Women’s Progress Tracked in Reports by APS, National Academies

The National Academies released a study early in June that found female scientists at major research institutions have made significant progress in overcoming many of the professional barriers they have historically faced in academia. Despite these gains however, women continue to remain underrepresented in science faculties overall.

The congressionally mandated study found that women seeking faculty positions and tenure are being selected at proportionally similar rates as men. In physics departments approximately 20 percent of tenure track positions are being filled by women. The study found that the main reason for this continuing disparity is the small number of women applying for such positions. Overall women make up only 14 percent of the PhDs in physics, and 12 percent of the applicant pool for university positions. The study focused primarily on women already enrolled in physics and did not delve into the underlying cause of the disparities at the undergraduate level. “I think you can see even in the numbers that I showed that physics is still one of the fields that has an unfortunately quite low representation of women at the higher ranks. It’s certainly been improving, at other ranks, but even in the PhD production you can see there that the numbers are still too low,” said Claude Canizares of MIT, co-chair of the committee that assembled the report, “[T]he good news is that the discrepancies between the number of PhDs produced and those applying for faculty jobs and entering the faculty is very slight.”

Other encouraging findings showed that generally once women became members of faculties, they reported few measurable differences between them and their male coworkers. Indicators such as the number of published papers, grant funding, award nominations, promotions and other job opportunities all showed near parity with men’s reported rates. The study did show that women professors on average earned about 8 percent less than men; however at the associate and assistant level, salaries were equivalent.

The study looked specifically at the full time faculties of the top 89 Carnegie research universities, using data collected through the National Science Foundation’s survey of earned doctorates.

APS Announces PhysicsQuest Winners

The winners of the APS-sponsored 2008 PhysicsQuest contest have been selected. Jason Holstege’s 7th Grade Science class at the CLEO/QEDC meeting in Baltimore in early June, while comics super-hero Spectra (left) takes a break from saving the world from the evil Miss Alignment.

“Long term quantum memory could potentially be continued for years, making it a true quantum computer,” said Kuzmich. “By minimizing the losses, the storage time extends, and in theory, this could be extended for an indefinite period.”

Physics is Olympians’ Idea of a Good Time

In a small classroom at the University of Maryland, nine-teen pairs of eyes stare attentively at a blackboard full of a complex array of quadratic equations. Though the physics on the blackboard is distinctly college-level, the class is composed entirely of high school students.

This is the training camp for the 2009 International Physics Olympiad’s US Team. At the end of the ten-day preparatory camp, five of the nineteen students were selected to travel to Mexico for this year’s international competition in July. Though only the five students were selected to go, nineteen kids in the classroom represented some of the brightest scientific minds in the country.

The International Physics Olympiad is the global zenith for high school physicists. Each year teams of high school students from over sixty different countries vie for the gold by unraveling complex physics problems during the nine-day competition in mid July. Organizers of both the international event and the training camp strive to advance physics education and reward students that have distinguished themselves in the field.

The Olympiad began in 1967 in Eastern Europe and expanded during the 1970s to include the rest of Europe and later the rest of the world. The United States first participated in 1986 when its team brought back three bronze medals from London, the best any team had done on its first outing. The American Association of Physics Teachers (AAPT) plans to celebrate the 2010 meeting of the APS with an event on the history of the Olympiad. The AAPT will present a special Olympic challenge to high school students on the last day of the April meeting in Boston to celebrate the 40th anniversary of the AAPT Olympiad.
I always say that what DanTechnologyCenter Ben built at the Catholic Church in ‘The Da Vinci Code,’ he did for me and my research with ‘Angels and Demons’. — Gerald Gabrielse, Harvard, describing how the film exaggerated for science.

“I know colleagues who began reading the book and said it was nonsense and quite reading it. But the book is good entertainment.” — Manfred Pauli, Carnegie Mellon, on his role as the science advisor of “Angels and Demons,” Pittsburgh Post-Gazette, May 15, 2009.

“I’m very happy to see popular culture introducing these scientific issues.” — Boris Kayser, Formlab, on why he thought the presence of CERN in “Angels and Demons” would be a noisy marketing tool for science. Chicago Tribune, May 20, 2009.

“It’s like trying to win the lottery. If you buy enough tickets, you’re eventually going to win.” — John Rees, Ohio State University, explaining the odds of detecting neutrinos at the IceCube detector in Antarctica. The Columbus Dispatch, May 17, 2009.

“We think that these giant flares are coming from really, really big stars.” — Charles Horowitz, Indiana University, describing how the crust of neutron stars, 10,000 times stronger than steel, can produce incredible bursts of energy. MSNBC.com, May 18, 2009.

