

RESONANCES

NEWS OF INTEREST TO FLORIDA STATE UNIVERSITY PHYSICS ALUMNI

2013

A Message from the Chair

Welcome to the Department of Physics newsletter for Summer 2013!

As I have mentioned in previous years, our department is a very special place indeed, and *Resonances* gives us chance to share some of the past year's significant events with you. For example, this past year saw as many as six scientists at FSU being elected Fellows of the American Physical Society. Only the massive Los Alamos National Laboratory had more! Other highlights include: the five year \$168M renewal award to the National High Magnetic Field Laboratory by the National Science Foundation, participation in the Higgs discovery, a trip to CERN for our undergrads, faculty being selected for and even serving as chairs on top-level national committees, faculty also winning other national and local awards, and our superb graduate and undergraduate students being engaged in outstanding research. I hope the newsletter is able to convey some of this excitement to you!

Since this is my last newsletter as chair, I would like to say that it has been an absolute privilege to serve the physics family at FSU for the past six years. It has been a highly rewarding experience seeing the department continue on its stellar upward trajectory. This has been possible not only because of our brilliant students and faculty but also the most wonderful and devoted staff anywhere on the planet! There are many exciting new events beginning to unfold; for example, we will have four new tenure-track assistant professors starting this fall—three in astrophysics and one in energy and materials. We are also beginning to scan and digitize all our old photos and dusty negatives to put them on the web for your viewing pleasure (and to help preserve them for posterity). For this next set of highlights, you will have to wait until next year's newsletter, which will be introduced by our new chair, Dr. James Brooks. Dr. Brooks takes over the reins this August. It will be fun, Jim — believe me!

Finally, many thanks to Dr. Nick Bonesteel and Kun Yang for compiling the newsletter and Scott Baxter for so expertly putting it together.

Very best regards to each and every one of you, and please don't hesitate to drop me a line at chair@physics.fsu.edu.

Peace, love, art, music and physics!

MARK RILEY

Chair

Raymond K. Sheline Professor of Physics





Members of Florida State University's High Energy Physics group. Members of this group played an important role in the search for — and possible discovery of — the elusive Higgs boson at CERN's Large Hadron Collider.

FSU physicists part of CERN's discovery of new particle

When physicists working on experiments at the Large Hadron Collider (LHC) announced on July , 2012, that they observed a new particle that may contain properties of the elusive Higgs boson, several Florida State University researchers had a special reason to celebrate.

Members of Florida State's High Energy Physics (HEP) group are among hundreds of scientists and graduate students from American institutions who have played important roles in the search for the Higgs at the LHC, located at the immense CERN laboratory near Geneva, Switzerland. More than 1,700 people from 89 American universities — including Florida State University — and seven U.S. Department of Energy (DOE) national laboratories helped design, build and operate the LHC accelerator and its four particle detectors.

The United States, through the DOE's Office of Science and the National Science Foundation, provides support for research, computing, and detector operations at the LHC for the "A Toroidal LHC Apparatus" (ATLAS) and "Compact Muon Solenoid"

(CMS) experiments, both of which were heavily engaged in the search for the Higgs boson. Florida State has been a member of the CMS collaboration since 1994, when design of the experiment was just beginning.

In a seminar and press conference viewed around the world, the ATLAS and CMS collaborations independently presented evidence of a new particle within data accumulated over the previous 16 months. Many members of the FSU HEP group were glued to their screens to watch the webcast that started at 3:00 am EST on July 4, 2012. Ashley Huff, an FSU undergraduate working for the summer with researchers from Duke University, was in the auditorium at CERN. "It was such an awesome experience and I feel so lucky that I was able to be there for such a historic event," reported Huff.

Members of Florida State's High Energy Physics (HEP) group are among hundreds of scientists and graduate students from American institutions who have played important roles in the search for the Higgs.

Members of the team working directly

on the analyses used for the discovery include Harrison Prosper, the Kirby Kemper Professor of Physics, FSU computer specialist Kurtis Johnson, and graduate student Joseph Bochenek, who is currently at CERN. Prosper has long championed the advanced analysis techniques necessary to make this discovery with the data available.

"In my view, there is simply no way we could have arrived at this point now without the use of such methods," Prosper said. "It was obvious to myself and my colleagues way back in 2000 (and we wrote a paper to that effect) that the use of such techniques was the only responsible way forward in the Higgs search if we were not to waste taxpayers' money by throwing away expensively acquired data. This is a fabulous result which is only the first step toward understanding this new particle."

