2006 APS March Meeting

Baltimore, MD

http://www.aps.org/meet/MAR06

Tuesday, March 14, 2006 11:15AM - 2:15PM –

Session H5 FEd FGSA FPS and CSWP: Forum: What Has Actually Changed in Physics Departments in the Situation for Women, Graduate Students and Other People? Baltimore Convention Center 309

11:15AM H5.00001 Forum: What Has Actually Changed in Physics Departments in the Situation for Women, Graduate Students and Other People? PATRICK MULVEY, AIP, RACHEL IVIE, AIP, DAVID CAMPBELL, Boston University, MARGARET MURNANE, University of Colorado-Boulder, KATE KIRBY, Harvard-Smithsonian Center for Astrophysics, ANNE CATLLA, Duke University — The decade of the 90's was a period of intense scrutiny of climate issues in physics departments, e.g. the status of women, the job situation for new Ph.D.'s and postdocs, and the preparation of physicists for careers inside and outside of physics. There were many conference sessions on these topics, and both APS members and leadership instigated important efforts to focus on specific areas. These efforts included the program of visiting committees to departments to examine the situation for women by the Committee on the Status of Women in Physics, the AIP's various studies of a statistical nature, and the creation by the APS of a Committee on Careers and the Forum on Graduate Student Affairs, as well as the recent APS-AAPT task force on graduate education. This forum patterned after similar sessions 10 years ago - will examine how physics departments have changed as a result of such efforts. It will begin with short (12-minute) talks by a panel of experts to describe what has happened in key areas. The greater part of the session will be a period of observations, questions, and discussion from the audience and the panel together. The purpose is to have an interchange on these interrelated topics from which we can all learn. THE TOPICS TO BE INTRODUCED IN THE SHORT TALKS AT THE BEGINNING OF THE SESSION ARE: 1) changes in graduate enrollment, composition, and subsequent jobs (Patrick Mulvey); 2) women in physics and astronomy departments 2005 (Rachel Ivie); 3) changes in graduate curricula and environment (David Campbell); 4) CSWP site visits to physics departments whats been accomplished and learned (Margaret Murnane); 5) survey of ethical issues in physics departments and the physics profession: results and reactions (Kate Kirby); and (6) physics departments from the point of view of younger physicists (Anne Catlla). The bulk of the session will be a public forum, on these and related issues, among the audience and the panel.

Tuesday, March 14, 2006 2:30PM - 4:54PM –

Session K4 DMP CSWP: DMP/CSWP Prize Symposium Baltimore Convention Center 308

2:30PM K4.00001 Nanocrystals, Nanowires and the Role of Quantum Confinement[1] , JAMES CHELIKOWSKY, University of Texas at Austin — One of the most challenging issues in materials physics is to predict the properties of matter at the nanoscale. In this size regime, new structural and electronic properties exist that resemble neither the atomic, nor solid state. By changing the size of the system, inherently intensive properties become extensive properties, which can be strongly altered from the macroscopic limit. Such properties can have profound technological implications, e.g., at small length scales a poor optical material like silicon can be converted to an optically active one. Unfortunately, the development of theoretical methods to predict the properties of these systems is formidable challenge. Nanoscale systems may contain thousands of electrons and atoms, and often possess little symmetry. I will illustrate some recent advances in this area based on methods that are designed to exploit high performance computational platforms. I will present real space pseudopotential techniques for solving the electronic structure problem within density functional theory (see http://www.ices.utexas.edu/parsec). I will apply these techniques to systems ranging from clusters of a few dozen atoms to systems containing over a thousand atoms. I will present predictions for the structural and electronic properties of semiconductor nanowires and nanocrystals, intrinsic and doped, and will resolve some outstanding issues in the literature.