“[A]ltogether a major break-through is reported without the scientific community in a position to give an answer.” — Raymond Jeanloz, UC Berkeley, on the efficacy of a new global monitoring system to listen for tremors resulting from a nuclear explosion. The Associated Press, May 23, 2009.

“Charlie Bolden is well-qualified to continue moving NASA in its years of drift.” — Gene McCull, Los Alamos National Laboratory, commending President Obama’s pick of a former astronaut to be the new head of NASA. NBC News, May 24, 2009.

“We put together the best physicists, the best engineers, the best of industry and academia. It’s not often you get that opportunity and pull it off.” — Ed Moses, Lawrence Livermore National Lab, on the team at the National Ignition Facility. The New York Times, May 25, 2009.


“No one has any idea what to do with the space station. We know what to do with a telescope. The ISS is just a way of keeping human beings in space. It’s flag-pole sitting.” — Robert Park, University of Maryland, MSNBC.com, May 27, 2009.

“These screws up happen... it going forward I would have gone but doesn’t look like a serious breach.” — M. Deutch, MIT, on the accidental publication of highly confidential lists of the country’s nuclear stockpiles, New York Times, June 2, 2009.

Games of chance are as ancient as human history, with archaeologists unearthing evidence of them on prehistoric digs. Gambling also led, indirectly, to the birth of probability theory, as players sought to better understand the odds. In the mid-17th century, an exchange between two prominent mathematicians—Blaise Pascal and Piere de Fermat—laid the foundation for probability, thereby changing the way scientists and mathematicians viewed uncertainty and risk.

Born in 1623 in Clermont-Ferrand, France, Pascal was a child prodigy largely educated by his father, Etienne, a local magistrate who was also well-versed with some of the most famous intellectuals of that era, including Rene Descartes and Pierre de Fermat. As a result, young Blaise was privileged to sit in on science meetings of some of the greatest minds in Europe. At age 11, he wrote an essay on the sounds of vibrating bodies, becoming the first to rise to what we now call Pascal’s Theorem, which states that if a hexagon is inscribed in a conic section, then the three intersection points of opposite sides lie on a straight line. One indication of how impressive this achievement was is the fact that Descartes, when shown the paper, initially did not know what to do with it and was later treater had writing tremors. When Pascal’s father became king’s commissioner of taxes in Rouen and was struggling with endless calculations and re-calculations, Pascal—not yet 19—saw the mechanical calculators of the day as nothing more than ways to substantiate his claim to the probability of winning for each player at the game when the game was interrupted, and the pot would be divided accordingly.

Pascal’s analysis stopped short of considering less idealized situations. In a few cases, it would not be possible to determine the odds of equally likely possible outcomes could not be listed, such as the weather, or the stock market. By the early 18th century, Jakob Bernoulli had devised the law of large numbers in an attempt to provide a mathematical formal that uncertainty decreases as the sample size increases for problems with an infinite number of outcomes. Other developments by leading scientists and mathematicians followed, ultimately transforming economics, actuarial science, and the social sciences.

A few weeks after his last correspondence with Fermat, Pascal narrowly escaped death when his carriage nearly ran off a bridge, prompting a religious conversion. He switched his focus from math and science to religious devotion, philosophy, and political treatises, and renounced games of chance. He did a considerable bit of math between 1658 and 1659 while exploring the cycloid and how it might be used to calculate the volume of solids, for example. His early work on probability seeped into his philosophical work as well, most notably the famous “Pascal’s Wager,” wherein he reasoned that the odds favor belief in God, even though God’s existence cannot be definitely proven. Pascal died of a brain hemorrhage on August 19, 1662, just before his 39th birthday. History has yet to record the outcome of his wager.
“Physics First” Battles for Acceptance

By Gabriel Papol

“Physics First” is a movement that encourages high schools to offer a physics course to ninth-graders, before they take chemistry and biology. Some also call it “early high school physics” (EHP). Science teachers and physicists have been gaining momentum as an organized movement of educators and physicists since around 1990, although the history of teaching physics to ninth-graders goes back several decades before that. Nobel Prize-winning physicist Leon Lederman, a prominent proponent, estimates that around 2,000 US high schools have now adopted some version of the program for at least some of their freshmen.