The new particle is in the mass region around 126 gigaelectronvolts. (A gigaelectronvolt is a little more than the mass of a proton.) Publication of the analyses is

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Six FSU researchers join ranks of APS Fellows

BARRY RAY

SPECIAL TO RESONANCES

Florida State University's stellar reputation for high quality scientific research across numerous disciplines was confirmed when six researchers were elected as fellows of the American Physical Society (APS).

The American Physical Society is the nation's largest and most prestigious professional society dedicated to the advancement of physics research and knowledge. Election to fellowship in the 50,000-member society is limited to no more than one-half of one percent of the society's membership and is a significant recognition by a scientist's peers of his or her outstanding contributions to physics.

"Those of us who have spent any time with these outstanding FSU programs are not surprised that six of our colleagues would be selected in a single year," said Vice President for Research Gary Ostrander. "This is another tangible example of the continued upward trajectory of our research efforts at Florida State."

Florida State's American Physical Society fellows for 2013 are Peter Hoeplich, Dragana Popovic, Luis Balicas, Rufina G. Alamo, Peng Xiong, and Paul Cottle.

Florida State tied for second in the nation for the number of APS fellows elected for 2012. The university was outpaced only by the massive Los Alamos National Laboratory, which produced 10 new fellows, and tied with research powerhouses Harvard, the Massachusetts Institute of Technology



Six new APS Fellows for 2012 from FSU, from upper left to lower right: Rufina G. Alamo, Dragana Popovic, Peter Hoeplich, Luis Balicas, Peng Xiong, and Paul Cottle.

and the University of California Davis.

The APS fellows and the language provided on their citations are:

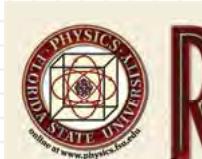
Rufina G. Alamo, a professor of chemical engineering in the Florida A&M University-Florida State University College of Engineering and frequent MagLab researcher, "for her use of well-characterized materials and performance of carefully designed experiments to address structure-property relationships in polyolefins."

Luis Balicas, a MagLab scholar/scientist, "for experimental studies of unconventional superconductors, heavy fermion materials, and frustrated magnetic systems."

Paul Cottle, the Steve Edwards Professor of Physics in the Department of Physics, "for the impact of his efforts to improve university physics education, especially for precollege teachers, and his advocacy for effective precollege science education standards and policy in Florida and nationally."

Peter Hoeplich, a professor of physics, "for outstanding contributions to stellar evolution, radiation hydrodynamics, and nuclear astrophysics, especially in the context of modeling the light curves and spectral evolution of supernova explosions."

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RESONANCES

Faculty Sponsor
Dr. Nicholas Bonesteel

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Scott Baxter**

NSF gives \$168 million grant to NHMFL

JEFFERY SEAY
SPECIAL TO RESONANCES

Officials from the Washington, D.C.-based National Science Foundation visited the National High Magnetic Field Laboratory on the campus of Florida State University February 4, 2013 to formally present a five-year renewal grant of more than \$168 million to Florida State President Eric J. Barron and MagLab Director Greg Boebinger.

During a brief ceremony at the MagLab, F. Fleming Crim, assistant director for the NSF Directorate of Mathematical and Physical Sciences, expressed delight at the chance to visit one of the NSF's premier research facilities. He described it as a national treasure.

"Today is a major milestone between the NSF and Florida State University," Crim said. "This renewal agreement is a vote of confidence in the National High Magnetic Field Laboratory by the community of users and by the National Science Foundation. It reflects the quality of the stewardship of Dr. Barron, Dr. Boebinger and everybody involved in this enterprise."

Crim praised not only the people—administrators and researchers—of Florida State University, but also those at the University of Florida and Los Alamos National Laboratory in New Mexico.

"They are the critical component that allows the magnet lab to serve the nation," Crim said. "They enable the science that happens here."

At a special ceremony Monday, February 4, 2013, the National Science Foundation announces the renewal of its 5-year grant for the National High Magnetic Field Laboratory at Florida State University. The new grant increases the Mag Lab's funding to \$168 million.

Barron underscored the significance of funding from the National Science Foundation.



The NSF presented the National High Magnetic Field Laboratory with a five-year renewal grant of more than \$168 million. FSU President Eric J. Barron (right) and NHMFL Director Greg Boebinger (left) received the grant from NSF Assistant Director F. Fleming Crim (center).

