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CSWP Gazette

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

INSIDE

Letter from the Editor

By Alice E. White, Bell Laboratories, Lucent Technologies

Welcome to the Fall 1999 issue of the CSWP Gazette! I've just returned from a wonderful weekend on Nantucket, where I accepted the Maria Mitchell Association Women in Science Award on behalf of the Bell Laboratories Graduate Research Program for Women (see accompanying article). The ceremony was very moving, with inspirational talks by Mara Alper, founder of the award and, until recently, curator of the Maria Mitchell Museum, Paula Rayman, an economist and Director of the Radcliffe Public Policy Institute, and Betty Letvin, director of the Math/Science Network, which is located at Mills College. I found the Maria Mitchell Association to be a group of dedicated, thoughtful people who, through their individual contributions, were making a real difference. Paula Rayman made the excellent point that, although the legislation has been passed to allow women equal access, there is still a very long way to go. Awards like the Maria Mitchell Award help to promote awareness by recognizing programs that are effectively addressing the problems. The ceremony was followed by a buffet dinner in Hinchman House, part of the Maria Mitchell complex, which includes her birthplace and her observatory. After dinner, they opened the observatory and we had a chance to view Jupiter and 4 of her moons through the telescope that Maria Mitchell used. What a thrill!

I hope that you will enjoy the other articles in this issue of the Gazette. Meera Chandrasekhar, who recently won one of the 1999 Presidential Mentoring Awards, describes the Newton Summer Science Academy, another program that is seeking to interest more girls in science. Monica van der Garde discusses the situation for women in the Netherlands and an initiative by FOM to improve things. Ann Orel shares what she has learned about childbearing leave policy as applied at her institution, UC Davis. Meg Urry reviews the history behind the Baltimore Charter and has some thoughtful recommendations for positive action. Finally, Stew Gilmor gives us an historical perspective with his article on the teaching of physics at women's colleges a hundred years ago.

As a new member of the CSWP, I've been impressed with the energy and dedication of the people on the committee. Issues that are being considered include broadening the site visit program to national labs, childcare at APS meetings, the roster of women and minorities in physics, and increasing visibility for women throughout the APS. We discussed possible venues for the Women in Physics display that was created for the Centennial meeting and encourage suggestions. In addition, the CSWP supports and advises Judy Franz and the Council on issues involving women, including the creation of a IUPAP Working Group on Women in Physics. As always, we welcome your input and your involvement!

Presidential Award Honors Meera Chandrasekhar

Dr. Meera Chadrasekhar of the University of Missouri, Columbia recently received one of the 1999 Presidential Awards for Excellence in Science, Mathematics and Engineering Mentoring.

In 1992, Dr. Chandrasekhar developed Exploring Physics, an afterschool program to introduce physics to female students in grades 5-7. It has grown to be part of elementary schools' curricula, impacting about 300 students annually. While maintaining an active research laboratory where she studies the optical characteristics of semiconductors, Chandrasekhar also developed three additional programs: (i) Families Exploring Science and Technology, where students in grades 6-7 and their parents build a drawbridge; (ii) Saturday Science, students in grades 8-9 visit local industrial sites and participate in hands-on activities; and (iii) Newton Academy, a ten-day residential science and technology program for female students in grades 9 through 11 (see story on page 10).

Ten individuals and five institutions were honored this year. The mentoring awards recognize those whose personal and organizational activities have increased participation of underrepresented groups in mathematics, engineering and science from kindergarten through graduate level.

Both the individual and the institutional awards, which are administered and funded through the National Science Foundation (NSF), include a $10,000 grant which is to be directed back into the recognized mentoring activity, and a Presidential commemorative certificate.

Newton Summer Science Academy

New Experiences for Women in Science and Technology

By Meera Chandrasekhar and Rebecca Litherland

The goals of the Academy are to provide hands-on integrated physical science experiences for female students.

The Newton Summer Science Academy is a ten-day residential institute for young women who have completed grades 9-11. It is held on the campus of the University of Missouri in Columbia, and is part of a project entitled *Promoting Young Women in the Physical Sciences*, funded by the National Science Foundation. While other programs in this project focus on students in grades 5-9, the Newton Academy is geared toward female high school students.

The goals of the Academy are to provide hands-on integrated physical science experiences for female students, opportunities to meet women scientists who may serve as role models, and a peer group of female students who are interested in the physical sciences. The academy staffs are university faculty and graduate students from the departments of Chemistry, Physics, Math and Industrial Engineering, and Science and Industrial Technology teachers from local schools. Female graduate and undergraduate students serve as live-in counselors. The 1997 and 1998 academies were offered at no cost to the participants, while the 1999 academy charges a modest fee. Recruitment brochures are distributed to students through area science teachers. The academy is limited to 40 participants, and is targeted to students in an 80-mile radius around Columbia. However, students from outside the area are accepted on a space-available basis. About two thirds of the students are rising sophomores, and the rest are divided between rising juniors and seniors.

