetries.

All of the delegates participated in several discussion groups, where lively debate and discussion took place for several hours each day. The six topics of discussion were: 1) Attracting Girls into Physics: Stereotypes, Role Models, Schools, Teachers, 2) Launching a Successful Physics Career: Mentoring, Evaluation, Different Career Paths, Visibility, Getting a Reputation, 3) Getting Women into the Physics Leadership Structure Nationally and Internationally, 4) Improving the Institutional Structure and Climate for Women in Physics — Working Conditions, Dropping Out of the Career, 5) Learning from Regional Differences: Northern/Southern Europe, Asia, Latin America, North America, 6) Balancing Family and Career. Each discussion group had four discussion leaders to guide the discussion, take recommendations on the specific topics, and present a set of coherent recommendations to the IUPAP Working Group on Women in Physics. The Working Group will present these recommendations

to the IUPAP executive council at their annual meeting in October in South Africa. The proposed recommendations can be found on the conference website.

It was fascinating to hear from female physicists from so many diverse countries and discuss challenges and share ideas for solutions. Although some countries have more balanced gender ratios in physics at the more introductory levels, all countries share the problem of an imbalance at the levels of professors and other leadership positions. What we have going for us in the U.S., however, is the understanding and support of many male physicists. I was surprised by how many delegates said this is not the case in their countries. The national physics organizations of most countries do not have any group that focuses on women in physics, and from speaking with the delegates, it seems there is both apathy for and resistance to addressing the issue of the low percentages of women in physics. Although there is still such a long way to go in terms of leveling the playing field, at least in the U.S. there is a general recognition that capable women should be encouraged to continue in physics. To have any impact on the culture of the physics community, we need the men on our side, and hopefully now that we have IUPAP listening to us, they will be able to positively influence the policies and policy-making bodies that affect us as physicists.

# The American Physical Society 2005-2006 Travel Grants for Women Speakers Program



**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 2005-2006 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 at ([www.aps.org/educ/women-speaker.html](http://www.aps.org/educ/women-speaker.html)). 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/cswp/travelgrant.html](http://www.aps.org/educ/cswp/travelgrant.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.

See following page for application form.

## Women Speakers List

Need a speaker? Consider consulting the American Physical Society Women Speakers List (WSL), an online list of over 300 women physicists who are willing to give colloquium or seminar talks to various audiences. This list serves as a wonderful resource for colleges, universities, and general audiences. It has been especially useful for Colloquium chairs and for those taking advantage of the Travel Grant Program for Women Speakers. To make the WSL easy to use, we have made the online version searchable by state, field of physics, or speakers' last names.



If you'd like to search the list to find a woman speaker, go to <http://www.aps.org/educ/women-speaker.html>

Women physicists who would like to be listed on the Women Speakers List or those who'd like to modify their existing entries can do so at <http://www.aps.org/educ/women-speaker-enroll.html> or see page 18.

APS also has a companion program for minority speakers. Information on the Travel Grant Program for Minority Speakers can be found at <http://www.aps.org/educ/com/travelgrant.html>. The Minority Speakers List can be found at [www.aps.org/educ/minority-speaker.html](http://www.aps.org/educ/minority-speaker.html).

# 2005-2006 TRAVEL GRANTS FOR WOMEN SPEAKERS

## ◆ APPLICATION FORM ◆

This form is also available on the Internet at [www.aps.org/educ/cswp/women-app.html](http://www.aps.org/educ/cswp/women-app.html)

This form must be filled out and approval received from the APS in order to be eligible for up to \$500 travel reimbursement.

**Please note that submitting this application form does not guarantee reimbursement.**

You will be notified within two weeks of receipt of this application whether or not it has been approved.

DATE:	_____				
INSTITUTION:	_____				
DEPARTMENT:	_____				
CITY:	_____	STATE:	_____	ZIP:	_____
APPLICATION PREPARED BY (Required):	_____				
NAME:	_____	TITLE:	_____		
PHONE:	_____	FAX:	_____		
EMAIL:	_____				

Please list information on the speakers below. Please indicate if speakers' dates or talk titles are tentative.

