CSWP

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Gazette

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

A NOTE FROM THE EDITOR

The main feature of the *Gazette* this month is the Colloquium Speakers List. The list is substantially expanded from the last one, now encompassing 157 registered speakers.

It is also expanded in a more substantive sense, due to the recently announced program of "Travel Grants for Women Colloquium Speakers." A separate article in this issue of the *Gazette* gives details on this program, and an announcement is also included in the pages of the CSL itself, in order to accomplish a more comprehensive distribution of the information. The CSL will be available from APS headquarters as a separately printed booklet.

The editor for this issue is Ken Lyons; assistant editor is Amy Halsted.

In This Issue:

We also have instituted a new section of the *Gazette* with this issue, entitled "Research of Current Interest." The initial offering under this title, by Cherry Murray of AT&T Bell Laboratories, appears on the back page of this issue. We welcome reader comment on this new addition.

Ken Lyons
Editor, CSWP *Gazette*, October

[The following article has been reprinted with permission from the author and has appeared in *Physics Today*, Vol. 43, No. 5, May, page 77 (1990)].

ON MATHEMATICS AND SCIENCE EDUCATION IN THE U.S. AND EUROPE

by Chiara R. Nappi*

In the last few years the deficiencies of U.S. education in mathematics and science have come into clearer focus. In high school, U.S. students lag behind students in most European (as well as some Asian) countries in terms of math and science performance. In college, six out of ten students who enroll with the intent of pursuing a scientific career end up switching to a nonscience major. At the Ph.D. level, half of the graduate students in math and science are foreigners.

This situation has raised much concern. It is felt by many national leaders that unless things change, the U.S.'s economic standards will follow those of the test scores. A shortage of scientists and engineers in the coming decade is already predicted, and it is argued by many that one way the U.S. can meet these future demands is to get more women and minorities into science. The problems experienced by women and minorities in math and science also are well known. Girls consistently score between 40 and 50 points lower than boys on the math section of the SAT test. Blacks account for 2% of all employed scientists and engineers, while they represent 10% of the U.S. work force. Women account for 15% of scientists and engineers (up from 9% in 1976, mostly due to the influx of foreign female Ph.D.s), but they are 44% of all employees.

There is, however, a point that has not been made: The participation of women in math and science seems to be worse in the United States than it is in Europe. There, the difference between boys' and girls' performances in math and science in high school final exams is less dramatic.[1] In European colleges, enrollment of men and women in math and science courses is more balanced. And, although most women science majors opt to become math or science teachers in middle or high school, the percentage of women in research and academia—up to 20%—is higher than it is in the United States.[2]

The reasons behind these phenomena are many and complex. It is, however, enlightening to point out some of the differences between the educational systems in the U.S. and Europe that may explain these differences. Indeed, comparing methods can be more informative than just comparing test scores.

First of all, up to middle school, the study of math and science (especially math) proceeds at a much slower pace in the U.S. than in Europe. For instance, the first two years of math—

WOMEN IN PHYSICS DEGREE PROGRAMS CONFERENCE
2–3 November 1990

see page 3

The "CSWP GAZETTE," a quarterly newsletter of the American Physical Society Committee on the Status of Women in Physics (CSWP), is mailed free of charge to all women listed on the computerized "Roster of Women in Physics," all US physics department chairs, and others on request. Because editorial responsibility rotates among CSWP members, please address all correspondence to: "CSWP Gazette," The American Physical Society, 335 East 45 St., New York, NY 10017.

usually called "algebra 1" and "geometry"—taken by the average American high school student mostly cover topics that European children learn in middle school. Because a majority of American high schools only require one or two years of math to graduate, many students never take a math course beyond algebra 1 or geometry. In other words, a student can graduate from an American high school knowing only as much math as a middle school student in Europe.

A consequence of this approach is that the amount of mathematics that foreign high school students learn over four or five years is concentrated in the last two years of high school in the U.S. These math courses are therefore necessarily very fast-paced and intensive. Moreover, they are usually elective, or optional, courses. It is not surprising that a good 50% of American students give up and content themselves with only fulfilling the minimal requirements. By doing so, however, these students, typically aged only 15, have virtually precluded themselves from pursuing math or science in college. Indeed, to be a science or math major in college, one must at least study trigonometry (and maybe precalculus), usually a fourth-year math course in high school. It is this lack of a good high school background that is responsible for the 60% of U.S. college science students who switch to nonscience majors.

There is no doubt that such a system places American students at a disadvantage with respect to students abroad. The approach in Europe is more systematic and steady in math and science, as in all other subjects: Students start studying math and science at an earlier age and proceed through high school at a more relaxed pace. In the lower grades, while basic math and problem-solving skills are mastered, concepts of higher-order mathematics also are introduced. In high school, there are no crash courses. For example, most American high school students study algebra intensively for a whole year, with daily classes on the subject, only to drop it the following year to concentrate on another subject, such as geometry, for another intense full year. But in Europe these subjects are studied in parallel over several years. Likewise, the physics that American students are supposed to learn in a year is spread over three or four years in Europe. Concepts in math and science need to be assimilated, and that takes time. European high school students study physics, chemistry, biology, and mathematics every year. The amount that they study varies from one type of high school to another, but they all must take these subjects every year.

The point I want to make is the following: *If courses are unnecessarily tough, and moreover optional, students do tend to opt out.* The teenage years are particularly critical. Boys and girls undergo so many physical and emotional changes that it is unwise to place too much pressure on them just then. It is the time when gender roles and stereotypes really sink in. Especially in the United States, there is a great deal of pressure on girls to concentrate on being socially successful. Moreover, stereotypes can have an unhealthy influence in an educational system like the American one. For example, the preconceived notion that girls and blacks are less capable in math and science than their white male peers may explain why girls and blacks are less likely to enroll in optional high school math and science courses; this in turn contributes to the disparate SAT results mentioned above. It is well known that these problems start in high school and that there is no significant difference between boys' and girls' performances in math and science up to eighth grade.[3] Further, as observed previously, girls in European high schools do seem to perform better than their American counterparts. It is not that stereotypes or gender roles do not exist in Europe. They do. However, in more structured educational systems like those in Europe, there is much less room for stereotypes to have an effect. No matter how you envision your role in life, you still need to know a required amount of math and science before you get out of high school. And because courses are not made unnecessarily intense and demanding in European schools, all students can handle them better, in spite of some inevitable teenage crises.

The American educational system, which is generally perceived as a more liberal system and therefore a more desirable one, is actually very selective. It selects the very talented and self-motivated students, those who would do well in any system. But it does not give a fair chance to the others; it simply neglects them. Many students, if properly and systematically educated, can blossom into the technicians and the competent teachers that the society needs. A social consideration is important here: An educational approach based on difficult and elective courses tends to discriminate against lower-class children, who often do not have the supportive home environment that would channel them toward math and science and help them through these subjects.

Another difference that might be relevant is that the educational system is highly decentralized in the U.S., while it is state-regulated in Europe. In Italy, for instance, the same curriculum is

AIP/AAPT/APS COSPONSOR CONFERENCE ON RECRUITMENT AND RETENTION OF WOMEN IN PHYSICS

As *Gazette* readers are well aware, there is a serious underrepresentation of women at all stages of the physics education pipeline and in physics careers. In response to these disturbing patterns, the physics department chairs participating in the 1989 AAPT Topical Conference on "The Future of U.S. Doctoral Physics Programs" recommended that graduate physics departments increase their efforts to address the problems of attracting and retaining women and minorities. The chairs also recommended that the AAPT, APS, and AIP take leadership roles in helping physics departments address this issue.

