

CSWP Gazette

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

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Guest Editorial:

Who is Killing the Single-Sex College?

By Peter Sheldon, Randolph-Macon Woman's College



Peter Sheldon

“Since its founding in 1891, Randolph-Macon Woman's College has offered women a rigorous education in the liberal arts and sciences” reads the first line of the Statement of Purpose from the college at which I teach. A small addition to this statement represents, and has added fire to, a significant national debate that is occurring right now. In the coming fall (2007), we will replace “women” with “men and women” and our new name will be Randolph College. The conclusion that this change is the best thing for us was a difficult and painful one at which to arrive.

The benefits of a single-gender college

Research has shown^{1, 2, 3} quite definitively that a single-gender college provides a better education for some of our college-aged students. Whether we are talking about a men's college or a women's college, there are benefits that relate to the following points.

Sisterhood/brotherhood: students and graduates of single-gender institutions appear to create stronger bonds with their friends and classmates. This is not so different from the results seen from inhabitants of fraternities and sororities at larger, coed institutions.

Traditions: single-gender institutions tend to hold more strongly to traditions, and generally have more of them (e.g. “ring week,” “pumpkin parade,” “founders' day”). These traditions are a very important part of many of the students' college experiences.

Focus on learning styles: although no one would claim that all of the members of a single gender learn best in the same way, there are some general differences between men and women⁴. A single-gender institution can focus on the learning styles of that gender to help them to learn better.

Fewer distractions: there are fewer of the traditional type of distractions that tend to occur between members of the opposite sex. Regardless of sexual orientation, there is less flirting, less attention paid to appearance, and less time spent socializing during the academic periods. While to some this might appear to be a negative, teenagers are more likely to overdo these kinds of behaviors.

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Amy Barger Wins 2006 MGM Award

By Ernie Tretkoff, APS News Staff Writer

Astrophysicist Amy Barger of the University of Wisconsin-Madison has been awarded the 2007 Maria Goeppert-Mayer award, which recognizes outstanding achievement by a woman physicist in the early years of her career. Barger is cited “For her pioneering efforts in using observational cosmology to provide new insight into the evolution of black holes,

star formation rates and galaxies.”

Barger has been fascinated by the topic since she was a child, when she looked up at the stars and knew she wanted to be an astronomer. “For me, I always had an aesthetic interest in the sky. It's so beautiful,” she says.

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Single-Sex Colleges, continued from page 1

Less competition in class: in some classroom situations, it has been seen that the males tend to dominate the questions or conversations. This can be because of the perceived competition to get a question or comment in first, or it can be because of the tendency for male students to receive more attention from teachers. I acknowledge that none of these behaviors can be applied to every classroom situation, but in general these things have been seen to be true. These behaviors are mitigated in a single-gender classroom, as there is at least no issue of competition between genders.

More leadership opportunities: all of the leadership opportunities will go to a single gender, so issues of which gender has more leaders do not exist. This has a larger impact on women, since women traditionally hold fewer leadership positions, both in college and after college (particularly in the workforce).

Improved academic and emotional confidence: because they do not have the issue of feeling sensitive in front of the opposite sex, students of the single-gender classroom, or single-gender school, will take more risks, and will develop more confidence. Along the same lines, men and women at a single-gender school will tend to explore fields that are traditionally dominated by the opposite sex. For example, a higher percentage than average of women at a women's college will major in fields such as math and physics. More men at a men's college will study, for example, English and creative writing, than is generally seen at a coed school.

Students at a single-gender institution also tend to be more successful in leadership positions and in their academic field because of the same gender role models. Faculty, staff, administrators, and visiting speakers are able to be or to show role models that are most appropriate to the gender.

The disadvantages of a single-gender college

The disadvantages of a single-sex education are few, although some would argue that they are large. The primary disadvantage seems to be that the single-gender college does not allow the student to experience a microcosm of the "real world". Competition between the sexes and interactions between the sexes is a real part of the world, and we are not training our students to deal with those. In addition, there is the question of whether we are depriving our students of being well socialized by limiting their interactions with the opposite sex.

I would claim that these disadvantages are actually pretty minimal, and are strongly outweighed by the developmental advantages. College is not the real world, regardless of gender. Small, liberal arts colleges especially are not the real world, as they tend to be more self-selected to have pretty homogenous populations. They have comfortable living situations with little parental oversight. Many have excellent quality athletic and campus center facilities. On the other hand, we give our students plenty of real world experi-

ences, regardless of whether it is a single-gender or coed college. And don't get the wrong idea — it is not as if there are no members of the opposite sex around at a single-sex college. Here at R-MWC there are male faculty, staff, and friends around the campus buildings, and there are even men in small numbers in the classes (graduate students, high school students, certificate of major students).

