APS physics

CSWP & COM Gazette

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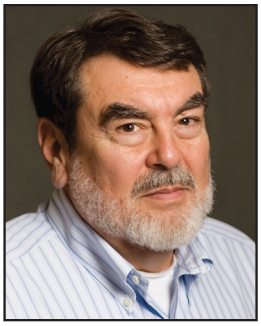
Newsletter of the Committee on the Status of Women in Physics & the Committee on Minorities of the American Physical Society

INSIDE

Guest Editorial: Gender Differences, Do They Matter? Should They Matter?

Lawrence S. Pinsky, University of Houston, CSWP Member



Lawrence S. Pinsky

There has been considerable research over the years on gender differences, and by that I mean intellectual differences. It is undeniable that there are characteristic differences between human females and males and in all species that have female and male forms, but most of those are fairly obvious and mostly irrelevant with respect to intellectual differences in humans. One aspect of the debates between the experts on various measures of intellectual ability that is relevant is the application of the results to explain or otherwise justify the substantial gender differences in participation in various fields, such as physics. There are, of course, gender differences in situations that are even greater than in physics, but many of them don't seem to attract the attention that the differences in the STEM fields do. For example, while there are women auto mechanics, plumbers, police and fire fighters, they are overwhelmingly in the minority. Generally, that is ascribed to differences in the physical strength of the average woman compared to her male counterpart, which given the practical demands of those fields, might be reasonable. However, no one suggests seriously that women lack the intellectual capabilities to enter those fields.

Intellectually, in the general sense, women are currently dominating our universities as undergraduates and as graduate students integrated over all fields, and the data are stunning [See e.g. *The Rise of Women: The Growing Gender Gap in Education and What It Means for American Schools*, March 31, 2013 Thomas A. Diprete & Claudia Buchmann, ISBN-13: 978-0871540515]. No one has seriously suggested that it is a manifestation of an endemic lack of intellectual ability on the part of males. So the last bastion of male intellectual superiority has become the reputed refuge of the most highly gifted in what is presumed to be the most intellectually challenging areas such as physics and mathematics. The suggestion that men's capabilities inherently exceeded women in mathematics was initially dispelled and replaced by the suggestion that while the mean was the same, the distribution was more compressed for women and that the tails of the distribution are more extensive for males so that the best and brightest are men (also presumably implying,

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Non-Cognitive Assessments: Enhance Validity and Diversity

Casey W. Miller, School of Chemistry & Materials Science, Rochester Institute of Technology

Despite their ubiquity, the wide differences in standardized test scores for different race/ethnicity and gender groups are only starting to be acknowledged in the realm of graduate admissions. Programs that are able and willing to break with traditional admissions protocols are observing that these scores do not tell the whole story behind a student, and are more or less irrelevant to predicting student success and retention in physics graduate school.

Figure 1 shows that racial/ethnic/gender groups have relatively large differences in average GRE Quantitative (GRE-Q) scores, even for physical science students. These data come from ETS, the company that makes the GRE[1]. The group differences are essentially the same for: the Physics GRE[2]; all graduate fields; students whose undergraduate GPA was an A; the SAT; 8th grade math achievement tests and fourth grade math achievement tests. ETS suggests these

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Publication Information

The COM/CSWP GAZETTE, a newsletter of the American Physical Society Committee on Minorities (COM) and Committee on the Status of Women in Physics (CSWP), is mailed free of charge to all those listed on the Roster of Women and Minorities in Physics, all U.S. physics department chairs, and others upon request. Because editorial responsibility rotates among COM and CSWP members, please address all correspondence to: COM/CSWP Gazette, American Physical Society, One Physics Ellipse, College Park, MD 20740-3844, or email to: ratnikova@aps.org. Opinions expressed are those of the authors and do not necessarily reflect the views of the APS or of the COM and CSWP.

Guest Editorial *continued from page 1*

so were the worst and dimmest) [Originally proposed by S. A. Shields, The variability hypothesis: The history of a biological model of sex differences in intelligence, J. Women Cult. Soc. 7 (1982), 769–797; and recently reiterated by L. Summers, *Remarks at NBER Conference on Diversifying the Science and Engineering Workforce*, 2005, January 14. Retrieved from http://www.harvard.edu/president/speeches/summers_2005/nber.php]. That last bastion has recently been debunked as well [See J.M. Kane and J.E. Mertz, Debunking Myths about Gender and Mathematics Performance, Notices of the AMS, 59-1 (2012) 10-21.], and generally the current evidence in that capacity is that there is no innate statistical difference.

So, how do we explain the lack of Nobel Prizes and Fields' medals being awarded to women? That is basically the issue we face now in our field and other allied STEM fields, the general lack of women in them. Whatever the reasons, we need to address them, and here is the reason why as I see it. We indeed want, and I would say, need, the best and brightest in our field and in other STEM fields as a species, given the challenges that face us. By excluding women (and for that matter any segment of our species) we are excluding over half of the potential field. Another way of phrasing it is that if the number of opportunities for physicists in this world is a scarce resource, we are currently populating it with less than the optimal individuals, in fact ~50% less.