"My own scientific career was launched with a summer fellowship at an NSF-funded laboratory, the National Center for Atmospheric Research," he said. "That and many other reasons is why NSF has become my favorite agency."

Barron described the NSF as always competing to be the very best and representing discovery that has impact and a purpose.

"This is what I love about the magnet lab," Barron said. "It is always competing to be the very best—and succeeding. It truly represents discovery with impact and a purpose."

Barron assured Crim that Florida State would continue to stay true to the path of discovery for the sake of the many scientists and students who conduct research at the National High Magnetic Field Laboratory.

"We will take this truly unique partnership between institutions and the National Science Foundation and continue to make you feel very proud of what we accomplish," Barron said.

Boebinger characterized the NSF grant

as a mandate to each of the MagLab's partners to continue realizing world-class, basic research opportunities for its community of users.

"An interdisciplinary facility like the MagLab isn't tenable without real, sustained investment from both academia and government," Boebinger said. "It's wonderful to step back today and celebrate what's been a long and tremendously successful partnership among so many institutions."

The MagLab is the only national laboratory in Florida. It employs approximately 350 scientists and support staff. Scientists from around the world use its high-powered magnets for scientific research and academic study.

The National Science Foundation approved a \$156.7 million grant for the MagLab for 2008 through 2012. The new five-year grant represents a substantial increase in support for the facility, which attracts scientists from around the world and has a substantial economic impact on the region. The MagLab also receives funding from the state of Florida. ☈

Conferences on Undergraduate Women in Physics:

A Student's Perspective

A note from Professor Susan Blessing: Ashley Huff wrote the following article for the CSWP & COM GAZETTE; it appeared in the Fall 2012 issue (Vol. 3, No. 2). Ashley was then a senior physics major at FSU. She had been involved in High Energy Physics research for the previous two years and defended her Honors Thesis during Spring 2013. She was the President of the FSU Chapter of the Society of Physics Students for 2012–2013 and plans to attend graduate school in the fall.

ASHLEY HUFF
SPECIAL TO RESONANCES

I am a physics major at Florida State University and will be starting my senior year in the fall. I have been working with Professor Susan Blessing for the past year and a half to measure the electron asymmetry from W boson decays using data from the D0 experiment at the Fermilab Tevatron Collider. In Summer 2011, I participated in the Research Experience for Undergraduates (REU) program at the National High Magnetic Field Laboratory in Tallahassee and decided that condensed matter physics isn't for me.

The Southeastern Conference for Undergraduate Women in Physics was the first conference I have attended. The conference ran from January 12–15, 2012, and included lab tours, student talks, and panel discussions with various groups of women in the field of physics. I left the conference with a whole new outlook on my role in the physics community.

I had been a physics major for two-and-a-half years by that point and had been conducting my own research for a year, but it wasn't until I spent those four days with a really great group of women that I truly felt like I belonged in the world of physics. The Southeastern section of the conference got a special treat in that we had the chance to visit Oak Ridge National Laboratory. I must have sent a picture of the Jaguar supercomputer to ten of my friends because I was so excited about how cool it is.

I really decided to go to this conference because I was going to have to figure out what do with my life with just an undergraduate degree in physics. I was quite

sure that there was no way I would get into graduate school. I will say that there were indeed many women there who showed me what I could do without graduate school (teaching, industry jobs, etc.), but it was actually all the women there who did go to graduate school who showed me that I could do that as well. I was stuck in this mindset that if I wanted to go far with physics that it just all needed to come to me very easily. It was the reassurance of total strangers that it honestly is difficult for everyone that convinced me I was wrong.

I never understood why my research advisor seemed to have so much faith in me, but

now I realize I'm not as bad off as I thought I was. I felt quite empowered by the end of the conference. Through the panel discussions I was not only given the encouragement to continue on in the field, but I was also told about many tools and techniques that would help me get through graduate school.