DATE OF COLLOQUIUM:	_____				
SPEAKER'S NAME:	_____				
HOME INSTITUTION:	_____				
HOME DEPARTMENT:	_____				
ADDRESS:	_____				
CITY:	_____	STATE:	_____	ZIP:	_____
PHONE:	_____	FAX:	_____		
EMAIL:	_____				
TITLE OF TALK:	_____				

DATE OF COLLOQUIUM:	_____				
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PHONE:	_____	FAX:	_____		
EMAIL:	_____				
TITLE OF TALK:	_____				

Please return this form to:

Arlene Modeste Knowles, Travel Grants for Women Speakers Program  
The American Physical Society  
One Physics Ellipse  
College Park, MD 20740-3844  
Tel: (301)209-3232 • Fax: (301)209-0865 • Email: [travelgrant@aps.org](mailto:travelgrant@aps.org)

# Women Speakers List (WSL)

## Enrollment/Modification Form 2005–2006

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

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

**Women Speakers List • APS • One Physics Ellipse • College Park, MD 20740-3844 • (301) 209-3232**

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** \_\_\_\_\_

If you have moved out of state, list previous state: \_\_\_\_\_

**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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## Current Employment Information (28 Characters per line)

Employer: \_\_\_\_\_

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

Position/Title: \_\_\_\_\_

## Professional Activity Information

CURRENT WORK STATUS (Check One)	TYPE OF WORK ACTIVITY	FIELD OF PHYSICS		
		Current Interest	Highest Degree	
1 ___ Faculty, Non-Tenured	Please check up to four of the activities in which you engage most frequently.	(check up to 4 in each column)		
2 ___ Faculty, Tenured		1 ___ Administration/Management	1 ___ Accelerator Physics	
3 ___ Inactive/Unemployed		2 ___ Applied Research	2 ___ Acoustics	
4 ___ Long-term/Permanent Employee		3 ___ Basic Research	3 ___ Astronomy & Astrophysics	
5 ___ Post Doc./Research Assoc.		4 ___ Committees/Professional Org.	4 ___ Atomic & Molecular Physics	
6 ___ Retired		5 ___ Computer Programming	5 ___ Biophysics	
7 ___ Self-Employed		6 ___ Development and/or Design	6 ___ Chemical Physics	
8 ___ Student Full Time		7 ___ Engineering	7 ___ Computational Physics	
9 ___ Student Part Time		8 ___ Manufacturing	8 ___ Computer Science	
10 ___ Teaching/Precollege		9 ___ Proposal Preparation	9 ___ Condensed Matter Physics	
11 ___ Other (please explain)		10 ___ Teaching - Secondary School	10 ___ Education	
_____		11 ___ Teaching - Undergraduate	11 ___ Electromagnetism	
_____		12 ___ Teaching - Graduate	12 ___ Electronics	
		13 ___ Technical	13 ___ Elementary Particles & Fields	
		14 ___ Technical Sales	14 ___ General Physics	
		15 ___ Writing/Editing	15 ___ Geology	
	16 ___ Other (please specify)	16 ___ Geophysics		
	_____	17 ___ High Polymer Physics		
	_____	18 ___ Low Temperature Physics		
		19 ___ Materials Science		
		20 ___ Mathematical		
		21 ___ Mechanics		
		22 ___ Medical Physics		
		23 ___ Non-Physics		
		24 ___ Nuclear Physics		
		25 ___ Optics		
		26 ___ Physics of Fluids		
		27 ___ Plasma Physics		
		28 ___ Quantum Electronics		
		29 ___ Solid State Physics		
		30 ___ Space Physics		
		31 ___ Superconductivity		
		32 ___ Surface Science		
		33 ___ Thermal Physics		
		99 ___ Other (please specify)		
		_____		

### TYPE OF WORKPLACE FOR CURRENT OR LAST WORK

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

### 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:

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### Office Use Only

Date of entry: \_\_\_\_\_

Roster #: \_\_\_\_\_

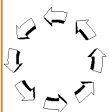
Initials \_\_\_\_\_

*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 staff liaisons. Please return this form to the address on the reverse side.*



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