Photo courtesy of Merra Chandrasekhar

(Left to Right): Sarah Heerboth, Kari Childers and Heidi Beardslee at the Newton Summer Science Academy for female students in grades 9-11, July 1998.

Realizing that the students use many products on a daily basis, but rarely appreciate the multiple components that are required to produce them, the Newton Academy has them design and build a polymer ball toy factory in order to learn about the integration of physics, chemistry, math, engineering and business. While the basic ingredients of the polymer balls are simple and familiar (gel glue and borax), the automation of a production line requires an unexpected array of conceptual and hands-on skills. Students encounter:

- **Mathematics** in determining the optimal mix of glue and borax required getting the highest bounce out of their balls. This problem is solved graphically.
- **Engineering** in designing their systems and in factory layout.
- **Physics** in the construction of a material handling system that involves gears, pulleys, circuits, switches, and motors.
- **Chemistry** in understanding polymers, acid-base chemistry, absorbance spectrophotometry, and waste generation.
- **Economy** and **cost-benefit analysis** in budgeting materials needed to build their factory. Students purchase items they need from a construction store with Newton dollars.
- **Legal issues** of intellectual property in posting and buying patents of equipment they have designed.

The students are grouped in teams of four. Each team is named after a prominent woman scientist or engineer and builds its own factory. The first five days of the academy are spent on hands-on chemistry, math and physics "lessons", focusing specifically on aspects that are relevant to polymer balls and mechanization. A very popular preparatory activity is to take apart Xerox machines, typewriters and stereo equipment, using reverse technology to understand the design and layout of an instrument. Students eagerly salvage small devices, particularly gears, motors, and pulleys, and paper feeders for conveyor belts. They also tour real assembly lines to collect design ideas for their factories. They visit the University's Engineering Manufacturing Laboratory (which has a basic conveyer belt and a programmable robot) and a manufacturing facility (Cheeseborough Ponds' Unilever in 1997, Sigma Chemical in 1998).

After these preparatory activities, the hard part is to reign in the urge to start building right away and to design the factory first. Engineering design is a new concept to many

students, and provides them an unexpected learning experience. Part of a weekend is spent drawing plans for the factory, assisted by design consultants (an industrial technology teacher and a "handy" graduate student). Teams present their designs to the faculty and other teams, which is a wonderful sharing experience, allowing students to question and critique their peers in an unusual domain.

Evening sessions feature e-mail training, team building, self-esteem, and gender awareness activities. Students view the Dateline NBC video featuring the Illinois Math and Science Academy all female physics course and discuss their experiences as females in math and science classes. They also view excerpts of women scientists' talks from the December 1995 NSF Women in Science Conference.

Two activities outside the classroom stood out as the highlights of the 1998 academy. The first was a weekend visit by Bridget Landry, Systems Engineer at the Jet Propulsion Laboratory in Pasadena, who spoke to the students on the Mars Pathfinder Mission. Ms. Landry is also a science fiction fan, and a screening of the movie 'Contact' and a discussion of science fiction themes followed her talk and dinner. The second was a formal dinner with local women scientists and engineers, and several university and school system administrators. The dinner featured a presentation by a woman engineer from a local company. Students invariably express surprise that there are "so many" women in science and engineering professions.

On the last day of the academy, families are invited to pizza and a demonstration of the factories. We find that each factory has a unique design. Some factories focus on mixing and extruding, others on rolling and packaging. Some are vertical, others horizontal and still others glitter with lights. Color and glitter in the polymer balls is a major theme. Students sell their polymer balls to their families, who are provided with Newton dollars for that evening — a big hit among the younger siblings!

- The response to the academy has been overwhelmingly positive. From responses immediately following the academy and interviews conducted four months later, the highlights repeatedly mentioned are the female peer group and the day with the JPL visitor. Enduring benefits for the students include an increase in confidence level and participation in science classes, and the positive impression of the many female scientists they met during the academy.

The University faculty found the first academy to be a major learning experience. We found that factors that were crucial to the success of the academy were:

- Collaboration among different departments, starting at the planning stage.
- Collaboration with the school district and involvement of classroom teachers in recruitment, planning and running the academy.
- A full-time person coordinating the activities of the academy. An equivalent of at least two months of full-time planning was necessary, starting about five months before the academy.
- Keeping the time commitment reasonable for collaborating faculty.
- A particular regard to making the application obvious to students teaching the lesson: this is particularly important in a short academy that integrates several disciplines.
- Activities where students could meet professionals in a social environment.

We are currently in the process of following up on students and the career paths they have chosen. We are aware of a few young women who intend to enter Engineering programs. Since the bulk of the students are still in high school, we will not know of the final impact of the academy for a few years.

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Have you moved? Changed jobs? Changed fields? Take the time now to update your name/address/qualifications on the Roster of Women in Physics (this database also serves as the Gazette mailing list). See pages 15-16.

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