Some of the most compelling arguments for single-sex education come from looking at outcomes. Women from women's colleges are more than twice as likely to pursue a higher academic degree. Graduates from single-sex institutions are far more likely to hold leadership positions in government and industry. By the same measures, R-MWC graduates are generally more successful than average, and show no obvious signs of the disadvantages mentioned above.

What is happening to single-gender education?

Overall, the arguments and evidence for single-gender education are quite compelling. So much so that more and more K-12 classrooms and schools are trying out single-gender education at various levels^{2,5}.

On the other hand, men's colleges have virtually disappeared. Men's colleges did not exist because men were at a disadvantage, but because advanced degrees were traditionally seen as being for men, while women had other roles in the home. As that attitude shifted over time, men's colleges began accepting women. Because there were few coed institutions, women's colleges were started so that women could receive an education equal to that of their male counterparts. As the last of the men's institutions started accepting women in the late 60's and early 70's, there was less of a need for women's colleges as being the only places that women could get an education. By some estimates, the number of women's colleges decreased by over a hundred in the 1960's alone. Overall, the number of women's colleges in the US went from about 300 in 1960⁶ to the number of 58 today.

The thing that is hard for supporters of women's colleges to accept (my faculty colleagues and I being among that group) is that the survival of women's colleges has little to do with the advantages we argue for so convincingly. Let's just accept that the advantages are significant for the sake of argument. If that is so, why, then, are there only 2 men's colleges left and why has there been a steady decline to the current 58 women's colleges in the United States?

What killed the women's colleges?

It is a pretty simple answer. There is one disadvantage seen by about 98 percent of 17 year-olds girls: there are no guys at them. It is not necessarily about outcomes, nor about academic and emotional advantages or disadvantages. It is about what a 17 year-old girl or her parents want and believe right now.

Are 17 year-olds and their parents convinced by

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Thirteen Women Named to Fellowship in the APS

By Sue Otwell, APS Staff

Thirteen women are among the 212 new Fellows of the American Physical Society. Each new fellow is elected after careful and competitive review and recommendation by a fellowship committee on the unit level, additional review by the APS Fellowship Committee and final approval by the full APS Council. Only 1/2 of 1% of the total APS membership is selected for Fellowship in the Society each year. A listing of all 2006 Fellows, as well as information on the Fellowship program and how to nominate an individual, may be found at www.aps.org/programs/honors/. A listing of all women Fellows of the APS can be found at www.aps.org/programs/honors/fellowships/women.cfm.

Susan Theresa Arnold

Air Force Research Laboratory

For outstanding achievements in anion laser photoelectron spectroscopy and the kinetics and dynamics of ion-molecule, electron-molecule, and electron-ion reactions of importance in the atmospheric and aerospace sciences.

DAMOP (Atomic, Molecular, Optical)

Estela Olga Blaisten-Barojas

George Mason University

For pioneering work in the computational simulation of atomic and molecular clusters including significant advances in the understanding of the structure and other important properties of nanoscale systems.

Computational Physics

Hui Cao

Northwestern University

For the invention of microlasers based on disordered media, and other groundbreaking experimental studies of coherent light generation and transport in disordered media. *Laser Science*

Hilda A. Cerdeira

ICTP

For her contributions in superconductivity, nonlinear dynamics and synchronization of chaotic systems and her development and management of outreach programs in communications and literature for colleagues in developing countries. *Forum on International Physics*

Shirley Suiling Chan

Princeton University

For using sophisticated techniques to explore the spectra, structure, and dynamics of proteins and nucleic acids, and for dedicated service to the American Physical Society. *Biological Physics*

Brenda Lynn Dingus

Los Alamos National Lab

For her pioneering work on understanding the highest energy gamma-ray emission from gamma-ray bursts.

Astrophysics

Sharon C. Glotzer

University of Michigan

For her pioneering simulations of glass-forming liquids, self-assembled nanomaterials and complex fluids, and for her leadership and service to the computational science community. *Computational Physics*

Physics

Paula T. Hammond

MIT

For her contributions to thin-film patterning of polymers through selective deposition and her studies on side-chain liquid-crystalline block copolymers.

Polymer Physics

E. Susana Hernandez

University of Buenos Aires

For her contributions to international physics, including remarkably diverse scientific contributions derived from her continuing efforts to bring together researchers from different areas and disciplines with particular emphasis on young scientists.

Forum on International Physics

Elizabeth Jenkins

University of California San Diego

For her contributions to the understanding of the flavor and spin symmetries for Baryons, through innovative application of the large N_c expansion.