As one response to these serious concerns, the three organizations are jointly sponsoring a conference on "Recruitment and Retention of Women in Physics." The conference will take place on 2–3 November 1990, at the facilities of the National 4-H Council in Chevy Chase, MD. The conference steering committee is cochaired by Roman Czujko of the AIP Employment and Education Statistics Department and by Mary Fehrs of Pacific University. Fehrs is chair of the AAPT Committee on Women in Physics.

At the conference, invited speakers will present background information on formal programs and informal activities that encourage women to enter and remain in physics at the undergraduate and graduate student levels. Interested faculty and students are encouraged to attend, whether or not their departments are currently engaged in such efforts. Considerable time will be set aside for the discussion of issues, outcomes, and strategies for effecting positive change.

Among the principal goals of the conference is the development of a set of recommendations on how to attract women into physics and keep them in the field. Work will also begin on booklets for undergraduate and graduate women to help prepare them for life in graduate school. The conference proceedings will be published as a resource manual for those departments that do not have programs for women and are unsure of what strategies to try.

Full or partial support for travel and attendance will be offered to a limited number of participants. Applications for support from women students and women faculty are especially sought. Persons interested in attending the conference should write a brief letter of application including a description of their background, reasons for attending, level of support needed (if any), and whether support will determine attendance.

Send letter of application to Topical Conference on Recruitment and Retention of Women in Physics, AAPT Executive Office, 5112 Berwyn Road, College Park, MD 20740. **LETTERS OF APPLICATION MUST BE RECEIVED BY 1 OCTOBER 1990.**

used all over the country. Children of the same age study the same topics in all subjects at about the same time. The Italian system has proved to be a powerful social equalizer: During the course of one generation, it has leveled enormous cultural differences between north and south, men and women. A national curriculum has the advantage that results do not depend too heavily on the particular geographical area, school district or even the teachers' level of competence. It is also much easier to restructure or change the curriculum in a more centralized system. Part of the problem that the U.S. faces in math and science education is to reconcile local authority with national needs.

In Europe, teaching is perceived as a desirable job for which one must be highly qualified. Teachers are government employees, with decent state-regulated salaries (the same for men and women), benefits, pensions, and maternity or family leave. A teacher needs a university degree in the appropriate field—math, physics, chemistry, or biology—to teach the subject in middle or high school. Because most European students choose their field of specialization before they enroll in college, prospective teachers take only courses in their subject or in closely related ones. By the time they graduate from college, they are highly qualified to pursue their teaching careers. This contrasts with the situation in U.S. high schools, where apparently one in three physics teachers and one in five chemistry teachers are not trained in those disciplines.[4]

In conclusion, U.S. students' performance in math and science could be highly improved by a more systematic approach to math and science teaching. One of the main problems at the moment is that U.S. schools tend to start teaching math and science too late, and therefore much too fast, with the result that teenagers are driven away from the *optional* math and science courses. This approach hurts everyone, but its most serious impact is on women and minorities. A change would represent an important step toward equality in education and society.

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*Chiara Nappi is a theoretical physicist at the Institute for Advanced Study in Princeton, New Jersey. She was born and educated in Italy. This column is excerpted from a talk delivered at the 13 January meeting of the Princeton chapter of the American Association of University Women.

References

[1] "Everybody Counts: A Report to the Nation on the Future of Mathematics Education," Natl. Acad. P., Washington, DC (1989).

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[3] G. Hanna, in *Mathematics, Education, and Society*, C. Keitel, P. Damerow, A. Bishop, P. Gerdes, eds., UNESCO, New York (1989), p. 134.

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REVIEW: *Beamtimes and Lifetimes* by Sharon Traweek

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Preface. It is a pleasure to review Sharon Traweek's book, *Beamtimes and Lifetimes*. As a postdoc at SLAC, I was one of the physicists interviewed by Traweek. I was a physicist at SLAC from 1973 until 1989, when I left to join the faculty at Indiana University. I worked on the MARK I detector at SPEAR and on the MARK II detector at SPEAR, PEP, and the SLC. I am now working on an SSC detector while continuing research in e^+e^- physics. I recently visited KEK in connection with the SSC work. Our SSC collaboration includes a large group of Japanese high-energy physicists, so I was also very interested in Traweek's observations on the differences between Japanese and American high-energy physicists.

Beamtimes and Lifetimes is based on anthropologist Sharon Traweek's studies of high-energy physicists, primarily in the United States and Japan. Her fieldwork was conducted over a five-year period beginning in 1972 at the National Laboratory for High Energy Physics (KEK) at Tsukuba, Japan, the Stanford Linear Accelerator Center (SLAC) in California, and the Fermi National Accelerator Laboratory (Fermilab) near Chicago. She also visited other laboratories and several university physics departments.

High-energy physicists may seem like an unlikely subject for an anthropologist's study. However, in reading *Beamtimes and Lifetimes*, one can understand that they do indeed form a community with a certain culture—a shared set of traditions, beliefs, and behavior. This community has an international character since high-energy physicists work and communicate with each other from all over the world. There are interesting variations in the culture in different countries, which Traweek describes for U.S. and Japanese physicists.

Traweek concentrates on three key symbols of the high-energy physics culture: the experience of time, the artifacts called detectors, and the common way of thinking (she says this is sometimes called "realism"). She focuses on two particular activities: the training of young physicists and the management of changes in the laboratories. Throughout the work the themes of gender and national culture are visited. These two are not separate: high-energy physics is dominated by men all over the world but the "masculine" and "feminine" personalities may in fact be opposite in two different countries.

An entire chapter is devoted to the description of high-energy physics detectors. This is probably appropriate since these devices are what make the physics possible. The high-energy physics groups spend years designing, building, commissioning, and then doing physics with them. They serve as the focus of the group effort. However, Traweek describes only three detectors at SLAC (End Station A, LASS, and MARK I, with an introduction about bubble chambers) and one at KEK, and draws rather general conclusions. She should have mentioned some detectors at Fermilab and CERN for more generality. I personally have trouble with the idea that the detectors embody so much of the "groups' models for scientific method." These detectors are all designed to do specific physics in very different environments, taking into account practical considerations, such as funding and availability of other resources. But then, I am surely biased since I spend my life on these detectors.

The chapter on the training of young high-energy physicists in the United States and Japan is very well done, and is, unfortunately, on the whole, quite accurate. This chapter is entitled "Pilgrim's Progress: Male Tales Told During a Life in Physics." Particularly interesting is the description of the postdoc double-bind: they must do meticulous, generally unrewarded work on the detector or software, excellent physics, and at the same time show independence, a "careful form of insubordination." Concern with social and psychological values, such as how to get along with other people, is considered unscientist-like. "Social eccentricity and childlike egoism are cultivated displays of commitment to rationality, objectivity, and science."

Many American postdocs are afraid to ask questions, fearing that they will "come across as uninformed or even stupid if they did." An experimentalist is quoted as saying that "he believed that a successful postdoc had to be rather immature: a mature person would have too much difficulty accepting the training without question and limiting doubts to a prescribed sphere. He felt that this precondition kept most women and minorities from doing well: their social experience had taught them to doubt authority only too thoroughly."