Since there are differences that do need to be addressed, even though native ability is not one of them, we face the task of making "reasonable accommodations," where they are needed. Unfortunately that phrase is associated with special provisions needed by the less than able-bodied amongst us, and women are not handicapped, but in order to attract those who are motivated to enter our field, we must be willing to welcome and encourage them to the maximum extent possible. Given the myriad challenges we face as a species, our ultimate survival may depend upon having the very best and brightest in the forefront of research in all fields, not the least of which is ours. ■

CSWP Recognizes 12 Outstanding Physicists in 2014

The APS Committee on the Status of Women in Physics (CSWP) began a program to highlight exceptional female physicists in January 2012. Each month a new woman is the face of **www.WomenInPhysics.org** and her brief bio is featured on the website. In 2014, the following women were featured by CSWP (in order of feature):

Gabriela Gonzalez, Louisiana State University

Karen Daniels, North Carolina State University

Lisa Whitehead, University of Houston

Shohini Ghose, Wilfrid Laurier University

Agnes Mocsy, Pratt Institute

Veronica Barone, Central Michigan University

Kathryne Sparks Woodle, Penn State University

Ibtesam Saeed Badhrees, King Abdulaziz City for Science and Technology

Susan Blessing, Florida State University

Jena Meinecke, University of Oxford

Giuliana Di Martino, Imperial College London

Bethany Goldblum, University of California, Berkeley

The CSWP Woman Physicist of the Month award recognizes female physicists who have positively impacted other individuals' lives and careers. The award is not restricted to just research physicists, but open to students, teachers or any woman doing physics-related work. Nominations are accepted on a rolling basis.

To nominate someone, the name, institution/facility/company, and email of both the nominee and nominator should be emailed to women@aps.org. The nominee's CV and a nomination statement, up to three paragraphs, should also be included in the email as attachments. ■

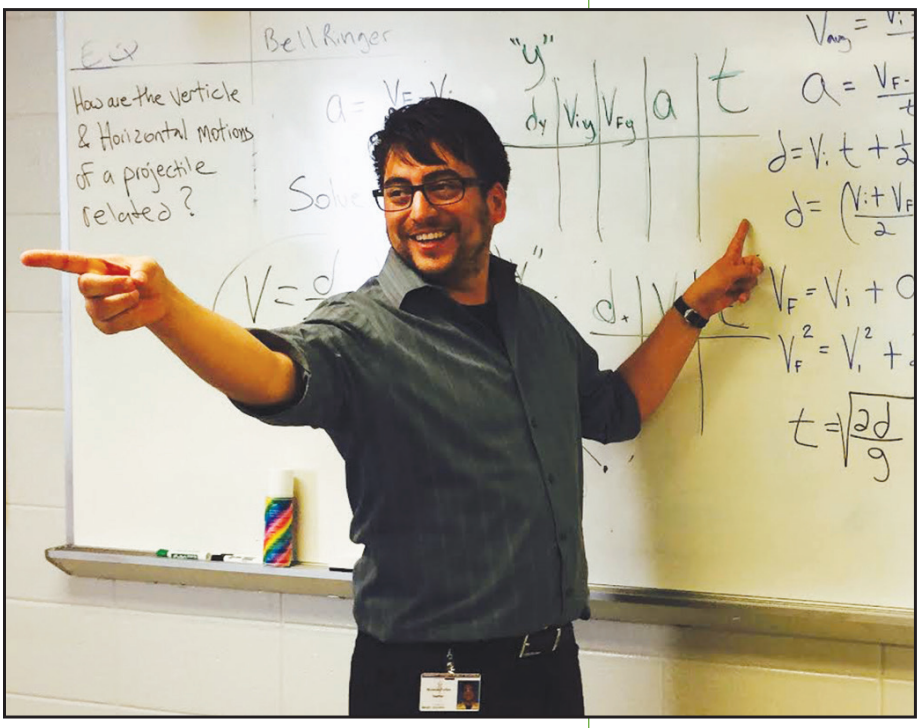
Ricky Farfan: A Hispanic Teacher Making a Difference

Ricky Farfan, a Georgia State University (GSU) PhysTEC graduate, is excited about beginning his first year of teaching physics at Berkmar High School in Lilburn, GA. Farfan teaches five physics courses, including one that is co-taught with a special education teacher and which is one of his hardest-working classes. Farfan, a Latino, identifies with the student body, which is almost half Hispanic and one third African American. Many students are excited to get to know him; he is one of the few Latino teachers at the school. Farfan is a patient and encouraging teacher who strives to help his students understand the language of math and physical concepts and recognize the value of learning.

In 2009, when helping a friend register for courses at Perimeter College, he got the "learning bug" and registered himself for math courses. With encouragement from his teachers, his interest grew to include physics, which he saw as a tangible application of math. After visiting Georgia State University and meeting Brian Thoms, the GSU PhysTEC site leader, Farfan was convinced he wanted to become a physics teacher.

In August 2012, Farfan began a bachelor's degree in physics with a concentration in education. Farfan feels that as a future teacher, he was given the right advice and set up to be successful from the start. At GSU, he was part of a community of 8-10 future teachers held together by Thom's leadership and support. Farfan's first teaching experience was as a Learning Assistant (LA), serving as a peer instructor in an introductory physics course. Farfan was recruited into the LA program by another GSU physics professor, Joshua Von Korff, who conducts research on Learning Assistants.

Farfan clearly remembers feeling intimidated the first time he was in a classroom "in the trenches," but he quickly grew to enjoy the experience. Another memorable part of Farfan's physics teacher education program was having the Teacher-In-Residence, Elizabeth Walker, observe his student teaching at a local high school. After the class, Walker helped Farfan deconstruct the lesson to improve it and build upon his strengths.



Ricky Farfan

Today, Farfan is teaching physics at Berkmar High School, his first choice school. He can already observe his impact on students. Farfan tells the story of one student who failed the first test but earned an 80% on the second test after studying with him after school. The student was thrilled at his improvement. Farfan relates well to his students, especially those who are tentative learners, as he was in high school. His students share Farfan's enthusiasm about spending the year exploring all the formulas listed on the formula sheet. For example, a recent interactive lab on projectile motion inspired his students. If the students correctly calculated where a ball would land, they were allowed to skip writing their lab report. When his students were successful, Farfan said it was if they had won a national championship. ■

Article reprinted from PhysTEC News, *Vol. 8, Fall 2014.*

WOMEN & MINORITY SPEAKERS LISTS

Need a Speaker?