One of the principal driving forces behind the movement is its supporters’ belief that the traditional biology-chemistry-physics course sequence, which has been the standard high school science sequence in the US since the late 1800s, needs to be updated to reflect a more realistic order of the physical sciences. According to an informational guide published by the American Association of Physics Teachers in 2007, it is in order to understand modern molecular biology and the biochemical processes in cells, students need a solid grounding in both physics and chemistry, and 2) mastery of the basic physics concepts of electronic and nuclear forces and the concept of energy storage and transfer are crucial to the understanding of chemical structures, atomic binding, gas laws, and the periodic table of the elements.

A publication by the nonprofit Biological Sciences Curriculum Study, also known as BSCS, expresses a similar viewpoint: “Coherence, we argue, is the primary reason to consider the C-to-C approach.”

The History

Physics First began appearing in various forms in the mid-1980s as one of several initiatives. Because of the greater leeway private school physics teachers have in determining their own curricula, for many years, the program is considered more prevalent in private schools than public schools—the National Science Foundation (NSF) estimates that 8% of public schools have implemented Physics First in some form in 2005, as compared to only 3% of public schools. Consistent with this self-selection, teachers’ opinions on Physics First have varied over the years, with some preferring higher-level physics courses expressing favorable opinions on the PCB sequence versus less than 25% of those not teaching physics. In fact, some high school teachers, including an enthusiastic Physics First teacher at Liberty High School in Carroll County, Maryland, says “teaching physics is like teaching a language—you can engage them in it and see it around them right away. We try to never fall into that trap of coming back to physics a second time later in high school.”

In the past decade, Physics First has moved to a new level with two initiatives that have been implemented in the governor’s office in Rhode Island, and another that is a partnership between two universities and a number of high schools in Missouri. Both efforts are supported by large grants that provide professional development, curriculum, and lab equipment to the crossover teachers. In Rhode Island, for instance, this initiative was very narrowly defined to the physics classes. Although it is too early to fully assess the impact of these efforts, representatives of these initiatives at a recent AAPT symposium devoted to “Early High School Physics” said they

Is it Working?

One of the challenges in evaluating the effectiveness of Physics First is the difficulty in selecting the criteria by which to measure it. As Young, the Maryland teacher, puts it, “You can’t measure success in the PCB sequence?” Is it increased numbers of physics majors in college? Is it increased participation in physics competitions? More positive attitudes of students toward the subject? Determined measure of “scientific literacy?”

In fact, AIP data show that most schools implementing Physics First do not even follow the full PCB sequence, which supporters also sometimes call the “right-side-up” sequence. According to AIP data, only 37% of public schools and 5% of private schools implement the full PCB sequence. In addition, not all schools teaching physics to ninth-graders offer the subject to all their students. Some private high schools teaching to ninth-graders, others to more advanced students with a subset of a range with abilities.

Despite the great variety in implementations of Physics First, and the difficulty in determining how to evaluate it, some basic trends have emerged. The program does not appear to have a significant percent of students who take a high school course when the number of students exceeded four, his staff knew not to mess with him. The plume of agitated air could quickly turn into a class F.

Science concerns, apart from medicine, would never have led him to add another pointed pencil to his storm alert system. Science, in general, was not one of his priorities.

But within the last year, Obey has become a science champion. And when the Science Engineering and Public Policy Group presented him with the George E. Brown, Jr. Public Service Award this past April, he in-

Serendipity

By Michael S. Lubell, APS Director of Public Affairs

It may not be a true “come-to-Jesus moment,” but within the last year, more members of Congress than I can count have turned to science. And when several of them, it represents a re- 

lusive conversation and not a born-again experience.

In the fifteen years I have been prowling the corridors of power, I must admit that I rarely encountered anyone who was overtly hostile to science. If there was a Luddite in the crowd of 535, I never met him or her. More often what I received was a pat on the back, with the implied, but never spoken words, “You’re a nice fellow and I enjoy talking to you, but I’ve got more weighty matters to deal with.”

No more. Take David Obey (D-WI, 7th), for example. He is powerful, intelligent and occa-

sionally irascible chairman of the House Appropriations Commit-

tee. For years three attributes summed up his political personal-

ity: a commitment to helping hard-working people, advancing medicine and healthcare; and car-

rying around a pack of carefully sharpened pencils in his white shirt pocket. But when the number of pencils exceeded four, his staff knew not to mess with him. The plume of agitated air could quickly turn into a class F.

Science concerns, apart from medicine, would never have led him to add another pointed pencil to his storm alert system. Science, in general, was not one of his priorities.

But within the last year, Obey has become a science champion. And when the Science Engineering and Public Policy Group presented him with the George E. Brown, Jr. Public Service Award this past April, he interrupted his overbooked sched-

ule and trekked across the Capitol to the Senate Hart Office Building for the first time in his life by his own admission—to receive the plaque.