She quotes a Nobel Prize lecture, which shows a rather negative and immature view of women: ". . . And, like falling in love with a woman, it is only possible if you do not know much about her, so you cannot see her faults. The faults will become apparent later, but after the love is strong enough to hold you to her. So, I was held to this theory, in spite of all difficulties, by my youthful enthusiasm. . . So what happened to the old theory that I fell in love with as a youth? Well, I would say it's become an old lady, who has very little that's attractive left in her, and the young today will not have their hearts pound when they look at her anymore. But, we can say the best we can for any old woman, that she has been a very good mother and has given birth to some very good children. . . ."

In Western culture, especially in the United States, the traits associated with successful high-energy physicists are male characteristics in the extreme: "independence in defining goals, deliberate and shrewd cultivation of varied experience, and fierce competition with peers in the race for discoveries." But interestingly, in Japan, Traweek states, these are the qualities associated with professionally active *women*, not men! However, these are not the characteristics of successful Japanese high-energy physicists.

"Women are seen as not sufficiently schooled in the masculine virtues of interdependence, in the effective organization of teamwork and camaraderie, commitment to working in one team in order to complete a complex task successfully and consulting with group members in decision making, and the capacity to nurture the newer group members in developing these skills." In fact, there are very few women high-energy physicists in Japan.

Traweek also contrasts the process of decision making within SLAC and KEK. At SLAC, although the style is informal, the group structure is hierarchical. Decisions are made at the top without consulting the lower echelons of physicists. At KEK, by contrast, groups have more of a tendency to make decisions by the consensus of everyone in the group, after much discussion. The following account was given, which contrasts both the training of young high-energy physicists and the decision-making process in Western countries and Japan. A young physicist from KEK who spent two years working in a European laboratory commented that he was "disturbed by various events he observed. He noted that many students who were very bright and talented were forced to take positions in industry because their professors had taken a personal (not intellectual or political) dislike to them, a dislike that appeared quite arbitrary and unscientific. . . . He was incredulous at the injustice he perceived. He was startled by the power of the group leaders. New projects were adopted only if a senior physicist chose to become involved. Decisions were made by senior people alone, and younger people were informed of these decisions only if they were on close terms with the decision-makers. Since his return to Japan, he has appreciated more fully the freedom, responsibility, and independence granted young physicists there." Traweek says that she heard this sentiment expressed many times.

After reading this book, one might wonder why anyone would want to become an experimental high-energy physicist. Perhaps it is difficult for an anthropologist to understand, certainly to be able to put into words, the excitement of the field, in spite of the difficulties. Also, Traweek had a rather narrow perspective. SLAC was her primary model for Western high-energy physics. The situations at other Western laboratories, for example, Fermilab, Cornell, DESY, and CERN, are undoubtedly different in many aspects. The majority of high-energy physicists in the United States are members of university groups. At SLAC, the laboratory physicists dominate over those from the outside universities, and this was particularly true during the time of the fieldwork. University physicists have more influence in laboratories such as Fermilab.

It is too bad that the book was not published ten years ago. SLAC, as well as the rest of the world of high-energy physics, has changed a great deal since the time of the fieldwork described here. Traweek gained a deep understanding of high-energy physicists during her work. I was surprised at how much I agreed with. I wonder whether she is still interested in doing work with this subject. As we high-energy physicists embark on the SSC era, there will be great changes in the way we do our work. Perhaps Sharon Traweek would be interested in continuing her studies.

CSWP ANNOUNCES "TRAVEL GRANTS FOR WOMEN COLLOQUIUM SPEAKERS" PROGRAM

The CSWP is pleased to announce the new "Travel Grants for Women Colloquium Speakers" program, designed to raise the visibility of women physicists in academia. The program offers two types of grants to physics departments that have more than one woman colloquium speaker in an academic year. By encouraging universities to invite more women as colloquium speakers, these women will be seen and known by students and faculty at institutions in additon to their own.

Program *A* reimburses up to $500 for travel expenses for the second of two women speakers in an academic year. Program *B* awards a grant of $1000 to departments having more than one-third women physics colloquium speakers in an academic year. A department may apply for either program, but not both.

By using this program a physics department can hear distinguished colloquium speakers, provide role models for women students, and supplement its travel budget. The CSWP Colloquium Speakers List makes it easy to choose and contact women speakers. Application forms for both types of grants are in this issue, and also have been sent to physics department heads.

Programs funds are limited and applications will be considered in the order in which they are received. Note that applications may not be filed until women speakers have actually spoken, so it may be an advantage to schedule them early in the year. The 31 January 1991 deadline for applications will be extended if program funds are still available.

The CSWP hopes that *Gazette* readers in academia will encourage physics departments to take advantage of the "Travel Grants for Women Colloquium Speakers," and welcomes comments on the program's utility.

AAAS PUBLICATIONS AVAILABLE

The AAAS Directorate for Education and Human Resources has released several publications which may be of interest to *Gazette* readers.

* *Equity, Excellence, & Just Plain Good Teaching.* By April L. Gardner, Cheryl L. Mason, and Marsha Lakes Matyas. This monograph examines ways to encourage young women to participate in science studies and careers. Types of curricula and teaching techniques are reviewed.

* *Looking into Windows: Qualitative Research in Science Education.* Edited by Marsha Lakes Matyas, Kenneth Tobin, and Barry J. Fraser. This monograph includes papers on teachers as researchers, on elementary and secondary science classrooms, and on exemplary science and mathematics teaching.

* *Marriage, Family, and Scientific Careers: Institutional Policy Versus Research Findings.* Edited by Marsha Lakes Matyas, Lisa Baker, and Rae Goodell. This monograph focuses on the problems faced by professional families, what current research says about family and child care issues, and institutional and federal responses to family issues.

* *Graduate School in Science and Engineering: Tips for Students and Faculty* and *Life After Graduate School: Tips on Finding a Postdoctoral Appointment.* These two resource sheets provide practical tips for undergraduate and graduate students (and their advisors) on financial aid, how to choose a thesis advisor, and how to prepare for and find a good postdoctoral appointment (or first job).

Single copies of each monograph are free; write to Marsha Lakes Matyas, AAAS, 1333 H Street, N.W., Washington, D.C. 20005-4792.

ERRATUM

In the most recent issue of the *Gazette* (June 1990, Volume 10, Issue 2), it was erroneously reported that the panel on Faculty Positions for Women was created in 1986. In fact, the Panel began its work in the academic year 1982–83. Apologies to those dedicated individuals who worked on the panel in its early years.

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PHYSICS COLLOQUIUM SPEAKERS LIST

compiled by the

COMMITTEE ON THE STATUS OF WOMEN IN PHYSICS

August 3, 1990

Sec. I:	Speakers by geographic area, with address and phone numbers.
Sec. II:	Talk titles by physics subfield, with speakers' names and affiliations.

Travel Grants Available for Women Colloquium Speakers

The CSWP has recently announced a grant program to encourage schools to invite female physicists as colloquium speakers. See details at end of CSL listing.

I. PHYSICS COLLOQUIUM SPEAKER INFORMATION, 1990/1991

This first section lists speakers, with addresses and phones, by geographic area (alphabetically within each subsection), together with references to the sections where talk titles appear. The symbol '*' identifies those listed in the section for GENERAL AUDIENCES. The symbol '+' denotes individuals who have indicated an interest in working with high school (h+) or middle school (m+) students, where the '+' alone indicates both. The section abbreviations in brackets are used for reference in the second section.

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II. COLLOQUIUM TITLES BY FIELD

This second section lists the speakers and titles, grouped by physics subfield and alphabetically by speaker within each group. Refer to the first section for address and phone information on the speakers. The two-character abbreviation after each name refers to a geographic region in the first section.