Consult the American Physical Society's women and minority speakers lists, online lists of women and minority physicists who are willing to give colloquium or seminar talks to various audiences. These lists serve as wonderful resources for colleges, universities, and general audiences. They have been especially useful for colloquium chairs and for those taking advantage of the Travel Grant Programs for Women and Minority Speakers. The online lists are searchable by state, fields of physics, or speakers' last names.

To find a woman speaker, go to: **www.aps.org/programs/women/speakers/**

To find a minority speaker, go to: **www.aps.org/programs/minorities/speakers/**

differences are rooted in educational opportunity/access differences. That is probably not inaccurate. It is probably also irrelevant to one's potential to become a research scientist.

The use of minimum acceptable scores on these tests is a signicant problem in numerous fields[3], despite ETS usage guidelines stating to not use such methods. Nearly all PhD programs in the AIP Graduate Programs book require the General GRE, with 25% explicitly stating a minimum GRE-Q score for admission; the median stated cutoff is around 64th-70th percentile, depending on year (~700 (155) on the old (new) test). Admissions protocols that use GRE cutoff scores will suppress diversity: no one in the shaded area of Fig. 1 could be admitted.

We can calculate the impact of hard cutoffs on the diversity of the "acceptable" applicant pool by integrating the score distributions from said cutoff up to a perfect score. This takes the original applicant pie, and distorts the fractional size of each of the slices. Defining *Representation* as the number for one group making it through the cutoff normalized by all individuals making it through the cutoff, the effect is a signicant change of representation: relative to the total pool of test takers, a typical cutoff score of 700 leads to over-representation of Men, Asians, and Whites by 14%, 23%, and 5%, respectively; while Women are underrepresented by 26%, Mexican Americans by 38%, Puerto Ricans by 71%, Other Hispanics by 70%, African Americans by 26%, and Native Americans by 50%. References here to gender include all races/ethnicities (and vice versa).

Another metric is selectivity: the fraction of test takers exceeding the cutoff for each group, normalized by the total test takers of that group. This allows the following in-group stats for the 700 cutoff: 26% of women and 5.2% of all under-represented minorities meet or exceed this cutoff. Without claiming causality, it is noteworthy that the fraction of physics PhDs granted to female and minority US citizens are ~22% and ~16%, respectively[4,5].

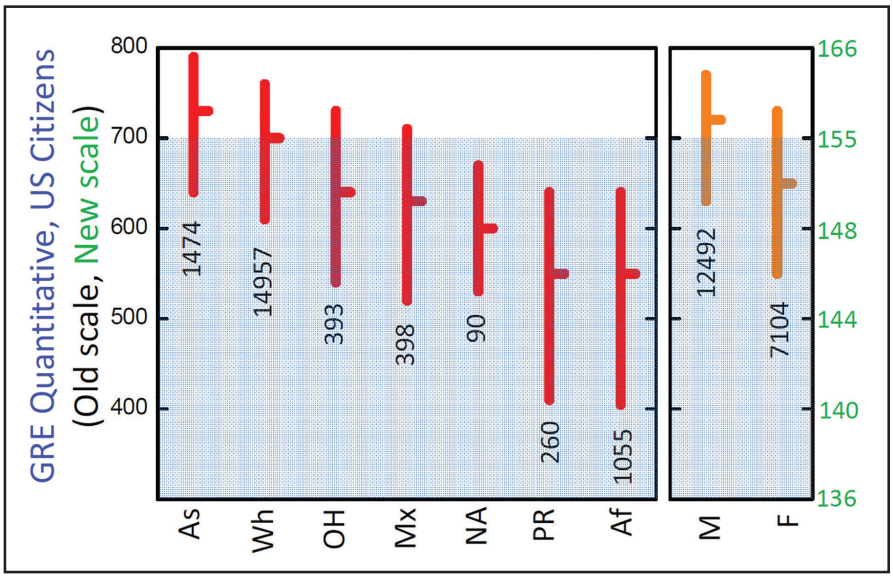


FIG. 1: Most recently released GRE Quantitative score distributions (2006-2007) by race/ethnicity and gender for US citizens whose self-identified intended graduate major was physical sciences."[1] The top (bottom) of the marker lines is the 75th (25th) percentiles of each distribution; the tick is the median. The left axis is the score from the old GRE; right axis is the conversion of those scores to the new test scale. From left to right, the groups are: Asian, White, Other Hispanic, Mexican American, Native American, Puerto Rican, African American; Male, Female.

The crisis at hand is that the standard admissions process disproportionately removes women and underrepresented minorities while not being able to identify students who will complete the PhD with much more accuracy than a coin toss[6]. While innumerable faculty acknowledge problems with the tests, diversity is taken into consideration after applying the GRE as an initial filter of the applicant pool[3]. The sheer convenience of sorting spreadsheets is a main reason such protocols are perpetuated. Others are misunderstanding what scores imply about intelligence, and ignorance of the tests' large standard error of measurement (around 20%).

Non-cognitive competencies are orthogonal to cognitive variables. "Non-cogs", such as conscientiousness, achievement orientation, grit, etc., can help identify students with the necessary non-science skills to navigate rigorous graduate programs. The importance of these constructs for success in higher education has been noted only recently[7-11], though decades of research in management and industrial-organizational (IO) psychology have shown that they enhance validity and diversity in selection processes. Indeed, non-cognitive skills do not appear to depend on identity, be that discipline, race, gender, culture, or language. Signicantly, the Council of Graduate Schools announced in late 2014 a project to explore these concepts for innovations in graduate admissions[12].