Nuclear Physics

Nikolitsa (Lia) Merminga

Thomas Jefferson National Accelerator Facility

For leadership in designing and developing energy recovery linacs, and applications to light sources and electron-ion colliders. *Physics of Beams*

Jolanta Irena Stankiewicz

ICMA

For significant contributions to the physics of semimagnetic semiconductors and pioneering semiconductor research in Venezuela.

DCMP (Condensed Matter)

Jennie Harriet Traschen

University of Massachusetts

For her ground-breaking contributions to early universe cosmology and black hole physics.

Gravitational Topical Group

Special Events Focusing on Women in Physics

APS Annual Meeting • Denver, Colorado

Sunday, March 4, 2007

8:00 am – 5:00 pm Professional Skills Development Workshop for Women Physicists

(Adams Mark Hotel)

Workshop for developing communication, negotiation and leadership skills for women physicists in industry and national labs. Reception for participants to follow (participants must be pre-registered).

Tuesday, March 6, 2007

7:30 am – 9:30 am CSWP/FIAP Networking Breakfast

(Convention Center)

Enjoy a full breakfast and network with colleagues! Cost: \$15. \$5 for physics students, thanks to FIAP's generosity. The speaker will be Lisa Dhar, InPhase Technologies, Inc. All are welcome, both men and women, however pre-registration strongly advised as only limited walk-ins accepted. Register at <http://www.aps.org/meetings/march/special/breakfast.cfm>.

11:15 am – 2:15 pm Invited Session: "Women in Academic Science: Balancing Career and Children"

(Convention Center)

Sponsored by the Committee on the Status of Women in Physics.

7:00 pm – 8:30 pm COM/CSWP Dessert Reception

(Adams Mark Hotel)

Learn about the work of the Committee on Minorities in Physics and the Committee on the Status of Women in Physics, network with colleagues, and unwind after a long day of sessions. All are welcome to join us.

APS Annual Meeting, Jacksonville, Florida

(all events will be held in the Hyatt Regency Hotel)

Friday, April 13, 2007

8:00 am – 5:00 pm Professional Skills Development Workshop for Women Physicists

Workshop for women physicists in industry and national labs to develop communication, negotiation and leadership skills. Reception for participants to follow (participants must be pre-registered).

Sunday, April 15, 2007

1:15 pm – 3:05 pm Invited Session: "Strengthening the Physics Enterprise"

Sponsored by the Committee on the Status of Women in Physics

Monday, April 16, 2007

12:00 pm – 1:30 pm CSWP/DPF Networking Luncheon

Buffet luncheon, opportunity for networking with colleagues! Cost: \$20 (\$5 for students). Joanne Hewett of SLAC will offer some informal remarks. All are welcome, both men and women, however pre-registration strongly advised as there will be only limited space for walk-ins. Register at <http://www.aps.org/meetings/april/social.cfm>

ASK THE PHYSICS MENTOR

“I have recently received an award. I have gotten comments such as ‘well, you probably got it because you’re a woman.’ How do I handle such comments, whether they could be true or not?”

Answer: Awards are not generally given for one single attribute. They are most often given for accomplishments, but they are also often given with a geographic, gender, or some other demographic distribution in mind. If indeed an award was given because you are a woman, or because you are an inhabitant of Georgia, we will assume it was also given for an accomplishment.

Whether there was a demographic reason or not, the comment is clearly inappropriate, as it has demeaning and sexist undertones. The commenter may not even be aware that this sort of comment is inappropriate. Awareness aside, it is indicative of an attitude that should not be tolerated, and, if possible, should be addressed. You might choose to point out: “If a male colleague received this award, would you

assume he got it because he was a man?” You might also ask: “Why would you make that assumption?” and perhaps help the commenter to see that there is no way to come to that conclusion logically. You should be sure to state firmly what you actually got the award for “No, I got the award for my accomplishments in X.”

Do you have a question for the Physics Mentor? Send it to women@aps.org. A member of the Committee on the Status of Women in Physics will offer suggestions in the next issue of the Gazette. No name or other identifying feature will be attached to your question.

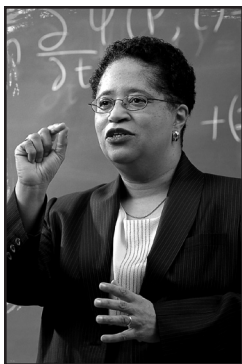


CHECK OUT
HUNDREDS OF
PHYSICS JOBS

<http://careers.aps.org>

NAS's Women's Adventures in Science Project

By Barbara Kline Pope, National Academy of Sciences



Shirley Ann Jackson

Now, more than ever, we need to excite young people about science and encourage the flow of talented students, including girls and minorities, into scientific and engineering careers. One way the National Academy of Sciences is addressing this need is through the "Women's Adventures in Science" project, a set of 10 paperbacks and an accompanying Web site, www.iwaswondering.org. Geared to middle-school readers, the books tell the life and science stories of 10 contemporary women scientists, beginning with the scientist's childhood and continuing through her schooling and scientific career. The Web site builds on this content, adding games, comic strips, and activities to the mix.