[1]Supported by the NSF (DMR-0551195) and DOE (DE-FG02-03ER25585 and -03ER15491)

3:06PM K4.00002 Near-field intensity correlations in metal-dielectric nano-composites , HUI CAO, Northwestern University — Spatial correlations of field and intensity are indicative of the nature of wave transport in random media and have been widely investigated in the context of electromagnetic wave propagation in disordered dielectric systems However, less is known of near-field intensity correlations in metallic random systems, which can exhibit rich phenomena due the involvement of intrinsic resonance effects-surface plasmons. Neither is clear the difference between correlation functions in metallic and dielectric systems. This paper presents the first experimental study of near-field intensity correlations in metal-dielectric systems in regimes where localization and delocalization are expected. Significant differences are observed between the spatial intensity correlations functions in metal-dielectric systems and those of purely dielectric random media. In disordered metallic nanostructures, surface plasmon modes are governed by the structural properties of the system and may be strongly localized. Recent theoretical studies of metallic nanoparticle aggregates suggest that the eigenmodes of such systems may have properties of both localized and delocalized states. However, it is not clear how such eigenmodes impact the propagation or localization of surface plasmon polaritons excited by impinging light, an issue addressed in this study. In the current experiment, the concentration of metal particles on a dielectric surface p was varied over a wide range to control the amount of scattering. Spatial intensity correlations obtained from near-field optical microscopy (NSOM) images show a transition from propagation to localization and back to propagation of optical excitations in planar random metal-dielectric systems with increase in metal filling fraction.

3:42PM K4.00003 Carbon Nanotubes: Recent Results and Directions , HONGJIE DAI, Stanford University — This talk will present our latest research on single walled carbon nanotubes. We have been using carbon nanotube as a model system to study interesting nanoscale problems concerning materials synthesis, solid-state physics and devices, surface science and nanobiotechnology. This presentation will cover our latest results in, (1) Controlled synthesis of nanotube structures on surfaces. (2) Coherent quantum electron transport and diffusive electron-phonon scattering phenomena in suspended nanotubes. (3) Pushing the performance limit of nanotube transistors, and (4) interfacing carbon nanotubes with biological systems including living cells.

4:18PM K4.00004 Exploiting the unique electronic and mechanical properties of carbon and boron nitride nanotubes , ALEX ZETTL, University of California at Berkeley — Carbon and boron nitride nanotubes have unusual geometrical features that affect their electronic, thermal, and mechanical properties. I will discuss relevant experimental studies of the underlying physics, as well as possible applications including sensors, nanoscale electric motors, high frequency tunable resonators, and phonon waveguides.

Wednesday, March 15, 2006 2:30PM - 5:30PM –

Session R6 CSWP: U.S. Women in Physics: Perspectives on Race and Gender Baltimore Convention Center 310

2:30PM R6.00001 An International Perspective on Women in Physics

, ARIEL MICHELMAN-RIBEIRO, BU / NIH — The 1^{st} International Union of Pure and Applied Physics (IUPAP) Conference on Women in Physics, held in 2002 in Paris, France, highlighted a number of issues facing women physicists around the world. A second conference was held in May 2005 in Rio de Janeiro, Brazil, with the goal of examining the progress made since the last conference and also to provide an opportunity for the delegates to present their research, both physics research and gender-related research, and to make contacts for future collaborations. The conference was attended by 145 delegates from 42 countries, including a very diverse delegation of 22 women and men from the U.S. The conference was organized by the Working Group on Women in Physics of IUPAP, which is charged with making recommendations to IUPAP on how to attract, retain, and increase the participation of women in physics at all levels. The conference included a round table discussion on "Research Funding and Women in Physics," several plenary talks, a poster session on women in physics in each country, a poster session on research by individual delegates, and discussion groups on six topics including attracting girls into physics, launching a successful career, getting women into leadership, improving the institutional climate, learning from regional differences, and balancing family and career. Conference proceedings have been published that include research abstracts, summaries from the discussion groups, articles on the plenary talks, and papers from each country on the status of women in physics in their country (proceedings can be found at http://proceedings.aip.org/proceedings/confproceed/795.jsp). This talk will discuss the U. S. delegation and their country paper on the situation for women in physics in the U.S. as well as highlights from the information presented by the delegates from other nations. The outcomes of the 2002 conference will be described briefly and then the signs of progress noted in 2005 will be summarized.

3:06PM R6.00002 What Works for Women in Undergraduate Physics? Learning from Different Institutions[1]

, BARBARA L. WHITTEN, Colorado College — The participation of women in physics has increased in recent years, but the percentage of women receiving bachelor's degrees in physics is still less than half that in mathematics or chemistry. The undergraduate years have been identified as the biggest "leak." With a team of women physicists, I have been studying undergraduate physics departments to learn what makes some departments female-friendly. An informal and supportive department culture is the most important factor we have identified. There are many elements that make up a female-friendly culture, and different kinds of institutions—small colleges, universities, women's colleges, and HBCUs—all have important ideas to contribute. I'll discuss what these different institutions have to tell us about recruiting and retaining women in the undergraduate physics major.