Many of the studies regarding non-cogs are seen as dubious by many STEM faculty, probably due to an implicit bias against "touchy feely" social science research with small numbers (many of us are spoiled by having Avagadro's number of participants in our experiments!). In what may be a not unsavory example, Richard Boyatzis[9] investigated how the didactic and clinical performance of dental students correlated with their as-admitted metrics of cognitive (undegrad GPA; Dental Admissions Test scores) and non-cognitive variables. The only signicant predictor of clinical performance (speculated to be analogous to research skills) was the Self-Management cluster of competencies: conscientiousness (arguably the most widely validated construct in IO psychology), achievement orientation, initiative, trustworthiness, adaptability, emotional self-control, and optimism. They, and others, conclude that cognitive ability and disciplinary knowledge are mere thresholds, necessary but insufficient for outstanding performance. Non-cognitive competencies lift the degeneracy.

Noting the growing importance of assessing non-cogs[13], *ETS* developed what they call the *Personal Potential Index* to assess certain aspects of personality. This is a standardized reference that probes non-cogs, similar to what many schools now demand before you can upload your letter. It is not clear if the PPI is catching on, but it offers inspiration for the future. Non-cognitive assessments will not be (widely) adopted

unless they have the same ease of use enjoyed by GPA and GRE scores. The Situation Judgment Test is a potential multiple choice format tool: applicants indicate how they would act in a hypothetical scenario. With appropriate design by a social scientist, these tests can measure non-cognitive competencies with a handful of such questions, and they can be tailored to address discipline-specific concerns.

Implementing non-cognitive assessment in the admissions process in the near term is likely to be limited to personal statements, reference letters, and interviews. Involving a social scientist can help make this evaluation more efficient and more robust, e.g., by developing a rubric to help identify important non-cognitive markers within each component, and providing training to deal with inter-rater reliability. Rubrics also increase fairness by ensuring all factors are assessed for each applicant, which itself is a means to mitigate implicit bias and reviewer fatigue. Regardless of specifics, any variables should receive coarse grades (0, 1, 2), including the conventional metrics like GPA and GRE. Coarse graining within the rubric is important because the resolution is poor. To first order, it is appropriate to equally weight the non-cognitive and cognitive metrics, since research has shown these are orthogonal. The Fisk-Vanderbilt Bridge Program offers a toolkit for the interested reader[14].

In short, measuring applicants along relevant non-cognitive dimensions will likely help select students with greater potential to excel in research and complete the PhD, while simultaneously increasing access for groups under-represented in physics. The success of Bridge Programs in physics demonstrates the efficacy of these methods.

A longer version of this article, with additional references, appears in the January 2015 issue of *STATUS*, published by the American Astronomical Society's Committee on the Status of Women in Astronomy[15]. I thank the NSF and RIT's Division of Diversity and Inclusion for supporting these efforts.

1 *http://www.ets.org/Media/Tests/GRE/pdf/gre_0809_factors 2006-07.pdf.*

2 *http://www.apsbridgeprogram.org/resources/140213-stc.pdf.*

3 *J.R. Posselt, American Journal of Education* ***120****, 481 (2014).*

4 *American Physical Society Minority Physics Statistics; http://www.aps.org/programs/minorities/resources/statistics.cfm.*

5 *American Physical Society/Source: IPEDS Completion Survey IPEDS Completion Survey and NSF-NIH Survey of Graduate Students and Postdoctorates in Science and Engineering; http://www.aps.org/programs/education/statistics/womenphysics.cfm.*

6 *Council of Graduate Schools, Ph.D. Completion and Attrition: Analysis of Baseline Demographic Data from the Ph.D. Completion Project (2008). Available from: http://www.phdcompletion.org/information/book2.asp.*

7 *W. E. Sedlacek, The Advisor: The Journal of the National Association of Advisors for the Health Professions* ***2****, 32 (2004), URL http://www.williamsedlacek.info/publications/articles/why1.pdf.*

8 *K. G. Stassun, S. Sturm, K. Holley-Bockelmann, A. Burger, D. J. Ernst, and D. Webb, American Journal of Physics* ***79****, 374 (2011), URL http://scitation.aip.org/content/aapt/journal/ajp/79/4/10.1119/1.3546069.*

9 *K. Z. Victoro and R. E. Boyatzis, Journal of Dental Education* ***77****, 416 (2013), http://www.jdentaled.org/content/77/4/416.full.pdf+html, URL http://www.jdentaled.org/content/77/4/416 abstract.*

10 *K. Powell, Nature* ***504****, 471 (2013).*

11 *C. Miller and K. Stassun, Nature* ***510****, 303 (2014), URL http://www.nature.com/nature/journal/v510/n7504/full/nj7504-303a.html.*

12 *http://www.cgsnet.org/innovation-graduate-admissions-through-holistic-review.*

13 *P. Kyllonen, A. M. Walters, and J. C. Kaufman, Educational Assessment* ***10****, 153 (2005), URL http://www.tandfonline.com/doi/abs/10.1207/s15326977ea1003_2.*

14 *http://www.vanderbilt.edu/gradschool/bridge/tools.htm.*

15 *C. W. Miller, Status* ***Jan****., 1 (2015), URL http://www.aas.org/cswa/status/Status_2015_Jan.pdf.*

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2016 CUWiP Sites Announced

The 2016 APS Conferences for Undergraduate Women in Physics (CUWiP) will be held Friday, January 15 through Sunday afternoon, January 17, 2016 at the following locations:

Oregon State University
University of California, San Diego
Black Hills State University
University of Texas, San Antonio
Georgia Institute of Technology
Ohio State University
Old Dominion University/Jefferson Lab
Syracuse University
Wesleyan University

The CUWiP goal is to help undergraduate women continue in physics by providing them with the opportunity to experience a professional conference, information about graduate school and professions in physics, and access to other women in physics of all ages with whom they can share experiences, advice, and ideas. Learn more at: **www.aps.org/programs/women/workshops/cuwip.cfm**

Student applications are accepted starting in September, and acceptance notifications are sent by December 1. Stay tuned to **www.WomenInPhysics.org** for updates on the application process!