House Speaker Nancy Pelosi (D-CA, 8th) might not have un-

dergone quite the same epiphany, but in the last year her zeal for science has reached new heights. This column has too few inches for any significant exposition, but if you Google “science, science, science, science!” you will quickly get the gist of my point.

In May, in recognition of her work, Craig Barrett, who had re-
Accelerating Universe: Who Knew What When?

Ed. Note: We featured the accelerating universe in our "This month in physics history" column in January. This was followed by a January 2009 letter to APS News reporting evidence for something qualitatively different--cosmic acceleration--just a few weeks later. January 1998 is a good time to review, as if you like Alex Filippenko's conference letter, March 1998 if you like the High-Z Supernova Consortium (who didn't think it was very convincing). This is a vivid account of the scene as Saul Perlmutter led the SCP to the reality of cosmic acceleration.

After 1969, dominant redshift objects (who didn't think it was very difficult) were the SCP result had been a little bigger, perhaps they would have found cosmic acceleration.

Finally, comparing the error ellipses shows that the statistical uncertainty in the values of Omega, lambda and Omega matter from the High-Z Team in our September 1998 AJ paper was every bit as good as that from the SCP in their June 1999 Ap J paper, despite our having a smaller sample of high redshift objects. That's because we had a larger sample of low-redshift objects from both Calan/Tololo and the Center for Astrophysics, an object-by-object way of determining the reddening to each supernova, and a larger fraction of excellent measurements from the Hubble Space Telescope. A bigger sample does not always yield a more precise answer.

For more information about Future Physicists Days, go to www.aps.org and search on "Future Physicists".

April Meeting Hosts Future Physicists

By Gabriel Popkin

Eighty-one undergraduates and at least one high school student gave talks, presented posters, and managed registration for the February 2009 meeting. Two sessions of talks were devoted to undergraduate research, and the participants also attended a special luncheon as well as an awards ceremony that included a round of the Society of Physics Students' (SPS) Physics Jeopardy.

Dominick Recco, a junior from the University of Wisconsin-Madison, won an award for his poster on the "Seasonal Variations of the Atmospheric Muon Flux in IceCore," a neutrino telescope under construction at the South Pole. "I love the talks, and the maximum exposure to physicists," said Recco, who was inspired to go into physics by his high school teacher.

Junior Mallory Kay Young, of Hendrix College in Arkansas, said her favorite session was the networking luncheon for women in physics. Young won an award for her talk on "Neutrinostimulated Pair-Creation in Supernovae." She said she was inspired to come to the April Meeting to hear her the meeting's advisor, Todd Tilney, who brought a total of six Hendrix students to the meeting. Tilney said that all Hendrix undergraduates do a "capstone" project at the end of their senior year, and the April Meeting provides a venue where they can present their research to a nationwide audience.

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OLYMPIANS continued from page 1

Teachers along with the University of Maryland have organized and trained each US team since the beginning. More than a dozen other organizations including APS and the American Association of Physics Teachers also help to sponsor the team.

This year’s traveling team is made up of: David Field, a sophomore at Andover, Massachusetts; Anand Natarajan a senior from Los Angeles, California; Will Moskowitz, a sophomore at senior from Evanston, Illinois; Ayan Malek, a senior from Woodside, New York; and Tahl Gurevich, a junior at Newton North High School, Massachusetts.

“All of the students attending the camp are considered part of the US team, and the five selected at the end of the camp make up the traveling team.

After the camp concludes, the students who are members of the traveling team are sent home with a hefty packet of homework, mostly problems culled from previous Olympiads. There is a brief, three-day refresher camp held in mid July right before the traveling team jets off to the city of Merida on the Yucatan Peninsula.

At the Olympiad, the US team will face off against over sixty countries on three complicated theory papers, each designed to test the students’ breadth and depth of knowledge. Last year the United States placed second overall, its best standing yet. The US Team generally places in or near the top ten in the world, facing some of the toughest competition from nations such as China, Russia, Vietnam, Iran, and Sweden.

To prepare for this challenge, the training at physics camps was rigorous and intense. For ten days straight the students rose early to face a full schedule of lectures, labs and practice exams. Topics ranged from basic wave mechanics and quantum mechanics to relativity and other modern physics.

“It’s tiring after a while,” said junior Dan Li, who attended last year’s camp as well, “It’s a lot of fun getting to work on physics without distractions, but after a while six problems long, from which the final group was selected to attend the physics camp. All of the students attending the camp are considered part of the US team, and the five selected at the end of the camp make up the traveling team.