The personal style of the stories and the photos helps kids identify with the women and envision

themselves in the role of a scientist. This personal approach seems to be working. In a review of three books from the series, including *Strong Force: The Story of Physicist Shirley Ann Jackson*, the publication *School Library Journal* (one of the leading resources for librarians working with young people in schools and public libraries) said "[T]hese three books are interesting, substantive, and eminently readable. Conversational but not condescending, these titles are informative and inspiring."

Excerpts of each book can be read at www.nap.edu/catalog/was. If you have questions about the project or suggestions for organizations that might be interested in distributing the books to young people, please send an e-mail to Terrell Smith (tsmith@nas.edu).

M. Hildred Blewett Scholarship for Women Physicists

This scholarship has been established to enable women to return to physics research careers after having had to interrupt those careers for family reasons. The scholarship consists of an award of up to \$45,000. The applicant must currently be a legal resident or resident alien of the US or Canada. She must currently be in Canada or the US and must have an affiliation with a research-active educational institution or national lab. She must have completed work toward a PhD.

Applications are due by June 1, 2007. Selection will be made by a sub-committee of the APS Committee on the Status of Women in Physics. Announcement of the award is expected to be made by July 1, 2007.

Details and on-line application can be found at www.aps.org/programs/women/index.cfm (click on Scholarships). Contact: Sue Otwell in the APS office at blewett@aps.org.

*Are you thinking about graduate schools?
Are you looking for one that is "female friendly"?
Check out the results of an informal survey and
read what departments say about themselves at
<http://cswp.womeninphysics.org/results.php>.*



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Not only did she know she wanted to be an astronomer, she knew exactly what she wanted to study: the most distant astronomical objects, those at the very edge of what we can observe. “I always knew that I wanted to study the distant universe. I didn’t want to do stars or anything local. I wanted to study things as far away as possible,” she says.

She has done just that. Barger’s primary research interest is mapping the star formation and accretion histories of the universe using observations at many wavelengths. She has made discoveries of new populations of dusty galaxies and supermassive black holes in the distant universe.

Recently, using the Chandra space telescope, she and colleagues observed a new population of black holes. The hard x-rays that Chandra observes can penetrate the dust clouds surrounding black holes, while lower energy radiation cannot. When Chandra began observations, astronomers expected to find some previously undetected, dust-obscured sources. But when Barger and her colleagues followed up on the Chandra observations with ground-based observations, they found that the new hard x-ray sources were more recent than expected, with a redshift distribution that peaked around 1, rather than 2 or 2.5 like the unobscured soft x-ray sources that had previously been observed.

“It completely changed our view. Prior to these results, astronomers thought black holes did most of their accretion, most of their growth, early on in the history of the universe, and then just went dormant. But what we found is that there’s actually a lot of growth occurring at fairly recent times. So the universe is much more exciting than had previously been thought,” says Barger. Astronomers have not yet fully explained these new sources.

In another recent research project, Barger used the SCUBA instrument on one of the telescopes on Mauna Kea to observe in submillimeter wavelengths. These long wavelengths are ideal for observing the radiation from dust, which might obscure a black hole or star formation. She and her team found an entirely new population of extremely luminous, dust-covered galaxies. “They’re a very important population that we hadn’t even had knowledge of,” she says. Now, Barger is looking forward to the next generation SCUBA instrument, which will be much faster and will be able to cover a much larger area.

Barger’s astronomical observations have spanned the electromagnetic spectrum, and she is particularly interested in trying to relate the different wavelength observations to each other. “Whatever window you use, whether it be submillimeter or optical or x-ray, it is just a window. So if you want to make sure you have a full understanding of the sources you’re looking at or the population you’re looking at, you need to know how the different wavelengths relate to one another,” she says.

Barger grew up in Madison, Wisconsin. Her father, a physicist at the University of Wisconsin-Madison, encouraged her and her two brothers to study science. She received her B.A. in physics in 1993 from the University of Wisconsin-Madison. She then went to Cambridge as a Marshall Scholar, and received her PhD in astronomy in 1997 from King’s College and the Institute of Astronomy at the University of Cambridge.

“It’s always fun to see how different places do research, particularly other countries. There was a cultural exchange, in addition to just being an amazing center for astronomy. It was really fun to start my astronomy career at a place that was so exciting and so active,” she says of her time in Cambridge.