CUWiP are three-day regional conferences held for undergraduate physics majors each January.

Special Events Focusing on Women and Minorities in Physics

APS March Meeting • San Antonio, Texas

SUNDAY, MARCH 1

Professional Skills Development Workshop for Women Physicists
Workshop for developing communication and negotiation skills; for post docs and early-career women physicists (participants must be pre-registered). Reception for participants to follow.

TUESDAY, MARCH 3

CSWP Invited Session and Post-Session Networking Event
Join CSWP for a morning session on Supporting the Recruitment and Retention of Women in Physics. Speakers and panelists include: Geoff Potvin (Florida International University), Vashti Sawtelle (Michigan State University), Allison Gonsalves (McGill University), Alison Coil (University of California), Carel Boekema (San Jose State University), Meenakshi Singh (Sandia National Labs), and Jenna Walrath (University of Michigan). There will be a post-session networking event with snacks and refreshments; all are invited.

WEDNESDAY, MARCH 4

National Society of Black Physicists (NSBP) Meetup
Grand Hyatt San Antonio, 6:00-7:00pm, Travis C NSBP members and those interested in the work of NSBP are invited to gather, network, and learn about NSBP initiatives. All are welcome. Students and postdoctoral researchers are particularly encouraged to attend

National Society of Hispanic Physicists (NSHP) Meetup
Grand Hyatt San Antonio, 6:00-7:00pm, Travis B NSHP members and those interested in the work of NSHP are invited to gather, network, and learn about NSHP initiatives. All are welcome.

LGBT+ Physicists/C-LGBT Roundtable and Panel Discussion
Grand Hyatt San Antonio, 6:00-7:00pm, Bonham B The LGBT+ Physicists group and the ad hoc APS Committee on LGBT issues (C-LGBT) welcome those who identify as gender sexual minorities, as LGBTQQ-IAAP+, or as allies to learn about the work of the APS ad hoc C-LGBT; provide feedback to the committee on the proposed work and recommendations to APS; network; and share experiences as LGBTQ+ physicists and students in various educational and professional environments. Attendees are encouraged to attend the Diversity Reception following this event to continue networking.

Diversity Networking Reception – co-sponsored by COM and CSWP
Grand Hyatt San Antonio, 7:00-8:30pm, Crockett C-D Learn about the work of the Committee on Minorities in Physics, the Committee on the Status of Women in Physics, and the ad hoc Committee on LGBT Issues, network with colleagues, and unwind after a long day of sessions. All are welcome.

Keep up with the action and connect with other meeting attendees using social media!
Twitter Account: @APSMeetings
Official Hashtag: #apsmarch

And don't forget to pick up your own Flat Meitner at the APS Membership Booth. Snap her photo and tweet the pic #flatMeitner

APS April Meeting • Baltimore, Maryland

FRIDAY, APRIL 10

Professional Skills Development Workshop for Women Physicists
Workshop for developing communication and negotiation skills; for post docs only (participants must be pre-registered). Reception for participants to follow.

SATURDAY, APRIL 11

CSWP/GGR Networking Luncheon
Enjoy lunch while networking with colleagues! Cost: $15; $5 for physics students thanks to GGR's generosity. All are welcome, both men and women. Pre-registration is strongly advised. Food served from 12:00-1:30pm; the panel begins at 1:00pm. Registration for this event is available through the April Meeting registration form.

SUNDAY, APRIL 12

Education & Diversity Networking Reception
Learn about the work of the Education & Diversity Department, network with colleagues, and unwind after a long day of sessions. Forum on Education Fellows and recipients of the Committee on Education's Award for Improving Undergraduate Physics will be recognized at this reception. All are welcome.

Please check dates of all events on the Meetings and hotel calendars, as they may change closer to the event dates.

Women and Minorities Named to Fellowship

Each year, APS members are nominated by their peers to Fellowship in the Society. New Fellows are elected after careful and competitive review and recommendation by a fellowship committee on the unit level, additional review by the APS Fellowship Committee and final approval by the full APS Council. Only half of one percent of the total APS membership is selected for Fellowship in the Society each year. This year, 37 women and 12 minorities were named to Fellowship.

AMERICAN PHYSICAL SOCIETY

Tiziana Di Matteo
Carnegie Mellon University

For pioneering work in computational cosmology which has made fundamental contributions to our understanding of the impact and growth of black holes in structure formation.

Senta V. Greene
Vanderbilt University

For her contributions to the field of nuclear physics and dedicated service to the community in promoting science to the general public and enhancing the participation of women and minorities in science.

Janna Levin
Columbia University

For contributions to theoretical cosmology and gravitation, especially applications of chaos theory and topology, and for highly original work at the interface of science, art, and literature.

Margaret Malloy
American Physical Society

For a career-long commitment to the journals of the American Physical Society, and particularly for her long and distinguished service to the physics community as Editor and Managing Editor of Physical Review A and Physical Review E.

DIVISION OF ASTROPHYSICS

Karen L. Byrum
Argonne National Laboratory

For contributions in advancing a complimentary experimental approach for studying dark matter by including cosmic gamma-rays and for contributions in developing new technologies for triggering and photo-detection.

Elizabeth A. Hays
NASA Goddard Space Flight Center

For her discovery of high energy gamma-ray flares from the Crab nebula in Fermi data and her major contributions to the success of Fermi.