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“It’s tiring after a while,” said junior Dan Li, who attended last year’s camp as well, “It’s a lot of fun getting to work on physics without distractions, but after a while the coaches have sought to foster this collegial spirit amongst the students. Paul Stanley, the academic director for this year’s team, stressed that they want to establish an environment where the students can both shine academically and enjoy themselves while meeting new people, books, and high ideas.

“Today’s culture and technology is being self conscious about being smart and about distractions, but after a while you do need time to relax.”

“It’s gotten to the point where we can say, ‘Hey, we can’t afford to probably shouldn’t work them much harder,’” said Andrew Lin, an assistant coach. Lin started out as a member of the US team in 2007 and has returned again, and has year after year helped to keep coach. He said that since then, “the Olympiad has grown… I’d like to think that it’s improved and I think the students are better.

Despite the intensity of the training, there’s very little jockeying for position on the traveling team. Instead there is a strong sense of camaraderie among the students.

“Last year the camp was about fostering competition over the five traveling team spots,” said Marianna Mao, “Physics is our idea of a good time.”

LaserFest Booth Debuts at CLEO

LaserFest made an early public appearance at June’s Conference on Lasers and Electro-optics and International Quantum Electronics (CLEO/IQEC) held in San Francisco. More, APS, partnering with the Optical Society of America, unveiled the yearlong celebration of lasers at CLEO/IQEC, and started out at promoting wide array of programs planned for next year.

To coincide with the 50th anniversary in 2010 of Theodore Maiman’s construction of the first working laser, LaserFest will highlight physics results through history and their potential for future innovation. Throughout the year a variety of programs and events will add to public awareness about the laser and its applications in today’s world. Planned programs include public demonstrations, traveling shows, videos, and educational materials for schools across the country.

The first LaserFest will reach the public to lasers and convey the idea that basic science is very important, especially because so many things we use in our daily life are laser based or used in laser systems as well.

The fifth anniversary is a great way to highlight that,” Nadia Ram- lage, the booth’s project director said.

The program is just getting underway. The traveling booth at CLEO/IQEC was the first official LaserFest event to disseminate information about next year’s activities. The booth featured the “F=MA Exam,” the multiple choice “Science Bowl,” and other giveaways emblazoned with LaserFest logos and information about the LaserFest website.

As O’Gara explained, “Next year’s booth will expand further as events and programs start to take off. It will travel to scientific and teaching conferences featuring information and demonstrations on how to convey to the public the importance of lasers.”

Ramiglan said that the reaction by the optics scientists at CLEO/ IQEC was overwhelmingly positive and promising.

“I think it’s a very cool idea. I have a seven-year-old at home. I’m very interested in seeing a physics when she grows up.”

Funding from the National Science Foundation and the Department of Energy will also help LaserFest to promote the importance of laser science. The agencies have awarded $300,000 in grants for events such as LaserDays and LaserFest. All of the excitement of lasers to people nationwide.

“Anything you want to introduce people in a good way,” said Andy Bayramian of the National Ignition Facility, “We don’t have enough young people going into laser technology.”
Robert L. Byer  
Stanford University  

Professor Robert L. Byer is the William R. Kenan, Jr. Professor of Applied Physics at Stanford University. He has conducted research and taught classes in lasers and nonlinear optics at Stanford University since 1969. He has made numerous contributions to laser technology and has received his BS degree in physics in 1964 from the University of California, Berkeley, and his MS and PhD degrees in 1967 and 1969 in Applied Physics from Stanford University.

Byer has served as department chair of Applied Physics in 1980-83, and 1999-2002; Associate Dean of Humanities and Sciences from 1984-86, and Vice Provost and Dean of Research at Stanford University from 1987 to 1992. He has been director of the Hansen Experimental Physics Laboratory from 1997 to 2006, and the Edward L. Ginzton Laboratory from 2006 to 2008.

He was elected President of the Laser and Electro-optics society of the IEEE in 1984 and of the Optical Society of America in 1994. He has served on the AIP Governing Board from 1993 to 2000 and was a founding member of the California Council on Science and Technology in 1999 and served as its Chair in 1994.