In 1996, Barger became a postdoctoral fellow at the Institute for Astronomy at the University of Hawaii. She continued her research there after being named both a Hubble Fellow and a Chandra Fellow at Large in 1999. In 2000, she returned home to the University of Wisconsin-Madison, where she is now an associate professor in the astronomy department.

Barger’s father is a professor in the physics department, and she says it’s nice having her father at the same university (though she says it would be odd if they were in the same department). Having a father in physics has helped her understand how the academic world works, she says. “When you’re a new faculty member, you don’t know what you’re supposed to do to get ahead. Since I grew up in this environment, I’ve always understood the system at some level,” she says. This has been a great advantage, she says.

Barger has noticed that even during the time she has been in astronomy, the climate has been improving for women. She notes that astronomy has a higher percentage of women than physics. “Astronomy is better than physics in terms of the number of women. Which is probably one of the reasons I felt more comfortable in it to begin with,” she says.

Barger says she has felt a real camaraderie with her female colleagues. “I have women friends who are in similar kinds of positions at universities across the country. I feel like we’re forming our own network,” she says. “I feel really connected; I feel really part of things. I don’t feel like we’re being competitive. We’re very supportive. I think that does make a big difference. To me, I want to stay out of politics as much as possible. That’s not why I’m in astronomy. I just want to do science.”

Barger has received many honors in addition to the Maria Goeppert-Mayer award. These include the Annie Jump Cannon Award in Astronomy, the Alfred P. Sloan Foundation Fellowship, the David and Lucile Packard Fellowship for Science and Engineering, and the Newton Lacy Pierce Prize in Astronomy. She was also a recipient of the Phillip R. Certain Dean’s Distinguished Teaching Award and the H. I. Romnes Faculty Fellowship for distinguished research, both at the University of Wisconsin-Madison.



Amy Barger

Barger says she has felt a real camaraderie with her female colleagues.

Our research has shown that interest in single-sex colleges has declined over time and will continue to decline with no end in sight.

Single-Sex Colleges, continued from page 2

the advantages touted loudly by the women's colleges? Some are and some are not, but your average 17 year-old and her parents who are looking at a national, liberal arts college, are convinced that she will get a good education wherever she goes. So she (or any guy looking at a set of similar colleges) is often more interested in the athletic facility, in the campus center, by the cell phone reception, and by the social opportunities.

Our research has shown that interest in single-sex colleges has declined over time and will continue to decline with no end in sight. This research includes market research of hundreds of teenagers (that we commissioned), national data from organizations such as ETS, and a survey of a subset of women's colleges, and of women's college that have turned coed (done by our faculty and staff). There is not enough demand for the women's colleges that are out there right now, and we do not expect that demand to get any better. The market research and national surveys showed that not enough teenagers were interested in women's colleges. All of the women's colleges that have gone coed in recent years were driven by enrollment/financial motives. The colleges that we studied that are still single-sex were experiencing low enrollments on the undergraduate level. We have increased our discount rates (offered more grants and financial aid) to unsustainable levels, or are struggling financially for other reasons.

Although we are convinced that we offer a superior education for women, and we know that there are great advantages to that, we are also convinced that demand is decreasing, our finances are beginning to take too large a hit to continue to try other avenues, and there is nothing else for us to try that will make enough of a difference. Of course there is a huge amount of resistance to the change. I address the most common objections next.

Objections to the transition to coeducation

Why don't you just do a better job marketing? We believe that we and the other women's colleges have done everything we can to market and to have the admissions departments work to attract students.

So how, then, are the women's colleges like R-MWC surviving? Given location, a number of the women's colleges have been able to balance their budgets with significant graduate programs, or other more specialized programs, which are coed. Others are in the same financially precarious position that we are in.

But aren't there more women going to college now than ever before? Yes, but women's colleges overall are still seeing a decrease. The increasing numbers are increasingly going to coed colleges.

R-MWC gives too much in financial aid. An informal poll of students shows some surprise at the size of the awards. Why don't you just drop the discount rate? This is no small issue, and it has been studied by many. We have tried small drops in discount rate with very negative enrollment results. The majority of those students who are surprised by the size of their award

package came here simply because of that award; it is what it took to get them here.

As other women's colleges close their doors or go coed, cannot we just win the war of attrition? If you look at the other colleges our students apply to, and if you look at the colleges we lose students to, we see that our primary competitors are not other women's colleges. As the women's colleges have closed their doors or gone coed, it has not resulted in a trend of the other women's colleges seeing overall increases in enrollment.