Victoria Kaspi
McGill University

For advancing our understanding of the astrophysics of neutron stars by elucidating the relationship between anomalous X-ray pulsars, soft gamma-ray repeaters, and magnetars.

Sera Markoff
University of Amsterdam

For fundamental contributions to our understanding of accreting compact objects on all scales, and in particular, for significant contributions to the question of formation of astrophysical jets in neutron stars and black holes.

Amber D. Miller
Columbia University

For important contributions to observations of the cosmic microwave background and development of innovative instrumentation for millimeter-wave cosmology.

Rosalba Perna
State University of New York, Stony Brook

For her pioneering contributions to our understanding of the long and short gamma-ray bursts, including the development of advanced models to describe their properties and environments, calculations of their particle and radiative emission, and innovative treatment of the time-dependent photoinization in the dusty environment around the bursts.

So-Young Pi
Boston University

For her seminal contributions to the phenomenon of density fluctuations in theories of cosmic inflation.

Suzanne T. Staggs
Princeton University

For her precision measurements of the absolute temperature, temperature anisotropy, and polarization of the CMB from the ground and a balloon, and for her development of novel coherent and bolometric instruments. The results of her pioneering research have led to the discovery of new clusters of galaxies, the kinetic SZ effect, and gravitational lensing of the CMB.

DIVISION OF ATOMIC, MOLECULAR & OPTICAL PHYSICS

Marcos Dantus
Michigan State University

For contributions to the development of pulse shaping and coherent control techniques for femtosecond electronic spectroscopy microscopy and remote sensing of molecules.

Luiz Davidovich
Univ Fed Rio de Janeiro

For theoretical contributions to quantum measurements, especially those involving cavity QED in the strong coupling regime, and for the advancement of quantum optics in Latin America.

Natalia M. Litchinitser
State University of New York, Buffalo

For fundamental contributions to linear and nonlinear light-matter interactions in metamaterials and structured light interactions with nanostructures.

Maria N. Piancastelli
Uppsala University

For studies of electronic structure and dynamics of core-excited and core-ionized atoms and molecules by means of x-ray spectroscopic tools.

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For information on nominating women and minorities for APS prizes and awards, please visit www.aps.org/programs/honors/nomination.cfm

Please Update Your Address

Dear Gazette *Reader,*

The APS Roster of Women and Minorities is also used as the Gazette *mailing list.*

If your address has changed and you wish to continue receiving the Gazette*, please visit www.aps.org/programs/roster/enroll.cfm to re-register and select The* Gazette *Mailing List as your Roster group.*

Questions? Contact Arlene Modeste Knowles at roster@aps.org.

Keep reading the Gazette*!*

DIVISION OF BIOLOGICAL PHYSICS

Margaret Gardel
University of Chicago

For her novel and inventive experimental contributions to understanding the mechanical properties of living cells from the molecular to cellular levels.

Sara A. Solla
Northwestern University

For applications of statistical physics to problems concerning learning, adaptation, and information coding in neural systems.

THE DIVISION OF CHEMICAL PHYSICS

Spiridoula C. Matsika
Temple University

For her contributions to understanding the dynamics of excited molecules around conical intersections and method development to calculate such at the highest levels of theory.

DIVISION OF COMPUTATIONAL PHYSICS

Fernando A. Escobedo
Cornell University

For the elucidation and prediction of complex phases formed by block copolymers, elastomers, and colloidal suspensions of anisotropic particles, and the advancement of novel Monte Carlo simulation methods.

Nicola Marzari
Ecole Polytechnique Federale de Lausanne

For the development of creative and original methods for ab initio calculations of materials properties, in particular Wannier-based electronic structure methods and first principles simulations of transport properties of solids and nanostructures.

Aldo H. Romero
West Virginia University

For his seminal contributions to open-source electronic structure codes, and the elastic and thermal characterization of semiconductors, metals, and complex nanostructures at ambient and high pressures.

DIVISION OF CONDENSED MATTER PHYSICS

Cristian D. Batista
Los Alamos National Laboratory

For theoretical contributions to the understanding of frustrated magnetic systems, topological phases, and electronic ferroelectricity.

Suzanne Te Velthuis
Argonne National Laboratory

For contributions to the understanding of magnetic heterostructures utilizing polarized neutron reflectivity.

DIVISION OF FLUID DYNAMICS

Shelley L. Anna
Carnegie Mellon University

For contributions in extensional rheology and droplet microfluidics and in particular for elucidating and manipulating the effect of surfactants in microfluidic tip streaming.

Karen A. Flack
US Naval Academy

For her clarifying work on the structure of three dimensional turbulent boundary layers, and for better characterizing the connections between surface roughness geometry and boundary layer drag.

Z. Jane Wang
Cornell University

For fundamental contributions to our understanding of insect flight through simulations of hovering, elucidation of unsteady forces, development of computational tools, and analyses of flight efficiency, stability, and control.

DIVISION OF MATERIALS PHYSICS

Elke Arenholz
Lawrence Berkeley National Laboratory

For developing and applying advanced soft x-ray instrumentation to achieve seminal advances in understanding magnetic materials and thin films.

Despina A. Louca
University of Virginia

For demonstration of the importance of the local atomic structure for elucidating the physical properties of complex oxides including the transition metal oxides through neutron scattering using the pair-density-function analysis.

Jose Menendez
Arizona State University

For significant contributions to the use of Raman spectroscopy in condensed matter physics and the understanding of lattice vibrations in semiconductor materials and superlattices.

DIVISION OF NUCLEAR PHYSICS

Mary Alberg
Seattle University

For seminal contributions to understanding the sea of the nucleon and other baryons and her extraordinary service to the physics community.