The questions my fellow physicists asked during the panel discussions were the most interesting part of the panel discussions. The women at this conference were all from different universities, but we weren't all that different, and many of the women had the same questions as I did. During the panel discussions we learned how to apply for graduate school and how to survive it. We also got a clearer picture of what we could do in industry with a physics degree. But mostly, we all had the same desire to spread awareness of science to a younger generation of girls. The various outreach programs that are being conducted in the Southeast gave me some great ideas for my own outreach. Since the conference, I have spoken to three high school classes in Miami, Florida through Skype about my research. I hope that alerting these kids about the cutting edge work being done gave them the push they needed to follow their scientific dreams. I also spent time in a fourth grade class in Tallahassee, Florida answering questions like "How long would it take to get to Pluto?" and "Is there life on other planets?" after talking with many of the women at the conference, I truly realized if I wanted the word about science to spread, I would have to get out there.

The poster session was the best part of the conference for me. I had presented my research once before, and I've presented it twice since then. It gets a little bit easier every time. After about four or five groups of people had come up to me, I realized that I really loved teaching people about what I've discovered. I had been questioning whether high energy physics (HEP) is really the right path for me but that is the moment I realized it is. During the poster session, Dr. Ayana Arce from Duke University stopped by my poster. She let me present my work and asked me a few questions at the end. Then she explained to me that she was a high energy physicist and told me about the REU program at Duke. The students who were accepted to the HEP part of the program would get to spend five weeks working at CERN. I had a list of about ten REUs that I wanted to apply for and somehow I never even looked at Duke's program.

Working at CERN has been my ultimate dream from the get-go, so I added it to the list. In my application I wrote about this conference and how the experiences I had changed my perspective entirely, and now I am at CERN this summer! ☈

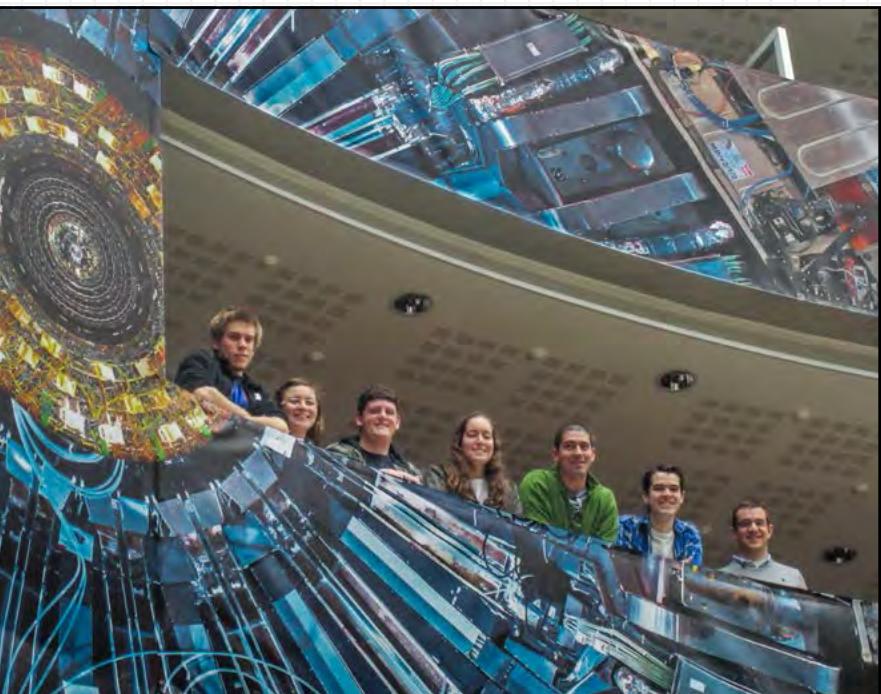
FSU physics students spend spring break at CERN

KATHLEEN LAUFENBERG
SPECIAL TO RESONANCES

On March 3, 2012, seven FSU physics students flew to Geneva, Switzerland for spring break. It was not your typical spring break. All seven were enrolled in PHZ4390, Particle and Nuclear Physics, for the spring 2012 term. They travelled to Geneva as part of an optional component to the course that included a week at CERN, the European Center for Particle Physics. Prof. Todd Adams and FSU International Programs arranged the trip and all of its activities. The group stayed at the CERN Hostel (i.e. on-site dorms) and ate many meals at the CERN restaurants. We had a group dinner in the Hostel kitchen on the day we arrived as well as a feast at local Italian restaurant later in the week.