Ok, well if R-MWC goes coed, isn't it now increasing its competitive pool from 58 colleges to the thousands of coed colleges and universities that are out there?

This is misleading because we are already competing primarily with coed schools. If we lose a prospective student, or a student as a transfer, it is overwhelmingly to a coed college. Our first-year students overwhelmingly come to us despite the fact that we are a women's college. They come for program, for small-college feel, because of proximity to home.

What about trying something else first? You could improve your facilities, change your academic offerings, find a niche, re-brand the college.

We initially commissioned the market research with these thoughts in mind. The question we asked is "what do we need to do to improve enrollment and remain single-sex." All of the above were options, and we intend to do them all. We were convinced, though, after our three years of research, that none of them would be enough due to the lack of demand for women's colleges. We also need to accept men in order to reach our enrollment goals.

Conclusions

There are great advantages to single-sex education for some students. But single-sex education is not for everyone. We believe that no matter what we do, we cannot increase the demand from 17 year-old girls enough to allow our college to survive successfully as a single-sex institution.

Are my colleagues and I who have reluctantly come to this conclusion complicit in the killing of the women's colleges? The objections above can be answered with research and statistics, but the tough question is, *if we believe in the advantages of women's education, how can we do this? Shouldn't we fight to the death?* I wonder, are we a women's college first, or a college that offers a "rigorous education in the liberal arts and sciences," as stated in the college's Statement of Purpose? I would hope that we are the latter, foremost. I would argue that we do not need to take anything away from the statement of purpose: we are still committed to the education of women, as well as men, and we are in a unique position to have a better understanding of the issues of educating women vs. men. It is more important that we be sure we can provide an excellent "rigorous education" into the future and that we be aware of the issues of educating the genders together than it is for us to risk failing as a

Single-Sex Colleges, continued from page 8

college that educates only women, and thus not be able to educate anyone.

When we go coed in the fall of 2007, is that going to make the women who stay here less successful? I would hope not. There are some who argue that the women who go to a women's college are self-selected from the students who would be successful in advanced education and leadership. Thus, wherever they go to college, whether it is single-sex or not, they would still be successful. I fully expect that we will still be able to educate successful, strong, independent women leaders of the future. And I certainly expect that we can do the same for men.

What can the physics community learn from the story of single-gender education?

Women are under-represented in physics and related fields such as math and engineering⁷. Paralleling arguments against single-gender education, many want to claim that the playing field has been leveled⁸, hence there is no need for the physics community to be concerned, but evidence presented here and elsewhere shows otherwise. Gender biases exist in our classrooms and our textbooks (examples and demonstration tend towards topics that are traditionally more interesting to men, such as football). Women learn differently than men⁴, and if we physics teachers were aware of these differences, then we could take advantage of them to retain women in physics classes. When only 5% of full professors in physics are women, and fewer high-profile physicists are women, there are few women role models for physics students; we need to seek out appropriate role models for all of our students. When the undergraduate physics classroom is dominated by men, as it often is, it is more difficult for the women to gain confidence in the subject; we need to make sure the communities in our departments are welcoming to all, and that the opportunities (research, jobs, extra-curricular activities) are open to all. A physics department will go a long way to attracting more women to physics if it is aware of, and

if it makes changes relevant to, the gender differences between how men and women learn and socialize. In our physics departments, we have educated many successful men physicists. And I certainly expect that if we are aware of the differences and the biases, and are willing to do something about them, we can do the same for women.

References

- ¹ *Internal research at R-MWC included but was not limited to a two-year market research study of high school students who would not consider a women's college, high school students who had inquired about R-MWC, current students, transfer students, alumnae and donors, performed by an outside contractor; and a study of a large number of women's colleges and colleges that went coed, with an intensive study of five from each category, performed by faculty and staff from the college.*
- ² *Amanda Milner-Fairbanks, "Extreme makeovers" Newsweek, 11/6/006, 56-57.*
- ³ *Kate Causserly, "An Educational Advantage for Women: Women's Colleges," <http://www.colostate.edu/Depts/SAHE/JOURNAL2/1999/AnEduc.htm> (accessed 12/30/06).*
- ⁴ *M. F. Belenky, B. M. Clinchy, N. R. Goldberger, and J. M. Tarule, Women's ways of knowing: The development of self, voice and mind. (Basic Books, New York, 1997).*
- ⁵ *"Single-Sex Versus Coeducation Schooling: A Systematic Review," Executive Summary from the U.S. Department of Education, <http://www.ed.gov/rschstat/eval/other/single-sex/index.html> (accessed 12/30/06)*
- ⁶ *Irene Harwarth, Mindi Maline, Elizabeth DeBra, "Women's Colleges in the United States: History, Issues, and Challenges," <http://www.ed.gov/offices/OERI/PLLI/wbrep.html> (accessed 12/30/06)*
- ⁷ *Evelyn Gates, "A Scientific Point of View," Physics Today 59(4), 64 (April 2006), and references therein.*
- ⁸ *Letters to the Editor, "Women in physics: Why and why not?" Physics Today 59(12), 10 (December 2006).*

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 13-14.