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Dr. Eva Bozoki, Brookhaven [NE]
1. *Synchrotron radiation and its use*

Dr. Ling-Lie Chau, UC Davis [SW]
1. *Frontiers in particle physics*

Dr. Gail G. Hanson, Indiana Univ. [MW]
1. *Physics and detectors at the superconducting supercollider*

Dr. Andrea Palounek, LBL [SW]
1. *Physics and detectors at the SSC*

Dr. Cynthia A. Volkert, AT&T [NE]
1. *Damage produced in silicon by high energy ion beams*

Dr. Dorothy S. Woolum, Calif. State-Fullerton [SW]
1. *Trace element microdistribution analysis by PIXE*

ASTROPHYSICS

Dr. Fran Bagenal, U. of Colo. [MW]
1. *The peculiar role of Io in the magnetosphere of Jupiter*
2. *Voyager explores the magnetospheres of the giant planets*

Dr. Sallie Baliunas, Ctr. for Astrophysics [NE]
1. *Solar and stellar magnetism*

Reta Beebe, NM State [SW]
1. *Winds and clouds of the giant planets*
2. *The Voyager exploration of the giant planets*

Dr. Bonnie J. Buratti, Caltech/JPL [SW]
1. *The icy satellites of Jupiter and Saturn*
2. *The Mars observer mission: Return to the red planet*

Dr. Bel Campbell, Univ. of NM [SW]
1. *Disks and jets in star formation*

Dr. Lynn R. Cominsky, Sonoma State Univ. [NW]
1. *Discovery of eclipses from an x-ray burst source*
2. *X-ray and γ-ray reprocessing*
3. *The extreme ultra-violet explorer satellite*

Dr. Carol Jo Crannell, NASA [EC]
1. *Imaging high-energy emissions from solar flares*
2. *Using balloon-borne platforms for observations of solar flares*
3. *The physics of high-energy solar processes in solar flares*

Dr. Irene M. Engle, US Naval Acad. [EC]
1. *Idealized Jovian magnetosphere shape and field*

Dr. Katherine Freese, UCSB [SW]
1. *Fundamental physics and dark matter*
2. *Baryogenesis: An explanation of the matter/antimatter content of the universe*
3. *Magnetic monopoles and cosmology*

Dr. Shadia R. Habbal, Ctr. for Astrophys. [NE]
1. *Exploring the dynamic nature of the magnetic field on the sun*

Dr. Martha P. Haynes, Cornell Univ. [NE]
1. *Extragalactic sociology: Environmental effects on galaxy evolution*
2. *Large-scale structure in the universe*

Dr. Christine Jones, Harvard [NE]
1. *Hot Gas in early type galaxies*
2. *Einstein x-ray images of the structure of clusters of galaxies*

Dr. Gillian R. Knapp, Princeton [NE]
1. *Gas, dust, and star formation*
2. *The life and death of stars*

Dr. Deborah A. Konkowski, USNA [EC]
1. *Cosmic strings*

Dr. Lucy-Ann McFadden, Cal Space [SW]
1. *What the asteroids tell us about solar system formation*
2. *Small solar system objects: Interrelationships among asteroids, meteorites, and comets*
3. *Planet-crossing asteroids: Their nature and origins*

Dr. Karie Meyers, Occidental College [SW]
1. *Variability in Seyfert Galaxies*

Dr. Nancy D. Morrison, U. of Toledo [MW]
1. *The fundamental properties of massive stars*

Dr. Theresa Nagy, NASA [EC]
1. *Binary star light curve modeling*

Dr. Anneila Sargent, Caltech [SW]
1. *Star formation*
2. *Millimeter wave interferometry of star-forming regions*

Dr. Virginia Trimble, USC [SW]
1. *Supernova: Bigger and better bangs*
2. *The universe you don't see: Existence and nature of dark matter*
3. *Formation and evolution of close binary systems*

Dr. Belinda J. Wilkes, SAO [NE]
1. *Quasars in full (multi-wavelength) view*
2. *Tour of the Universe*

Dr. Dorothy S. Woolum, Calif. State-Fullerton [SW]
1. *Meteorites and what they tell us about the solar system*
2. *Nucleosynthesis of the heavy elements*
3. *interpreting solar system elemental abundances of the $N=50$ neutron shell*

BIOLOGICAL AND MEDICAL PHYSICS

Dr. Beverly S. Cohen, NYU Med. Ctr [NE]
1. *Deposition of ultrafine particles on the human tracheobronchial tree: A determinant of the dose from radon daughters*
2. *Sampling airborne particles for estimation of inhalation exposure*

Margaret C. Foster, SUNY [NE]
1. *X-ray microanalysis as a tool for physiology*

Dr. Suzanne Gronemeyer, St. Jude Hosp. [SE]
1. *Clinical magnetic resonance imaging*

Dr. Susan Lea, SFSU [SW]
1. *Accretion onto magnetized neutron stars: numerical models*

Dr. Arlene J. Lennox, Fermilab [MW]
1. *Neutrons against cancer: The clinical experience at Fermilab*

Dr. Carmay Lim, Harvard [NE]
1. *Enzyme catalysis: Mechanism of ribonuclease A*

Prof. Eugenie V. Mielczarek, George Mason U. [EC]
1. *Iron transport and storage compounds in living systems: Mossbauer spectroscopy*

Dr. Marilyn E. Noz, NYU [NE]
1. *Local area networks in an imaging environment*

Dr. Elizabeth A. Rauscher, Tecnic Research [SW]
1. *Magnetic flux control of pain*

Prof. Geraldine L. Richmond, Univ. of OR [NW]
1. *The spectroscopy of metal ions bound to proteins and polymers*

Dr. Beverly A. Rubik, Temple Univ. [EC]
1. *Frontier issues in physics and biophysics*

Dr. Petra Schmalbrock, Ohio State [MW]
1. *Magnetic resonance imaging and spectroscopy*
2. *Investigations of flow with magnetic resonance*
3. *Pulse sequence development for magnetic resonance imaging*

Dr. Janet Sisterson, Harvard U. [NE]
1. *Medical applications of proton beams*
2. *Proton radiation therapy at the Harvard Cyclotron Laboratory*

Dr. Sara A. Solla, Bell Labs [NE]
1. *Statistical mechanics of neural networks*

Dr. Audrey V. Wegst, [MW]
1. *Medical physics in diagnostic radiology*
2. *Quality control in nuclear medicine and diagnostic radiology*
3. *Placental transfer of radionuclides and fetal radiation dose*

CHEMICAL AND STATISTICAL PHYSICS

Dr. Juana V. Acrivos, San Jose State [SW]
1. *Solid state physical chemistry of high T_c superconductors*
2. *Dynamics of triplet states in organic conductors*

Dr. Nancy J. Brown, Lawrence Berkeley Lab. [SW]
1. *Theoretical and experimental chemical kinetics*
2. *Energy transfer*

Dr. Joan M. Frye, Howard Univ. [EC]
1. *Photodissociation dynamics studied using tunable diode laser spectroscopy*

Dr. Sandra C. Greer, Univ. of MD [EC]
1. *Chemical reactions and critical points*
2. *Equilibrium polymerization as a phase transition*

Prof. Judith Herzfeld, Brandeis Univ. [NE]
1. *Self-assembly in crowded solutions: Nonideality and long-range order*
2. *Solid-state NMR studies of light-driven proton pump*