During the week, the group experienced one of the world's premier particle physics laboratories in many different ways. One of the highlights of the visit was a tour of the CMS experiment. Physicists from the FSU High Energy group have been involved in the CMS collaboration since 1994. CMS is located at Point5 in the French countryside, about 10 miles from the primary CERN site (CERN is divided into a number of smaller parcels in both Switzerland and France). CERN provided a bus to shuttle the group to Point5. Unfortunately, due to the re-start of accelerator operations for 2012, we were not able to see the detector itself. At the surface we were able to explore the CMS control room and see the building where the detector was assembled. We were also able to go one hundred meters underground into the USC cavern that holds much of the electronics related to data readout as well as detector monitoring and control. The tour was led by FSU Professor Emeritus Vasken Hagopian who was just about to start an eight-hour shift as Shift Captain, leading a team of physicists monitoring the detector for that period.

The week also included guided tours of the Atlas experiment (with a 3D movie



FSU students at CERN

of the detector), the CERN computing center (home of the original web server), the LINAC (the initial source of the beam for the Large Hadron Collider (LHC)), and the magnet test facility where all of the LHC magnets are commissioned. There was also time to explore the CERN visitor center and the Globe, a public exhibition recently opened to celebrate particle physics. We also met with Prof. John Huth, a faculty member from Harvard University who discussed his work, and several current and former members of the FSU high energy group who were at CERN that week.

"Studying abroad and visiting CERN was the pinnacle of my undergraduate experience. The science, organization, and people of this trip were all astounding, and this is a memory that I will hold with me forever," says Sandon Simmons, senior physics major. The group spent most of the week together and got to know each other very well. Jill Adams from International Programs also participated in the visit, lending her 25 years of expertise in

international travel and organization.

The trip was not science all the time. We started the week with both a mini-train tour and a walking "treasure hunt" through downtown Geneva. On Tuesday afternoon we toured the United Nations headquarters. Thursday was a day trip to Bern, the capital of Switzerland. There we saw the apartment where Einstein lived in 1905 (outside only due to renovations) and spent several hours exploring the Einstein exhibit at one of the museums. There was also some free time to spend in the evenings, including shopping, dining, and fun in Geneva and St. Genis, a nearby French village. Some of the group also went to the Geneva auto show, Europe's largest car show.

This is a first of its kind program offered between the College of Arts and Sciences and FSU International Programs to combine a science course taught on campus with a trip to a foreign site during spring break. According to the students, the trip was a huge success and a truly unique experience. ☺

Three members of Physics Department recognized by FSU

Each year Florida State University recognizes outstanding research accomplishments by professors and research scientists. The Department of Physics is proud to announce that three members of the department have been selected for this year's awards. Professor Bernd Berg has received the Distinguished Research Professor Award, Professor Alexander Volya has received the Developing Scholar Award, and Professor Ingo Wiedenhofer has received the Honors Thesis Mentoring Award.



Bernd Berg



Alexander Volya



Ingo Wiedenhofer

Dr. Bernd Berg

*Recipient of
Distinguished Research Professor Award*

The Distinguished Research Professor (DRP) award has been designed to recognize outstanding research and/or creative activity of eligible Florida State University faculty. It is open to full-profs who have completed at least five years in the rank of Professor at FSU.

Berg has been honored with this award for his outstanding contributions to computational physics, which has become an essential component to modern physics research. Among a number of pioneering contributions to lattice quantum field theory (a branch of particle physics), Berg's multicanonical simulation method has been most influential. Originally developed in particle physics, this approach has found its way over statistical physics into biophysics and biochemistry as documented in about 1,500 citations of the two original papers. Berg has also written a well received textbook on Markov chain Monte Carlo simulations. Originally from Germany, Berg studied at the Freie Universität Berlin, was a Fellow at CERN and an Assistant Professor at Hamburg University before joining the Florida State University in 1985 as an Associate Professor. Berg is the Dirac Professor of Physics at the Florida

State University, received the Leibniz Professorship of Leipzig University, is a Fellow of the American Physical Society and a recipient of the senior Research Prize of the German Humboldt Foundation.

Dr. Alexander Volya

*Recipient of
Developing Scholar Award*

Developing Scholars are mid-career associate professors who have been singled out by their peers for recognition. The Developing Scholar Award is based on evidence of a clearly established program of teaching, research and creativity lasting over a number of years.

Associate Professor Alexander Volya received the FSU 2012 Developing Scholar Award. Dr. Volya received his Ph.D. from Michigan State University and carried out postdoctoral work at the Argonne National Laboratory prior to joining FSU in 2003. His research work focuses on novel aspects of nuclear physics and its connections to astrophysics, mesoscopic physics, fundamental science, quantum chaos, and many-body physics in general. He co-authored over 70 publications in peer-reviewed journals, he was invited to give series of lectures at national and international schools on nuclear physics, and he serves as a panel member in review committees for Federal Funding Agencies.