BOOK REVIEW: *Out of the Shadows: Contributions of Twentieth-Century Women to Physics*

By Ernie Tretkoff, APS News Staff Writer

Despite the difficulties they faced, they made significant advances in physics, and some of these women also emerged as great leaders, mentors, teachers and advocates for women.

Women have made many significant contributions to physics, but very few are known. *Out of the Shadows: Contributions of Twentieth-Century Women to Physics*, edited by physicists Nina Byers and Gary Williams of UCLA, is a collection of essays describing the lives and work of 40 women who have made noteworthy contributions to physics, often overcoming severe discrimination to do so.

While a few of these women are famous, many are virtually unknown, and this book fills an important need in collecting their stories and bringing their contributions to light.

These 40 women are selected from the *Contributions of 20th Century Women to Physics* website (<http://cwp.library.ucla.edu>) which documents the contributions of 83 women in the 20th century. The subjects for this book were restricted to women who made their contributions between 1876 and 1976.

Each chapter is written by a distinguished physicist who in many cases is also a close colleague, friend or family member of the subject. These women's contributions span many areas of physics, including astrophysics, biophysics, mathematical physics, geophysics, particle physics, and nuclear physics.

In this volume one can read about familiar characters such as Marie Curie, who discovered the radioactive elements polonium and radium; Lise Meitner, who discovered nuclear fission while fleeing the Nazis; Maria Goeppert Mayer, who devised the nuclear shell model, and Vera Rubin, who discovered dark matter.

We also learn about Hertha Ayrton's improvements to electric arc lamps and her studies of vortices in water and air, which led her to develop a simple fan that could disperse poison gas in the trenches in World War I. Another fascinating but less well-known subject is Agnes Pockels, who spent much time cooking and cleaning in the kitchen, which led to her interest in soap and oil films. She studied how these films affect the water's surface, and devised an apparatus to study surface physics in her kitchen. Yet another interesting chapter describes Katharine Burr Blodgett's development of non-reflecting coatings for glass.

Many of these women, especially in the earlier part of the century, faced discrimination. Several worked as unpaid or poorly paid lab assistants or teachers, denied the opportunities men had to do research. Harriet Brooks, who made significant contributions to the study of radioactivity, including the first observation of the recoil of a decaying nucleus, was forced to give up her job teaching physics at Barnard College when she announced her intention to get married. Nuclear physicist Marietta Blau suffered severe discrimination and exile as both a woman and a Jew during the period the Nazis were in power. Later in the century, particle physicist Sau Lan Wu

was denied entry to several graduate schools because she was female, and as the only woman in the class at Harvard in 1964, she couldn't study with her male peers because she wasn't allowed to enter the men's dorms, where they did homework.

Several of these women married other scientists, but then found they were unable to get jobs because anti-nepotism laws prevented their husband's university or lab from hiring the women as well. Even those who could get jobs have often faced difficulty combining work and family, as many women in physics still do today. They were frequently not given credit for their work. Despite the difficulties they faced, they made significant advances in physics, and some of these women also emerged as great leaders, mentors, teachers and advocates for women. But for the most part the essays downplay or ignore their struggles and focus on the woman's research.

Each chapter is divided into two sections, the first explaining the woman's major discoveries, the second giving some brief biographical information. In many cases this forced division of the chapters into these two sections seems unnatural; taking the woman's work out of the context of her life makes some of these essays confusing, redundant, or both.

In many of these essays, the woman's research is clearly explained in an accessible style, but in a number of chapters the subject's research is described in technical language that could only be understood by an expert in the field, and thus it is sometimes difficult for a non-expert to fully appreciate the significance of the woman's contribution.

Some of the biographies offer an insightful glimpse at a woman's character and secrets of success. But many of the biographies are dull, simply listing positions held, places lived, and honors received, but not giving any sense of the woman's personality. Such biographies are informative, though not inspiring, which is unfortunate, since many of these women surely have fascinating stories that have been left out of this volume.

Overall, *Out of the Shadows* is a solid reference volume that would make a great starting place for a student doing a report, and the book will hopefully motivate readers to find out more about some of these amazing women.