Michelle A. Espy
Los Alamos National Laboratory

For the application of nuclear physics techniques to biomedical research and national security challenges. Including pioneering work in the application of ultra-low field nuclear magnetic resonance to functional brain imaging and non-invasive identification of materials for national security.

Julia A. Velkovska
Vanderbilt University

For her leading role in the understanding of hadron production and collective phenomena measured in relativistic heavy ion reactions at the RHIC and LHC laboratories.

DIVISION OF PARTICLES & FIELDS

Mary R. Bishai
Brookhaven National Laboratory

For her contributions to flavor physics, including analysis of the NuMI/MINOS neutrino beam, leadership of the accelerator neutrino program, and contributions to understanding of the b-quark.

Larry D. Gladney
University of Pennsylvania

For his contributions to the study of B physics at the Tevatron and Babar, and for his outstanding efforts in science teaching and outreach programs for middle- and high school students and teachers.

Eva Halkiadakis
Rutgers University

For her leadership in precision electroweak and top quark measurements at the Tevatron and searches for Supersymmetry at the LHC and for pioneering work in pursuit of new physics in multi-jet final states.

Deborah A. Harris
Fermilab

For leadership in measuring the neutrino reactions that enable current and future accelerator neutrino oscillation experiments.

Maria Spiropulu
California Institute of Technology

For pioneering searches for supersymmetry and extra dimensions at the Tevatron, innovative searches for new physics and the study of the Higgs boson at the LHC, and key contributions to triggering and data flow for CDF and CMS.

Shufang Su
University of Arizona

For her fundamental contributions to the phenomenology of Higgs bosons, dark matter, supersymmetry, and other physics beyond the Standard Model, which have stimulated and guided experimental search programs.

DIVISION OF PHYSICS OF BEAMS

Mei Bai
Brookhaven National Laboratory

For outstanding contributions to the dynamics of spin-polarized beams and the acceleration of polarized protons for the first high energy polarized proton collider.

DIVISION OF PLASMA PHYSICS

Debra A. Callahan
Lawrence Livermore National Laboratory

For innovative design and modeling of hohlraums for Inertial Confinement Fusion and leadership in the execution of hohlraum experiments on the National Ignition Facility.

Christine Charles

For discovery of current-free double layers in helicon plasma sources, development of helicon ion beam generators, and their application to space propulsion and materials modification.

TOPICAL GROUP ON FEW-BODY SYSTEMS

Laura E. Marcucci
University of Pisa

For advancing the understanding of electroweak interactions in nuclei, particularly for precise studies of low-energy radiative and weak capture processes of astrophysical relevance in the few-nucleon systems.

TOPICAL GROUP ON INSTRUMENT AND MEASUREMENT SCIENCE

George Rodriguez
Los Alamos National Laboratory

For his outstanding leadership in the development of ultrafast laser-based and high-speed optical instrumentation and his creative application of these diagnostics to the impactful measurement of materials, systems, and devices.

TOPICAL GROUP PRECISION MEASUREMENT & FUNDAMENTAL CONSTANTS

Ana Maria Rey
University of Colorado, Boulder

For her pioneering research on developing fundamental understanding and control of novel quantum systems and finding applications for a wide range of scientific fields including quantum metrology and emerging interface between AMO, condensed matter, and quantum information science.

TOPICAL GROUP ON QUANTUM INFORMATION

Lorenza Viola
Dartmouth College

For seminal contributions at the interface between quantum information theory and quantum statistical mechanics, in particular, methods for decoherence control based on dynamical decoupling and noiseless subsystems and for characterizing entanglement in quantum many-body systems.

FORUM ON INDUSTRIAL & APPLIED PHYSICS

Jesus A. del Alamo
Massachusetts Institute of Technology

For fundamental contributions to the development of III-V compound semiconductor electronics.

Ernesto E. Marinero
Purdue University

For his seminal contributions to the development of materials for recording and sensor devices enabling continuous density increases of information storage technology, in particular of magnetic recording. ■

Do you have a story to share with the Gazette readership? Email women@aps.org

Fellowship Winners Chosen by APS Committee on Women in Physics

Michael Lucibella, APS Staff Writer

Ani Tshantshapanyan

Monique Tirion

Applications for the Blewett Fellowship are due in June. Learn more at go.aps.org/apsblewett

The American Physical Society awarded five M. Hildred Blewett Fellowships this year to women returning to their careers after a hiatus, the largest number of winners since the beginning of the program.

Chosen by the APS Committee on the Status of Women in Physics, the five include three new recipients and two returning recipients from last year. Amy Daradich of the University of Ottawa and Leslie Kerby at Los Alamos National Laboratory first received fellowships in 2013, while Ani Tshantshapanyan of North Carolina Central University, Monique Tirion of Clarkson University, and Lusaka Bhattacharya of Oklahoma State University are new.

The fellowship is a one-year grant of up to $45,000 that can be used towards a wide range of necessities, including equipment procurement, salary, travel, tuition, and dependent care. This is the tenth year the fellowship has been awarded.

Ani Tshantshapanyan

Ani Tshantshapanyan was first drawn to physics during high school in Armenia. “My parents are chemists, they’re also PhDs,” she said. “I grew up in that environment of science.”

She received her PhD in semiconductor physics from the Yerevan State University. At the same time, she had also been working as a laboratory assistant and then as a senior lecturer at the department of applied physics at the Russian-Armenian University, also in Yerevan, Armenia.

Then in 2012 her husband Karen, who also has a doctorate in physics, took a job in Durham, North Carolina. “We moved to a different country and finding a secure job was not easy,” Tshantshapanyan said.

After her third child was born last June, Tshantshapanyan decided to step away from research for a short while to spend more time raising her three children. “After about one year I started to search for a position,” Tshantshapanyan said.