Dr. Juliette W. Ioup, Univ. of New Orleans [SE]
1. *The always-convergent iterative technique of deconvolution*

Dr. Branka M. Ladanyi, Colorado St. [MW]
1. *Solvation and chemical reaction dynamics in polar media*
2. *Computer simulation of fluid properties of spectroscopic interest*

Dr. Marsha I. Lester, Univ. of PA [EC]
1. *Photodissociation and photoionization of van der Waals complexes*

Dr. Carmay Lim, Harvard [NE]
1. *Nonequilibrium effects in chemical kinetics*
2. *Dynamics of gas-surface interactions*

Dr. Susan R. McKay, Univ. of ME [NE]
1. *The random field problem: Phase diagrams and thermodynamics*
2. *Spin glasses and chaos*
3. *Renormalization group methods and exactly-solvable models of phase transitions*

Dr. Cherry A. Murray, AT&T [NE]
1. *Colloidal crystals*
2. *Two-stage melting in two dimensional colloidal crystals*

Dr. Kathie Newman, Notre Dame [MW]
1. *Ordering transitions in semiconductors*

Dr. Mary Jo Ondrechen, Northeastern Univ. [NE]
1. *Predeicting the spectroscopic properties of discrete mixed-valence systems*
2. *The role of polarizable bridging ligands in discrete-molecular, conducting, and superconducting systems*

Dr. Mary Beth Ruskai, Univ. Lowell [NE]
1. *Limits on stability of molecular ions*
2. *Relative entropy in quantum statistical mechanics: inequalities, extremal properties, and estimation*

Dr. Roberta P. Saxon, [SW]
1. *Theoretical studies of multiphoton processes*
2. *Theoretical study of Rydberg molecules*

Prof. Jodye Selco, Univ. of Redlands [SW]
1. *Spectroscopy and kinetics of transient species*

Dr. Sara A. Solla, Bell Labs [NE]
1. *A statistical mechanics approach to optimization problems*
2. *Statistical mechanics of neural networks*

CONDENSED MATTER PHYSICS

Dr. Juana V. Activos, San Jose State [SW]
1. *Solid state physical chemistry of high T_c superconductors*
2. *Dynamics of triplet states in organic conductors*

Dr. Sheila Bailey, NASA [MW]
1. *Advances in photovoltaics*
2. *Space photovoltaics*

Prof. Jill C. Bonner, Univ. of RI [NE]
1. *Spin-Peierls transitions*
2. *Quantum effects in spin dynamics*

Dr. Alison Chaiken, NRL [EC]
1. *Integrated magnetics*
2. *Superconducting intercalation compounds*

Dr. Meera Chandrasekhar, Univ. of MO [MW]
1. *Quantum wells under hydrostatic pressure*

Dr. Shirley Chiang, IBM [SW]
1. *Scanning tunnelling microscopy of metals on semiconductors*
2. *Atomic force microscopy*
3. *Imaging molecules on surfaces by scanning tunneling microscopy*

Dr. Deborah D. L. Chung, SUNY [NE]
1. *Intercalation and exfoliation of graphite*
2. *Ohmic contacts to III-V compound semiconductors*
3. *Superconducting composite materials*
4. *Carbon fiber composites*

Dr. Esther Conwell, Xerox [NE]
1. *Differences between one- and three-dimensional semiconductors*
2. *Metal-insulator transition in doped trans-polyacetylene*
3. *Solitons, polarons, and photoconductivity in polyacetylene*
4. *Conducting polymers*

Dr. Denice Denton, Univ. of Wisconsin [MW]
1. *Effects of moisture on the dielectric properties of polyimide films*

Dr. Stephanie B. DiCenzo, AT&T [NE]
1. *Photoelectron spectroscopy of supported metal clusters: The molecular-metallic transition*

Dr. Vicky Diadiuk, MIT Lincoln Lab [NE]
1. *Fabrication and characterization of semiconductor microlens arrays*

Dr. Renee D. Diehl, Univ. of Liverpool [FO]
1. *LEED studies of alkali metals adsorbed on transition metals*

Dr. Flonnie Dowell, Los Alamos [SW]
1. *Molecular modeling of complex materials*
2. *New phase and molecule predictions for partially-ordered chains*

Dr. Mildred Dresselhaus, MIT [NE]
1. *Intercalation and superlattices*
2. *Liquid carbon*

Dr. Georgia Fisanick, AT&T [NE]
1. *Periodic Structures in laser-materials interactions*

Dr. Judy R. Franz, West Virginia Univ. [EC]
1. *Do Coulomb gaps exist?*
2. *Metal-nonmetal transitions in expanded liquid mercury*

Dr. Laura H. Greene, Bellcore [NE]
1. *High Tc oxide superconductors*
2. *Metallic superlattices*
3. *Proximity effects in novel superconductors: Heavy fermions and high T_c*

Dr. Elisabeth Gwinn, UCSB [SW]
1. *Nonlinear dynamics in semiconductors*
2. *The quantum hall effect in parabolic wells*

Prof. Judith Herzfeld, Brandeis Univ. [NE]
1. *Self-assembly in crowded solutions: Nonideality and long-range order*
2. *Solid-state NMR studies of light-driven proton pump*

Dr. Frances A. Houle, IBM [SW]
1. *Interdependence of excitation and reaction in laser-solid interactions*
2. *Charge carriers and semiconductor etching*
3. *Photochemical deposition of thin films: Gas phase and surface chemistry*

Dr. Juliette W. Ioup, Univ. of New Orleans [SE]
1. *Orthogonality of measured normal modes in underwater acoustics*

Dr. Deborah Jackson, Hughes Research [SW]
1. *Teaching old atoms new tricks*
2. *Interference effects between different optical harmonics*

Dr. Shirley A. Jackson, AT&T [NE]
1. *Magnetic polarons in diluted magnetic semiconductor superlattices*
2. *Zone-folding and quasi-direct optical transitions in semiconductor superlattices*
3. *Excitonic magnetic polaron effects in stressed diluted magnetic semiconductors*

Dr. Barbara A. Jones, Harvard [NE]
1. *The two-impurity Kondo model: Numerical renormalization group study*

Dr. Kathleen Kash, Bellcore [NE]
1. *Optical properties of microstructures*

Prof. Karen L. Kavanagh, UC, San Diego [SW]
1. *Interdiffusion of Si, P, and In at poly-Si/GaAs interfaces*
2. *X-ray scattering studies of heavily doped silicon*

Dr. Jacqueline Krim, Northeastern Univ. [NE]
1. *Surface melting of adsorbed films*
2. *Floppy disks and fractal dimensions*

Dr. Kei May Lau, UMass/Amherst [NE]
1. *Quantum-size and strain effects in semiconductor heterostructures*
2. *Organometallic chemical vapor deposition technology*

Dr. Gabrielle G. Long, NIST [EC]
1. *Small angle neutron and x-ray scattering by ceramics*

Dr. Rosemary A. MacDonald, NIST [EC]
1. *Modelling porous media: Application to macromolecular separation*

Dr. Susan R. McKay, Univ. of ME [NE]
1. *The random field problem: Phase diagrams and thermodynamics*
2. *Spin glasses and chaos*
3. *Renormalization group methods and exactly-solvable models of phase transitions*
4. *Phase diagrams and models of chalcogens adsorbed on nickel surfaces*

Dr. Laurie E. McNeil, Univ. of NC [EC]
1. *Delight in disorder: Structural studies of chalcogenide glasses*