Byer will receive the Frederick Ives Medal/Quinn Endowment from the Optical Society of America in 2009 and was awarded the IEEE Photonics Award in 2006. He has been the recipient of the IEEE Third Millennium Medal, the A. L. Schawlow Award of the Laser Institute of America, the R. W. Wood prize of the OSA, the Quantum Electronics Award of the Lasers and Electro-optics Society, and the Adolph Lomb Medal of the Optical Society of America. He is a fellow of the APS, AAAS, LEOS, LIA and OSA. He was elected to the National Academy of Engineering in 1987 and to the National Academy of Science in 2000.

He has served on the Editorial Boards of Optics Letters, Applied Physics Letters, Review of Scientific Instruments, and the Proceedings of the IEEE. He served on the NRC Committee on Optical Sciences and Engineering, and the NRC Committee on Inertial Confinement Fusion. He served as Vice Chair of the NIST NRC Advisory Board, Physics Panel. He completed a four year term on the Air Force Scientific Advisory Board in 2006. He is serving on the LLNL, NIF, and PS Directors Review Committee and on the SLAC Coherent Light Source Science Advisory Committee.

His outreach includes dozens of public lectures and demonstrations appearing on the History Channel and Discovery Channel.

Gregory Boebinger  
National High Magnetic Field Laboratory  

Greg Boebinger is director of the National High Magnetic Field Laboratory (MagLab) and a Professor of Physics at Florida State University. He received his BS in physics from the Massachusetts Institute of Technology in 1986 where he was a Hertz Fellow and Karl Taylor Compton Fellow during his research measuring the magnetic field dependence of the fractional quantum Hall effect (FQHE).

His research career has been centered on the utilization of intense magnetic fields as a thermodynamic parameter to access and elucidate new correlated electron phases. Prior to MIT, he was a Churchill Fellow at the University of Cambridge, working on the then-newly-discovered organic superconductors, focusing on structural phase transitions underlying magnetic ordering. After MIT, he received a NATO Fellowship to the Ecole Normale Superieure in Paris. In 1987, he joined Bell Laboratories where he engineered and constructed with his colleague a pulsed magnetic field program that was the first to achieve millisecond-duration magnetic fields exceeding 7 T. His high-magnetic-field research included resonant tunneling spectroscopy, chaos in quantum wells, new correlated electron states in double quantum wells, and the low-temperature behavior of the high-temperature superconductors in the absence of superconductivity. His research has continued while MagLab Center Leader at Los Alamos National Laboratory (1998-2004) and MagLab Director (2004-present) responsible for all three MagLab experimental areas.

He is a Fellow of the American Physical Society and the American Association for the Advancement of Science. Among his service on numerous boards and committees is his chairing of the Neutron Advisory Board for Oak Ridge National Laboratory. For the APS, he has served on the Buckley Prize Selection Committee and on the APS election committee during the shift from the notorious ‘phone book’ to wireless. His outreach includes dozens of public lectures and demonstrations appearing on the History Channel and Discovery Channel.

Robert C. Richardson  
Cornell University  

Bob Richardson attended Virginia Polytechnic Institute between 1954 and 1960 where he obtained both BS and MS degrees in physics. His thesis work involved NMR studies of solid He. He obtained his PhD degree from Duke in 1966. In the Fall of 1966 he began work at Argonne National Laboratory in the laboratory of David Lee and were later joined by Douglas Osheroff. Their research goal was to observe the nuclear magnetic phase transition in solid He.

In the Fall of 1971, they made the accidental discovery that liquid underwent a pairing transition similar to that of superconductors. The three were awarded for that work the Simon Prize in 1976, the Buckley Prize in 1981, and the Nobel Prize in 1996.

Bob has been on the Cornell faculty since 1967. He served as Director of the Laboratory of Atomic and Solid State Physics from 1990 to 1997 and is currently the F. R. Newton Professor of Physics. After 32 years of teaching he joined the Cornell Administration to serve as the Vice Provost for Research and as the Senior Science Advisor to the Provost and President of Cornell.

Richardson has served on a number of boards related to research and teaching among which are: The National Science Board, the governing body of the NSF; The Duke University Board of Trustees; The Board of Directors of the American Association for the Advancement of Science; The Board on Physics and Astronomy of the NRC; The Board of Directors of Quantum Optics, Garching; He has served as member, The Center for Directed and Distinguished Scientist at the Physical Research Laboratory, Ahmedabad, India, and held the Einstein chair of the Indian National Science Academy.

He is a fellow of the American Physical Society with contributions spanning many areas of quantum optics, coherence and statistical optics, and plasmonics. He is the author of a well-known research monograph “Quantum Optics”. He introduced the idea of coherences induced by vacuum, which is important in understanding the quantum control of matter.