Through her husband, she found a postdoc position at North Carolina State University studying the complex geometry of quantum dots, which have been used in detectors and lasers.

“My research is about the physical properties of so-called quantum dots,” she said.

“Properties of quantum dots can be controlled by their external shape and many other physical properties.”

With the help of the Blewett fellowship, she hopes to publish more papers on her research, as well as develop software to further her work. She hopes also to establish contacts with other research institutions nearby and ultimately find a private company to collaborate with to commercialize the kind of quantum dots she’s been helping to develop.

Monique Tirion

Monique Tirion is returning to physics in order to work on better understanding the dynamics of proteins. X-ray crystallography is a well-established method for studying the makeup of proteins that make life possible. However, it turns out that scientists have been seeing only part of the story. “So people have been admiring these static images for a long time,” Tirion said. “We can take it a step further… We can make those static images [into] dynamic images.”

Using software she has been helping to develop, she has been able to calculate the normal vibrational modes of the different proteins based on their shapes. The work has helped explain some of the finer points of how these protein systems behave. “It’s not an easy computation, but if you carry it through, the insights you gain from it can be very exciting,” Tirion said. “The static images really can’t elucidate how all of these little mysteries are resolved.”

She said she’s always been driven by her fascination with the biological sciences and trying to understand how the world works and what makes things happen. “It’s just a natural evolution,” Tirion said. “The world around us is so astounding, the trees and the flowers and whatnot. My effort to understand that naturally came to this scale, this nanoscale where I’m working at.”

Tirion attended Texas A&M University for her undergraduate degree in physics, and then Boston University for her PhD. There she met Daniel Ben-Avraham, her future husband. Shortly after receiving her doctorate, her husband took a job at Clarkson University in upstate New York. The two moved to the small town of Potsdam, and a short time later her son Yoel was born.

Yoel was born with three health issues. “All three individually take some effort to supervise, but all three at the same time was a bit overwhelming, so I decided to give it my full attention.”

She carefully monitored his diet and homeschooled Yoel until he started the 7th grade, and today he is much healthier. With Yoel doing well, Tirion has been able to return to research. Thanks to the Blewett support, she hopes to take the recent work she’s been doing on proteins even further.

“I would like to make it more easily available to the crystallographers,” Tirion said. “I’m not sure where it will go, but I’m just analyzing these systems and sharing them with the crystallographers, and seeing where it takes me from there.”

Lusaka Bhattacharya

Lusaka Bhattacharya grew up in India and had always been interested in the sciences. "Physics is very interesting to me because in physics you have mathematics, and you also have a theoretical part and you have an experimental part," Bhattacharya said. "My mom is also a mathematician so I decided that that means I would study physics."

She studied theoretical nuclear physics at the Saha Institute of Nuclear Physics in India and received her PhD from the University of Calcutta in 2012. Studying nuclear physics there, she focused on studying the quark-gluon plasma, and traveled a great deal to present her work around the world. "It is a very new field so you can explore a lot," Bhattacharya said. She added that the idea of learning about what made up the universe just an instant after the Big Bang was what attracted her to the field.

While working on her doctorate, she met her husband, and the two married in 2010. He finished his degree early and traveled first to Helsinki, and then to Oklahoma, for his postdoc work. After Bhattacharya finished her doctorate in 2012, she moved to Oklahoma to join her husband. "My husband is a theoretical physicist like me, but it is very difficult to get a postdoctoral position in the same university," she said.

It was the first time the two had been able to live in the same city for an extended period of time. Bhattacharya decided to take some time away from research and start a family. Earlier this year, her first son was born. "Now he's almost nine months old so now I think I should start my career again," she said.

She started volunteering at Oklahoma State University to collaborate with her mentor at Kent State University. She's helping to develop a photon probe for detecting when particle collisions have created a quark-gluon plasma .

For more on the Blewett fellowships, see http://www.aps.org/programs/women/scholarships/blewett/index.cfm ■

Lusaka Bhattacharya

2015 Edward A. Bouchet Award Recipient: Jorge Lopez

The Edward A. Bouchet Award was established in 1994 to identify and recognize a distinguished minority physicist who has made significant contributions to physics research. This year, Jorge Lopez of the University of Texas El Paso is the recipient of the Bouchet Award and his citation reads:

"For extensive research accomplishments in theoretical nuclear physics, pioneering work in heavy ion collision dynamics and development of systematic ways to study problems of nuclear fragmentation and his relentless work in building bridges to Latin America and his outreach to the Hispanic community to increase diversity in Physics."

Lopez earned BS and MS degrees at the University of Texas at El Paso, and a Ph.D. at Texas A&M University in 1986 with highest honors and earning the Best Thesis Award. He went to the Niels Bohr Institute and Lawrence Berkeley Lab for postdoctoral stays and returned to his alma mater in 1990 where he has been Assistant, Associate and Professor, as well as Associate Dean and Department Chair. Dr. Lopez is a Fellow of APS, has been President of the Texas Section of APS, Chair of the Committee on Minorities, President of The National Society of Hispanic Physicists, and is current President of the Division of Radiation Physics of Mexican Physics Society. His research has focused on nuclear physics, but he has also studied gravity waves, astrophysics, physics education, pre-K science teaching, materials science, and applications of scientific methods to political science, anthropology and cultural heritage. He has edited and written six books and published over 100 articles, and organized regional, national and international meetings. He received the 2014 Mentoring award from the Division of Nuclear Physics of APS, the 2009 Hyer Research Award from the Texas Section of APS, and was admitted to the Mexican Academy of Sciences in 2012. His biggest source of pride is the large number of BS, MS and PhD students he has supervised to date: 60.

Jorge Lopez

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