Dr. Patricia M. Mooney, IBM [NE]
1. *Deep level defecs in III-V semiconductors*
2. *DX centers in III-V semiconductor alloys*
3. *Influence of DX centers on heterojunction device characteristics*

Dr. Cherry A. Murray, AT&T [NE]
1. *Surface enhanced Raman scattering*
2. *Colloidal crystals*
3. *Two-stage melting in two-dimensional colloidal crystals*

Dr. Barbara Neuhauser, SFSU [SW]
1. *The design and fbrication of an ultralow temperature bolometer for detection of solar neutrinos and dark matter*

Prof. Gertrude F. Neumark, Columbia Univ. [NE]
1. *Luminescence characterization of materials: ZnSe*
2. *Properties and role of alkalai metal impurities in ZnSe*

Dr. Kathie Newman, Notre Dame [MW]
1. *Ordering transitions in semiconductors*

Dr. Marjorie Olmstead, UCB [SW]
1. *Formation of the interface between a polar insulator and a non-polar semiconductor*
2. *Initial stages of semiconductor interface formation*

Dr. Mary Jo Ondrechen, Northeastern Univ. [NE]
1. *The role of polarizable bridging ligands in discrete-molecular, conducting, and superconducting systems*

Dr. Carmen Ortiz, IBM [SW]
1. *Physics of magnetic thin films*
2. *Physics of laser irradiation of thin films*

Dr. Elga Pakulis, IBM [NE]
1. *Microwaves as a probe of high temperature superconductors*

Dr. Julia M. Phillips, Bell Labs [NE]
1. *Materials issues in high T_c superconducting thin films*

Dr. Talat S. Rahman, Kansas St. Univ. [MW]
1. *Dynamics of ordered overlayers on metals*
2. *Surface reconstruction and surface phonon dispersion - a lattice dynamical study*
3. *Surface lattice dynamics and electron energy loss spectroscopy*
4. *Dynamics of associative desorption of hydrogen from metal surfaces*

Shang-Fen Ren, Univ. Ill, Urbana [MW]
1. *III-V semiconductor surfaces studied by total energy calculation*
2. *Anisotropy of optical phonons and interface modes in GaAs-AlAs superlattices*
3. *Orientation dependence of phonons in GaAs-AlAs Superlattices*

Prof. Geraldine L. Richmond, Univ. of OR [NW]
1. *Nonlinear optics as a probe of solid/liquid interfaces*

Dr. Pia N. Sanda, IBM [NE]
1. *Polymeric photoconductors*

Dr. Rozalie Schachter, Amer. Cyanamid [NE]
1. *GaAs devices grown by non-arsine MOVPE*

Dr. Lynn F. Schneemeyer, AT&T [NE]
1. *High temperature superconductors*

Dr. Mary Silber, U. of Minn. [MW]
1. *Bifurcations with symmetry and spatial pattern formation*

Prof. Mary Beth Stearns, Ariz. St. Univ. [SW]
1. *Origin of magnetism in 3D metals*
2. *Structural and magnetic behavior of multilayered films*

Dr. Katherine Strandburg, Argonne Natl Lab [MW]
1. *Quasicrystals and random tilings*
2. *Phase diagram of a quasiperiodic crystal model*
3. *Melting in two dimensions*

Dr. Janet Tate, Oregon St. Univ. [NW]
1. *High temperature superconductivity*

Dr. Tineke Thio, MIT [NE]
1. *Hopping conductivity and magnetism in pure* La_2CuO_{4+y}

Dr. Judith A. Todd, USC [SW]
1. *Microstructure-mechanical property relationships in advanced structural materials*
2. *A new look at interphase precipitation reactions*

Dr. Cynthia A. Volkert, AT&T [NE]
1. *Damage produced in silicon by high energy ion beams*
2. *Density changes in silicon due to the creation and annealing of point defects*
3. *Viscous flow of metallic glasses*

Dr. Gwo-Ching Wang, RPI [NE]
1. *Two-dimensional phase transitions studied by low-energy electron diffraction*

Prof. Mary Anne White, Dalhousie Univ. [FO]
1. *Thermal properties of clathrates: Tempest in a teapot?*

Dr. Alice E. White, AT&T Bell Labs [NE]
1. *Mesotaxy: Single-crystal growth of buried silicide layers by ion implantation*
2. *Ion-beam-induced damage in* $YBa_2Cu_3O_{7-\delta}$*: A mobility edge?*

Dr. Barbara A. Wilson, JPL/Caltech [SW]
1. *Optical properties of heteroepitaxial III-V and II-VI materials*
2. *Recombination mechanisms in Type II heterostructures*
3. *Optical probes of semiconductor interfaces*

Dr. Jane E. Zucker, AT&T [NE]
1. *Spectroscopy of excitons and phonons in quantum wells*
2. *Nonlinear optics below the band edge in quantum wells*

ENVIRONMENTAL & ENERGY PHYSICS

Dr. Sallie Baliunas, Ctr. for Astrophysics [NE]
1. *Sun, stars, and climate*

Dr. Nancy J. Brown, Lawrence Berkeley Lab. [SW]
1. *Combustion-generated air pollutants*

Prof. Janice Button-Shafer, Univ. of MA [NE]
1. *Physicists' views of the strategic defense initiative*

Dr. Beverly S. Cohen, NYU Med. Ctr [NE]
1. *Deposition of ultrafine particles on the human tracheobronchial tree: A determinant of the dose from radon daughters*
2. *Sampling airborne particles for estimation of inhalation exposure*

Dr. Joanne K. Fink, Argonne [MW]
1. *Characterization of fission products released from experiments that simulate hypothetical severe reactor accidents*
2. *The final stage of a postulated reactor meltdown: Interaction of a molten core with concrete*

Dr. Luisa F. Hansen, Lawrence Livermore [SW]
1. *Neutron and gamma-ray transport through materials of interest to fusion reactors*

B. K. Lunde, [MW]
1. *Capital costs of building design*

FLUID AND PLASMA PHYSICS

Dr. Fran Bagenal, U. of Colo. [MW]
1. *The peculiar role of Io in the magnetosphere of Jupiter*
2. *Voyager explores the magnetospheres of the giant planets*

Dr. Mary L. Brake, Univ. of MI [MW]
1. *Unusual light emission in relativistic electron beam pumped gases*

Dr. Alicia Butcher Ehrhardt, Princeton U. [NE]
1. *Carbon and hydrocarbon transport in the plasma edge*

Dr. Martha H. Redi, Princeton [NE]
1. *Models of energy confinement in plasma physics*

Dr. Helen L. Reed, Arizona St. Univ. [SW]
1. *Stability and transition of laminar viscous flows*

Dr. Mary Silber, U. of Minn. [MW]
1. *Equivariant Hopf bifurcation and spatio-temporal pattern formation*
2. *The faraday experiment in square geometry*
3. *Bifurcations with symmetry and spatial pattern formation*
4. *Convection in a rotating flu8id layer*

GEOPHYSICS

Dr. Fran Bagenal, U. of Colo. [MW]
1. *The peculiar role of Io in the magnetosphere of Jupiter*
2. *Voyager explores the magnetospheres of the giant planets*

Dr. Nadine G. Barlow, Johnson Space Ctr. [SW]
1. *Planetary geophysics*
2. *Past and future exploration of Mars*
3. *Impact cratering as a geologic process*

Dr. Prabha Durgapal, Welex [SW]
1. *An analytic model for electromagnetic wireline tools for geophysical exploration*