His 1975 paper on the OED phenomenon at surfaces showed, much before the development of near field techniques, how to probe surface features by using dipolar fields. His theory of optical resonance in fluctuating fields became the driving force of many theoretical and experimental studies in the area. He discovered how entanglement can be transferred from field to atoms which led to methods for the production of the squeezed states of atoms; these states are now referred to as Bose condensed states. He was recently elected a fellow of the Royal Society, UK. He has been a fellow of the APS and the Optical Society of America for many years. He was awarded the Max Born Prize from the Optical Society of America, Humboldt Research Award of Germany, and the Physics Prize of TWAS, Trieste.

Marta Dark McNeece  
Spelman College  

Marta Dark McNeece serves as a professor in the Physics Department at Spelman College. She received her BS in Physics with an Astronomy minor from the University...
STEPHEN C. MCGuIRE
Southern University and A&M College

Stephen C. McGuire is professor of physics at Southern University and A&M College and a Fellow of the American Physical Society. He received BS in physics from Southern University, MS in nuclear physics from the University of Rochester, and PhD in nuclear science from Cornell University. After receiving his doctorate, he spent four years as a staff scientist at the Oak Ridge National Laboratory. His current research interest is in solid-state physics. He has been an associate professor of the Chemical and Biological Physics section of the National Society of Black Physicists, to New York University’s “Physics in the Science Curriculum” Summer Institute. In 1996, he completed her term on APS Committee on Minorities. She has served on the American Society of Physics Teachers Committee on Minorities.

WARRN B. MORI
University of California, Los Angeles

Professor Warren B. Mori received his BS from UC Berkeley in 1981, and his MS and PhD from the University of New Mexico in 1983 and 1984, respectively. He has been on the research and regular faculty of the Physics and Astronomy and of the Electrical Engineering Department of UCLA since 1984. Starting in 1998 he has been a full professor in both departments. Since the fall of 2006 he has been the Director of the UCLA Institute for Digital Education. His current research interests are in plasma physics, laser and beam plasma interactions, plasma-based accelerators and light sources, inertial confinement fusion, high energy density science, relativistic shocks, and high performance computing. Prof. Mori holds patents for uplighting high frequency by rapid plasma creation, and for the use of relativistic ionization from for tunable radiation. He was awarded the International Center for the Peace and Disarmament Prize in Physics in 1997. He was also awarded the APS Prize in 1998 for his “outstanding contributions to particle simulations of complex laser-plasma phenomena and of plasma-based light sources.” He was elected a Fellow of IEEE in 2006 for his work in plasma science. He has served on many panels and committees. He has advised fifteen graduate students including two recipients of APS best thesis prizes and mentored 7 postdoctoral researchers.

Belita Koiller
Physics Institute, Federal University of Rio de Janeiro, Brazil

Belita Koiller is a condensed matter theorist. She has collaborated with several institutions in the United States including with UC Berkeley, Johns Hopkins University, and the Condensed Matter Theory Center at the University of Maryland. She was in the Editorial Board of Applied Physics Letters and Journal of Applied Physics for three years, starting 2006. Belita Koiller received a Guggenheim Fellowship in 1982, and she has been a research fellow of the Brazilian National Council for Scientific and Technological Development since 1985. In 1995 she was the first woman to be elected a full member to the Brazilian Academy of Sciences. In 2002 she received the Physical Sciences division. She was decorated “Comendador da Ordem de Merito Cientific” by the President of Brazil in 2002. Belita Koiller is a L’Oréal UNESCO 2005 Laureate for Women in Physical Sciences.

She served for 3 years, starting in 1994, as a member of the ICSU Comittee on Science Building in Science. Since 2005 she has been a member of the Executive Committee of the International Human Rights Network of Academics and Scholars Societies, which assists colleagues (scientists and scholars) who suffer repression, discrimination, or arrest. She is currently a member of the IUPAP Commission on Semiconductors.
According to a recent survey by the Federal Demonstration Partnership (FDP), on average faculty are spending 42% of their federal research time administrative tasks. While these tasks do not include proposal writing. Two decades ago, that number was only 18%. This heavy commitment of researchers’ time to administrative functions is a terrible waste of faculty time and government money. Many of the tasks that faculty are performing could be managed better, and at a lower cost, by staff. For example, familiar with the requirements associated with personnel actions, export control, as well as human and animal subject protocol reviews. [The Federal Demonstration Partnership is a cooperative National Academies of Sciences initiative among nine federal agencies and 120 institutional recipients of federal funds, seeking efficiency and effectiveness in government-university research administration. Its report is available at http://www.thefdp.org/Faculty_Committee.html]

The situation is likely to grow worse as faculty help to provide the new information required for research funded under the American Recovery and Reinvestment Act of 2009 (the “stimulus” bill). Just as the government is clearly recognizing, through increased funding, the important role of the university in supporting our nation’s economy, it is adding additional administrative burdens to those leading that research. The situation is likely to be exacerbated by universities’ spending cutbacks associated with the economic downturn. Universities undoubtedly decrease the administrative support they provide to faculty in the face of quite significant budget cuts. It is likely that we can improve the situation.