Dr. Ingo Wiedenhofer

Honors Thesis Mentor Award

The Honors Thesis Mentor Award was presented to Associate Professor Dr. I. Wiedenhofer for the year 2011-2012. The award recognizes a faculty member who has been outstanding in his service to the students in the Honors Program. Since 2002, Dr. Wiedenhofer has supervised seventeen undergraduate research projects, six of which were/are being performed as Honors in the Major theses.

Ingo Wiedenhofer is an Associate Professor at the Florida State University Physics Department and serves as Associate Director for Operations at the John D. Fox accelerator laboratory. His research interests are in Experimental Nuclear Physics, in particular the physics of exotic nuclei and nuclear astrophysics. He performs experiments at the National Superconducting Cyclotron Laboratory (NSCL) and established a new research program with the RESOLUT facility at FSU's John D. Fox accelerator laboratory. He was elected as chair of the User Executive Committee of the NSCL in 2007 and elected to the FRIB User Committee in 2009. Ingo Wiedenhofer was the 2010 recipient of the FSU Developing Scholar Award. ☺

the PHYSICS AWARDS C.E.R.E.M.O.N.Y.



Mark Riley (left) with Jim Valentine, winner of one of two Atom Awards presented in 2012.



Jeff Owens (right) presents the Dirac Fellowship Award to Zachary McDargh.



Winston Roberts (right) congratulating Zachary McDargh with a special award.



Dirac-Hellman Award winner Wenxin Ding (left) with Bernd Berg.



Andrew Wilson (left) and Darren McGlinchey (center), winners of the John D. Fox Award, with Sam Tabor.



Mark Riley (center) flanked by five-year service award recipients Christopher Bradley (at left) and Mark Cartagine (at right).



Dr. Riley thanks Eva Crowdus for organizing yet another highly successful family awards party.



Liuqi Yu (left), recipient of the Yung Li Wang Award, with Sam Tabor.



David VanWinkle (left) presents the Schwarz Scholarship Award to Daniel Scott Davis.



Susan Blessing (left) presents Alicia Gomez with the Lynn Shannon Proctor Award.




Left to right — Jesse Raffield, Derrick Van Gennep and Ashley Huff, all Silver Medal winners in the annual Physics poster competition.



Mark Riley congratulates Paul Eugenio for winning the prestigious PAI award.



Powell Barber, left, being congratulated by Dr. Riley for his 20-year service award.



From left — Karoline Köpp and Joseph Bochenek, Hagopian Endowment winners, with Sharon and Vasken Hagopian.



Daniel Moerland (left), Lannutti Award winner, presented by Joseph Owens.



Ashley Huff, Lannutti Award winner, with Dr. Owens.



Simon Capstick, at right, presented the Novotny Award to Jennifer Misuraca.



Ashley Huff and Daniel Moerland, the 2012 Lannutti Award winners.



Mark Riley with Richard Boisseau, the Atom Award winner. The Atom Award is the department's highest staff honor.



At left is Eden Steven, winner of the Nelson Endowment Award, with Jorge Piekarewicz.

Reina named 'Woman Physicist of the Month'

JEFFERY SEAY
SPECIAL TO RESONANCES

Florida State University Professor Laura Reina has been named Woman Physicist of the Month for February 2013 by the American Physical Society's Committee on the Status of Women in Physics (CSWP).

Reina, who was elected a fellow of the American Physical Society in 2005 and a fellow of the American Association for the Advancement of Science in 2011, conducts research into the phenomenology of elementary particle physics. She is known for her work with the Large Hadron Collider at CERN, the European Organization for Nuclear Research, to assist in the detection of the elusive Higgs boson particle. In July 2012, scientists got their first glimpse of the particle, which helps explain how matter attains its mass.

"It is a great honor for me to be part of the group of women physicists that have been recognized by the American Physical Society through the Woman Physicist of the Month initiative," Reina said. "I'm very grateful to the colleagues that have taken the initiative and time to nominate me and to support and highlight the image of women physicists. I hope young talented women will read our stories and feel more confident in approaching physics in their studies."

The CSWP Woman Physicist of the Month award is intended to highlight exceptional female physicists who have positively impacted other individuals' lives and careers.