Physics is still male-dominated, but that is slowly changing. *Out of the Shadows* had to stop at 1976. After that date there were simply too many worthy, accomplished women to choose from. Hopefully one day soon we will find more women included in anthologies of great physicists and women will be recognized simply as physicists, not as women physicists. Until then, books like this one serve an important purpose in recognizing the accomplishments of women who have gone unnoticed.

The American Physical Society 2006-2007 Travel Grants for Women Speakers Program

Limited funding is available for the
2006-2007 academic year!
Apply online at
[www.aps.org/programs/
women/speakers/
travel-grants.cfm](http://www.aps.org/programs/women/speakers/travel-grants.cfm)

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 2006-2007 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/programs/women/speakers/enroll.cfm. 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/programs/women/speakers/travel-grants-app.cfm) 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:
www.aps.org/programs/women/speakers/index.cfm.

Women physicists who would like to be listed on the Women Speakers List or those who would like to modify their existing entries can do so at:
www.aps.org/programs/women/speakers/enroll.cfm or see page 15.

APS has a companion program for minority speakers. Information on the Minority Speakers List and the Travel Grant Program for Minority Speakers can be found at:
www.aps.org/programs/minorities/speakers/index.cfm.

2006-2007 TRAVEL GRANTS FOR WOMEN SPEAKERS

◆ APPLICATION FORM ◆

This form is also available on the Internet at www.aps.org/programs/women/speakers/travel-grants-app.cfm

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

Please list information on the speakers below and 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: _____		
SPEAKER'S NAME: _____		
HOME INSTITUTION: _____		
HOME DEPARTMENT: _____		
ADDRESS: _____		
CITY: _____	STATE: _____	ZIP: _____
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

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 ___	1 ___	Accelerator Physics
3 ___ Inactive/Unemployed		2 ___ Applied Research	2 ___	2 ___	Acoustics
4 ___ Long-term/Permanent Employee		3 ___ Basic Research	3 ___	3 ___	Astronomy & Astrophysics
5 ___ Post Doc./Research Assoc.		4 ___ Committees/Professional Org.	4 ___	4 ___	Atomic & Molecular Physics
6 ___ Retired		5 ___ Computer Programming	5 ___	5 ___	Biophysics
7 ___ Self-Employed		6 ___ Development and/or Design	6 ___	6 ___	Chemical Physics
8 ___ Student Full Time		7 ___ Engineering	7 ___	7 ___	Computational Physics
9 ___ Student Part Time		8 ___ Manufacturing	8 ___	8 ___	Computer Science
10 ___ Teaching/Precollege		9 ___ Proposal Preparation	9 ___	9 ___	Condensed Matter Physics
11 ___ Other (please explain)		10 ___ Teaching - Secondary School	10 ___	10 ___	Education
_____		11 ___ Teaching - Undergraduate	11 ___	11 ___	Electromagnetism
_____		12 ___ Teaching - Graduate	12 ___	12 ___	Electronics
		13 ___ Technical	13 ___	13 ___	Elementary Particles & Fields
		14 ___ Technical Sales	14 ___	14 ___	General Physics
		15 ___ Writing/Editing	15 ___	15 ___	Geology
	16 ___ Other (please specify)	16 ___	16 ___	Geophysics	
	_____	17 ___	17 ___	High Polymer Physics	
	_____	18 ___	18 ___	Low Temperature Physics	
		19 ___	19 ___	Materials Science	
		20 ___	20 ___	Mathematical	
		21 ___	21 ___	Mechanics	
		22 ___	22 ___	Medical Physics	
		23 ___	23 ___	Non-Physics	
		24 ___	24 ___	Nuclear Physics	
		25 ___	25 ___	Optics	
		26 ___	26 ___	Physics of Fluids	
		27 ___	27 ___	Plasma Physics	
		28 ___	28 ___	Quantum Electronics	
		29 ___	29 ___	Solid State Physics	
		30 ___	30 ___	Space Physics	
		31 ___	31 ___	Superconductivity	
		32 ___	32 ___	Surface Science	
		33 ___	33 ___	Thermal Physics	
		99 ___	99 ___	Other (please specify)	

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:

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.

Women Speakers List (WSL)

Enrollment/Modification Form 2006–2007

Additions/Modifications may also be made on the Internet at www.aps.org/programs/women/speakers/enroll.cfm
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: _____

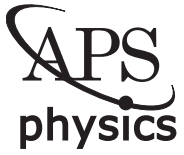
New Entry Modification

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

Middle school High school General Audiences Colloquium

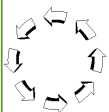
To register a new title, give the title as you want it to appear in the left column below. Then check the section(s) where it is to be inserted. To delete a title, indicate the title and check the appropriate box below. A limit of four total entries will be imposed. You may use additional pages if you 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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