Dr. Juliette W. Ioup, Univ. of New Orleans [SE]
1. *Inversion of seismic data using Fourier coefficients*
2. *The modified image method for airborne electromagnetics*

Dr. Elizabeth A. Rauscher, Tecnic Research [SW]
1. *Resonant magnetic field pulsations and the mechanisms of the earth ionosphere excitation modes*

Dr. Sara A. Solla, Bell Labs [NE]
1. *A scaling model for crack propagation and fracture*

INTERFACE AND DEVICE PHYSICS

Dr. Susan D. Allen, Univ. of Iowa [MW]
1. *Laser deposition and etching*

Dr. Sheila Bailey, NASA [MW]
1. *Advances in photovoltaics*

Dr. Alison Chaiken, NRL [EC]
1. *Integrated magnetics*

Dr. Meera Chandrasekhar, Univ. of MO [MW]
1. *Quantum wells under hydrostatic pressure*

Dr. Shirley Chiang, IBM [SW]
1. *Scanning tunnelling microscopy of metals on semiconductors*
2. *Atomic force microscopy*
3. *Imaging molecules on surfaces by scanning tunneling microscopy*

Dr. Deborah D. L. Chung, SUNY [NE]
1. *Ohmic contacts to III-V compound semiconductors*

Dr. Vicky Diadiuk, MIT Lincoln Lab [NE]
1. *Fabrication and characterization of semiconductor microlens arrays*

Dr. Mildred Dresselhaus, MIT [NE]
1. *Intercalation and superlattices*

Dr. Laura H. Greene, Bellcore [NE]
1. *Heavy fermion*
2. *Metallic superlattices*
3. *Proximity effects in novel superconductors: Heavy fermions and high* T_c

Dr. Frances A. Houle, IBM [SW]
1. *Interdependence of excitation and reaction in laser-solid interactions*
2. *Charge carriers and semiconductor etching*
3. *Photochemical deposition of thin films: Gas phase and surface chemistry*

Dr. Deborah Jackson, Hughes Research [SW]
1. *Lightwave technology*

Dr. Shirley A. Jackson, AT&T [NE]
1. *Magnetic polarons in diluted magnetic semiconductor superlattices*
2. *Zone-folding and quasi-direct optical transitions in semiconductor superlattices*

Dr. Kathleen Kash, Bellcore [NE]
1. *Optical properties of microstructures*

Prof. Karen L. Kavanagh, UC, San Diego [SW]
1. *Interdiffusion of Si, P, and In at poly-Si/GaAs interfaces*

Dr. Kei May Lau, UMass/Amherst [NE]
1. *Quantum-size and strain effects in semiconductor heterostructures*

Dr. Carmay Lim, Harvard [NE]
1. *Dynamics of gas-surface interactions*

Dr. Patricia M. Mooney, IBM [NE]
1. *Influence of DX centers on heterojunction device characteristics*

Dr. Cherry A. Murray, AT&T [NE]
1. *Surface enhanced Raman scattering*

Dr. Marjorie Olmstead, UCB [SW]
1. *Formation of the interface between a polar insulator and a non-polar semiconductor*
2. *Initial stages of semiconductor interface formation*

Dr. Talat S. Rahman, Kansas St. Univ. [MW]
1. *Dynamics of ordered overlayers on metals*
2. *Surface reconstruction and surface phonon dispersion - a lattice dynamical study*
3. *Surface lattice dynamics and electron energy loss spectroscopy*

Shang-Fen Ren, Univ. Ill, Urbana [MW]
1. *III-V semiconductor surfaces studied by total energy calculation*

Prof. Geraldine L. Richmond, Univ. of OR [NW]
1. *Nonlinear optics as a probe of solid/liquid interfaces*

Dr. Rozalie Schachter, Amer. Cyanamid [NE]
1. *GaAs devices grown by non-arsine MOVPE*

Prof. Mary Beth Stearns, Ariz. St. Univ. [SW]
1. *Structural and magnetic behavior of multilayered films*

Dr. Gwo-Ching Wang, RPI [NE]
1. *Two-dimensional phase transitions studied by low-energy electron diffraction*
2. *Kinetics of 2D ordering studied by high resolution low energy electron diffraction*
3. *Growth of large lattice mismatch metal-semiconductor heteroepitaxy thin films by MBE*

Dr. Margaret H. Weiler, Raytheon [NE]
1. *Semiconductor devices for high frequencies*

Dr. Margaret H. Weiter, Honeywell [NE]
1. *HgCdTe photodiodes for infrared imaging systems*

Dr. Alice E. White, AT&T Bell Labs [NE]
1. *Mesotaxy: Single-crystal growth of buried silicide layers by ion implantation*
2. *Mechanisms of formation of buried oxide layers by ion implantation*

Dr. Barbara A. Wilson, JPL/Caltech [SW]
1. *Optical properties of heteroepitaxial III-V and II-VI materials*
2. *Recombination mechanisms in Type II heterostructures*
3. *Optical probes of semiconductor interfaces*

Dr. Jane E. Zucker, AT&T [NE]
1. *Spectroscopy of excitons and phonons in quantum wells*
2. *Nonlinear optics below the band edge in quantum wells*

MOLECULAR AND POLYMER PHYSICS

Dr. Esther Conwell, Xerox [NE]
1. *Solitons, polarons, and photoconductivity in polyacetylene*
2. *Conducting polymers*

Dr. Flonnie Dowell, Los Alamos [SW]
1. *Molecular modeling of complex materials*
2. *Molecular theories for polymers*
3. *New phase and molecule predictions for partially-ordered chains*

Dr. Sandra C. Greer, Univ. of MD [EC]
1. *Equilibrium polymerization as a phase transition*

Prof. Judith Herzfeld, Brandeis Univ. [NE]
1. *Self-assembly in crowded solutions: Nonideality and long-range order*
2. *Solid-state NMR studies of light-driven proton pump*

Dr. Sonja Krause, RPI [NE]
1. *Elastic small-angle neutron scattering of multi-block copolymers and crosslink labeled gels*
2. *Equilibrium thermodynamics of homogeneous and microphase separated block copolymers*

Dr. Rosemary A. MacDonald, NIST [EC]
1. *Modelling porous media: Application to macro-molecular separation*

Dr. Mary Jo Ondrechen, Northeastern Univ. [NE]
1. *Predeicting the spectroscopic properties of discrete mixed-valence systems*

Prof. Geraldine L. Richmond, Univ. of OR [NW]
1. *The spectroscopy of metal ions bound to proteins and polymers*

Dr. Linda Stuk, Univ. of Texas [SW]
1. *Diffusion of small molecules in polymers, or: Why are there no plastic beer bottles?*

NUCLEAR AND PARTICLE PHYSICS

Prof. Karen Barad, Barnard College [NE]
1. *Numerical simulations of quantum chromodynamics*

Prof. Janice Button-Shafer, Univ. of MA [NE]
1. *Utilization of polarized targets and polarized beams in nuclear and particle physics*
2. *Is there a fifth force?*

Dr. Ling-Lie Chau, UC Davis [SW]
1. *Frontiers in particle physics*

Prof. Jolie A. Cizewski, Rutgers Univ. [NE]
1. *Symmetry and supersymmetry in heavy nuclei*
2. *Onset of deformation in heavy nuclei*

Dr. Bunny C. Clark, Ohio State Univ. [MW]
1. *Relativistic effects in nuclear physics*