Three factors have contributed to this increase. The first is the set of changes made to OMB Circular A-21 in the early 90s. This circular contains federal regulations governing the reimbursement of universities for both direct and indirect costs associated with the performance of federally-funded research. Direct costs are those that can be associated with a specific research project, such as faculty and graduate student salaries, research supplies, etc. Indirect costs are those that are associated with the performance of federally funded research, but which cannot be attributed to a specific project. These include items like university research administration, utilities, and research building depreciation. Indirect costs are further subdivided into Administrative and Facilities. One of the changes to A-21 limited the reimbursement of indirect administrative costs to 26% of the related direct costs. Since most universities lose money with this reimbursement rate, almost all of them cut back the local administrative support upon which faculty could draw directly. The A-21 changes also meant that faculty no longer charge for administrative functions directly to the grant. Prior to this change, one or more faculty would commonly hire an administrative assistant who was, or would become, skilled in the administrative functions directly associated with the specific research. A-21 no longer allowed reimbursement for this function. As a consequence of these two changes, faculty took on administrative tasks previously performed more effectively and inexpensively by administrative assistants.

Over the almost two decades since these changes took place, the administrative burden on university resources and faculty has also grown as a result of increased local cost sharing. This includes expenditures for ITAR control, environment, health and safety reporting, controlled substance regulations, as well as requirements related to human and animal subject experiments. During the time that I was Stanford’s Vice Provost and Dean of Research and Graduate Policy, 2003-2006, Stanford typically allocated around 20% of its funds available for new endeavors to research compliance. Universities dare not take this lightly. They do not need to meet these requirements. Indeed, universities receive many of these regulations as vital for the appropriate conduct of research. While such regulations are federally funded as part of the research support. Given the financial health universities face presently, therefore, it is more likely that they will cut back on local faculty administrative support.

The third contributing factor, largely unrecogn-ized in the various discussions of administrative support and indirect cost reimbursement, is the increase in the ratio of NIH funding to that from other agencies. The ratio of NIH funding to that of all agencies grew from 52% in 1992 to 63% in 2007, according to Appendix Table 5-6 in the National Science Foundation’s publication, Indicators 2008 (http://www.nsf.gov/statistics/seind08/). The admin-istrative costs associated with human and animal subject experiments make the average indirect administrative costs associated with NIH funding significantly greater than those associated with research funded by the other agencies. In addition, the Institutional Review Boards associated with human subject research require a great deal of faculty time for which they are not, for the most part, compensated. While it is important to have faculty input on these boards, participation takes the faculty away from direct participation in their research. The $10B appropriation for NIH contained in the American Recovery and Reinvestment Act of 2009 will only exacerbate this situation.

It is important to understand the financial burdens placed on universities by federal reimbursement and cost-sharing policies. According to Indicators 2008, university expenditures on R&D rose from $31B to $98B between 1990 and 2006. Approximately one-half of this is for unreimbursed indirect costs and cost sharing. This amounts to something like an increase from $0.5K to $1.5K per person in the U.S. for every $1K of NIH funding. This increase is shocking, given the heat that Congress has thrown at public universities for average tuition increases in recent years. Throughout those years, SSRL was constant-
tory. In response to that, Congress may not react completely rationally and with a broad perspective. Still another approach would be to eliminate the pro-
hibition in OMB Circular A-21 on the direct charging of administrative support for faculty. I believe that this is so important that I, the Federal Co-Chair of the Department of Health and Human Services, will testify strongly to Congress should there be a move to lift the cap. In response to that, Congress may not react completely rationally and with a broad perspective.

The one objection that has been voiced to this approach is that universities are likely to decrease the administrative support that they provide via indirect cost reimbursement if the faculty can fund that support directly. My own sense is that this concern is irrelevant in the present climate. The severe economic situations in which most universities find themselves, coupled with the less-than-full indirect cost recovery, will inevitably lead to such cutbacks. University presidents and the boards of directors of the major pharmaceutical companies. It would be par-