[1]Supported by NSF grants #HRD-0120450 and #HRD-0332874

3:42PM R6.00003 Women Physicists of Color Achieving at the Intersection of Race and Gender

, K. RENEE HORTON, University of Alabama — As minority women physicists, we stand at the intersection of race and gender. We are physicists to be sure, but we are also women of Native, African and Hispanic descent. We are colleagues, mothers, sisters, and wives, as are our white counterparts, but our experiences cannot be distilled to only gender or race. As Prudence Carter and Scott Page remind us, women of color emerge from the interaction between race and gender.[1] This distinction is important since most researchers who study American women's participation in science focus exclusively on the participation of white American women. Of those who acknowledge the existence of non-white women, most do so by disclaiming the exclusion of women of color because the numbers are so small or the experiences are different from white American women. There are some important differences however. While American women are 15 percent of all scientists and engineers, black American women are 60 percent of all black scientists and engineers. Yet less than 3 black women and 3 Hispanic women earn PhDs each year, out of about 1100. As Rachel Ivie and Kim Nies Ray point out, "Minority women especially represent a great, untapped resource that could be drawn on to increase the size of the scientific workforce in the U.S."[2] Donna Nelson's study of diversity in science and engineering faculties further finds that there are no female black or Native American full professors.[3] In physics, there are no black women professors and no Native American women professors at all. Despite such a bleak picture, there is hope. Of the 18 departments that award at least 40 percent of bachelor's degrees to women, 7 are Historically Black Colleges and Universities. Black women are earning degrees from HBCUs at rates above equity, and many singles and firsts at predominantly white institutions continue to persevere despite the obstacles.

[1] Prudence Carter. 2005. Intersectional Matters and Meanings: Ethnicity, Gender, and Resistance to "Acting White." Annual Meeting of the American Educational Research Association. Montreal: AERA; Scott Page. 2004. The Logic of Diversity. Private Communication.

[2] Rachel Ivie and Kim Nies Ray. 2005. Women in Physics and Astronomy, 2005. AIP Publication R-430.02. College Park, MD: American Institute of Physics.

[3] Donna J. Nelson. 2005. A National Analysis of Diversity in Science and Engineering Faculties at Research Universities. Norman, OK: University of Oklahoma.

4:18PM R6.00004 Effects of Informal and Formal Support Groups on Retaining Women and Minorities in U. S. Physics

, MIA ONG, TERC — This abstract was not received electronically.

4:54PM R6.00005 Interacting in the Smog Factors that Shape Faculty Attitudes and Beliefs about Race and Inclusion

, APRIEL K. HODARI, The CNA Corporation — Many faculty members realize that we must interact productively with diverse colleagues and students, and we must find ways to benefit from the talents of all members of our intellectual community. Put simply, we must aim for the ceiling rather than the floor. This means that we approach our work informed that engaging diversity in our classrooms will increase our success and the success of *all* our students. But in physics, it is often difficult to measure and address diversity issues because doing so is not perceived as central to our discipline. To address this apparent disconnection, we present some ideas on race [1] and inclusion [2] within the context of the physics instruction. Specifically, we speak to how university faculty might use inclusive pedagogy in physics education research and curriculum. Our goal here is to open a frank dialogue and present concrete avenues to explore as you create activities that serve your classroom best.

1. Tatum, Beverly Daniel. (2004). Changing demographics and challenges of the future. *Draft Proceedings of the National Science Board Workshop on Broadening the Participation in Science and Engineering Research and* Education. Arlington, VA: National Science Board; Tatum, Beverly Daniel. (1997). *Why are All the Black Kids Sitting Together in the Cafeteria? And Other Conversations about Race*. New York: Basic Books.

2. Bonilla-Silva, Eduardo. (2003). *Racism without Racists: Color-blind Racism and the Persistence of Racial Inequality in the United States*. Lanham, MD: Rowan & Littlefield; Thiederman, Sondra. (2003). *Making Diversity Work: 7 Steps for Defeating Bias in the Workplace*. Chicago: Dearborn Trade Publishing.