Prof. Cynthia A. Gossett, Univ. of WA [EC]
1. *The giant dipole resonance in hot nuclei*
2. *Hard photon production in heavy ion collisions*

Dr. Luisa F. Hansen, Lawrence Livermore [SW]
1. *Microscopic optical model potentials in the analysis of nucleon-nucleus scattering*
2. *The transport of 14-MeV neutrons through materials of interest to fusion reactors*

Dr. Gail G. Hanson, Indiana Univ. [MW]
1. *Physics of the neutral weak vector boson Z0*
2. *Physics and detectors at the superconducting supercollider*

Dr. Lorella M. Jones, Univ. of IL [MW]
1. *Quark and gluon jets - trails of color in a colorless world*

Dr. Noemie Benezer Koller, Rutgers [NE]
1. *Studies of nuclear structure via magnetic moment measurements*

Dr. Deborah A. Konkowski, USNA [EC]
1. *The nature of singularities in general relativity*

Dr. Corinne A. Manogue, Oregon St. Univ. [NW]
1. *The Klein paradox: Rolling relativistic quantum balls uphill*
2. *Changing topology: The trousers problem*
3. *The rotating vacuum*

Prof. June L. Matthews, MIT [NE]
1. *Probing the nucleus with high-energy photons*
2. *How many nucleons does it take to scatter a pion?*

Dr. Marilyn E. Noz, NYU [NE]
1. *Group theoretical examples in relativistic quantum mechanics*

Dr. Andrea Palounek, LBL [SW]
1. *Physics and detectors at the SSC*

Dr. Sathyavathi Ramavataram, Brookhaven [NE]
1. *Nuclear shell models*
2. *Continuum theories of nuclear reactions*
3. *Polarization phenomena in nuclear reactions*
4. *Model calculations at intermediate and high energies*

Dr. Elizabeth A. Rauscher, Tecnic Research [SW]
1. *S-matrix of decay in light and heavy elements*
2. *Cosmology models, strings, and particle physics*

Dr. Junko Shigenitsu, Ohio State [MW]
1. *Uses of lattices in elementary particle physics*

Prof. Johanna Stachel, SUNY Stony Brook [NE]
1. *Collisions between ultra-relativistic heavy ions*

Dr. Julia A. Thompson, U. of Pittsburgh [EC]
1. *Direct photon production at the CERN ISR*
2. *Anomalous electron production at low transverse momentum*
3. *Relativistic heavy ions and close-packed quarks*
4. *CP violation: Collaborative physics research in the USSR*

Dr. Reeta Vyas, Univ. of Arkansas [SE]
1. *Two-body effects in photodisintegration of deuteron and triton*
2. *A trip to nuclear world. (for undergraduate students.)*

Dr. Sallie A. Watkins, Univ. of So. Colorado [MW]
1. *The beta ray work of Lise Meitner*

Dr. Dorothy S. Woolum, Calif. State-Fullerton [SW]
1. *interpreting solar system elemental abundances of the N=50 neutron shell*
2. *Trace element microdistribution analysis by PIXE*

OPTICS and OPTICAL PHYSICS

Dr. Susan D. Allen, Univ. of Iowa [MW]
1. *Laser induced desorption analysis iof surface defects and contamination*

Dr. Vicky Diadiuk, MIT Lincoln Lab [NE]
1. *Fabrication and characterization of semiconductor microlens arrays*

Dr. Sarah L. Gilbert, NIST, Boulder [MW]
1. *Fiber lasers*

Dr. Helen Vogele Gourley, System Sci. Group [SW]
1. *Heat and light in optical systems*
2. *Optical properties of surfaces: How to use them in system design*

Dr. Cherry A. Murray, AT&T [NE]
1. *Surface enhanced Raman scattering*

Dr. Carmen Ortiz, IBM [SW]
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TALKS FOR GENERAL AUDIENCES

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ATTENTION COLLOQUIUM ORGANIZERS: The CSWP has recently announced "Travel Grants for Women Colloquium Speakers," a program offers two types of grants to physics departments who have more than one female speaker in an academic year. Grants of $500 to $1000 are available to qualifying departments. By using this program, a physics department can hear distinguished speakers, provide role models for female students, and supplement its travel budget. Application forms have been distributed in the CSWP Gazette, or may be obtained from Amy Halsted, at APS Headquarters, (212) 682-7341.

Program funds are limited and applications will be considered in the order in which they are received. Note that applications may not be filed until women speakers have actually spoken, so it may be an advantage to schedule them early in the year.

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RESEARCH OF CURRENT INTEREST

MELTING IN 2D AND 3D - TIME RESOLVED MICROSCOPY OF COLLOIDAL SPHERES

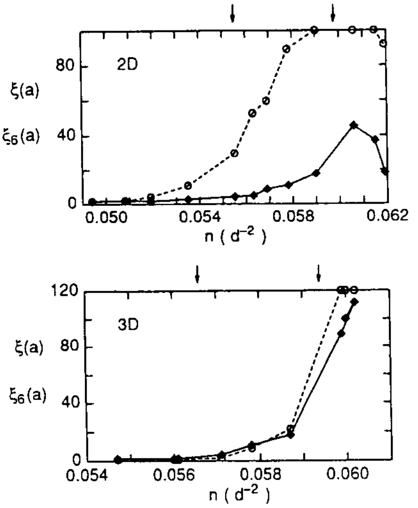

Figure: Translational correlation length ξ (solid curves) and bond orientational correlation length ξ_6 (dashed curves) in units of nearest-neighbor spacing a for the 2D and 3D colloidal systems versus in-plane density n in units of squared inverse sphere diameters. The arrows on each curve mark the transitions to fluid (low density) and crystal (high density) phases. The 2D sample shows an intermediate hexatic region in which the bond orientational order is long-range and the translational order is short-range. The downturn in the 2D curves for densities above the crystal transition marks the beginning of out-of-plane motion (buckling of the 2D crystalline layer).

Cherry Murray and coworkers Wolfgang Sprenger and Rick Wenk, all of AT&T Bell Laboratories, have recently used digital imaging in a high powered optical microscope to study the instantaneous particle positions and trajectories of a layer of monodisperse, highly charged 0.3 μm diameter polystyrene spheres in water suspension, rigidly confined into a two-dimensional layer between two smooth glass plates. They have contrasted the melting transition of this one layer two-dimensional (2D) system with that of an identical but 3D colloidal sample. They map out the microscopic trajectories of about 2000 particles in the center of a sample that is 10^3 - 10^6 times larger in spatial extent.

Effectively, the particles, driven in Brownian motion by the water molecules, execute an analog simulation which may be compared with digital simulations. The advantages this analog simulation has over a normal computer simulation, other than the obvious fact that this is a real experiment complete with noise, is that Murray can study an enormous system effectively with no boundary conditions just by studying a small central part of a large box of particles; and she can also wait for the system to reach equilibrium. The group finds that the two dimensional layer of spheres near melting takes roughly 10 hours, or 10^7 collisions to equilibrate, which is roughly 3 orders of magnitude *longer* than most computer simulations. Moreover, the repulsive screened Coulomb interaction of the particles can readily be tuned between the different limits which have been studied by digital simulaton, merely by varying sphere diameter and charge and ion concentration. The dynamic correlation lengths obtained are shown in the figure. Note the separate divergence of translational and orientational order in 2D, in contrast to the "normal" melting behavior of the 3D crystal.

Courtesy C. A. Murray, AT&T Bell Laboratories, Murray Hill, NJ 07974

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