Florida State University Professor Laura Reina, known for her work with the Large Hadron Collider at CERN and the search for the elusive Higgs boson particle, has been named Woman Physicist of the Month for February by the Ameri-



Laura Reina

can Physical Society's Committee on the Status of Women in Physics.

"Laura has excelled as a physicist for many years and has received quite a bit of attention for her accomplishments," said Sam Huckaba, dean of Florida State's College of Arts and Sciences. "This is a fantastic recognition to add to her portfolio. It shows that she is more than just an outstanding scientist but also a luminary role model for other women working in the field."

Reina earned a doctorate in high-

energy theoretical physics from the International School for Advanced Studies in Trieste, Italy, in 1992. After postdoctoral work at the University of Brussels and at Brookhaven National Laboratory in Upton, N.Y., she joined the University of Wisconsin Madison as assistant scientist in 1997.

When Reina joined the Department of Physics at Florida State in 1998, she was a recognized expert on b-quark physics and CP ("charge parity") violation, having written numerous papers on b-quark

decays as a graduate student and during her postdoctoral work. At that point, she became excited by the possibility of new results from the Large Hadron Collider (LHC), changed research directions and became a world expert on the phenomenology of the Higgs boson. Knowing that the LHC offered the best chance of detecting the Higgs, she began working closely with the LHC experimenters, doing high precision calculations of the expectations for Higgs searches.

Reina's research will be particularly important in the next few years, as the Higgs boson's properties are studied. She specializes in the effects of perturbative QCD ("quantum chromodynamics") corrections to Higgs phenomenology, and these corrections are vital in determining the interactions and decays of the Higgs. She has developed a number of analytical and numerical algorithms for implementing these corrections, and they have been part of the particle phenomenologist's toolbox.

"Laura's work has had an enormous impact matched by few others, and she currently has an extraordinary average of 83 citations per paper," said Marc Sher, professor of physics at the College of William and Mary. Sher nominated Reina for the distinction of Woman Physicist of the Month.

Reina has helped educate a generation of particle theorists through her well-received Theoretical Advanced Study Institute summer school lectures, which she has given several times during the past decade. She is an excellent teacher, having won teaching awards at Florida State, and is a successful mentor. Her first two doctoral students now have faculty positions at research universities, and most of the others are continuing in the field. ☈

Piekarewicz appointed to elite U.S. nuclear panel

SUSAN HELLSTROM
SPECIAL TO RESONANCES

In the first four months of last year, physics Professor Jorge Piekarewicz has received recognition from the National Science Foundation (NSF), the Department of Energy (DOE), and the American Physical Society (APS). Piekarewicz was invited to serve a three-year term on the joint DOE/NSF Nuclear Science Advisory Committee (NSAC). He also was named an "outstanding referee" by the APS.

NSAC, the most influential committee concerned with basic nuclear science in the United States, provides advice and guidance to the DOE and NSF on both short-term and long-term national scientific priorities. The combined budget for DOE and NSF nuclear science is more than \$500 million per year.

Piekarewicz is the third person from Florida State to be appointed to this panel since its inception in 1977. The others were Robert O. Lawton Distinguished Professor Donald Robson (serving from 1978 to 1982), and Raymond K. Sheline Professor of Physics Mark Riley (serving from 1999 to 2002). Robson is a past chair of the physics department, and Riley is the current chair.



Jorge Piekarewicz

explaining many aspects of nuclear matter to the community, and we here at Florida State know him as an excellent teacher."

In being named an "outstanding referee" by the APS, Piekarewicz was one of 149 members out of the approximately 60,000 currently active referees selected for 2012.

Piekarewicz was named an APS fellow in 2005. ☈

Inductees named to SPS

At the 2012 Awards Ceremony, a new round of students were honored with induction to SPS.

From left to right: Taylor Hinds, Kevin Blondino, Alicia Gomez, Daniel Moerland, Karen Bermes, Zach McDargh, Ashley Huff, Derrick VanGennep, Kyle Serniak, Spencer Rosenfeld, and Luis Barrera.



'APS Fellows'

—continued from page 3

Dragana Popovic, a MagLab scholar/scientist, "for experimental studies of glassy behavior in strongly correlated systems near the metal-insulator transition."

Peng Xiong, a professor of physics, "for contributions to structured superconductors, ferromagnets, and their hybrids."

"This year's APS bounty is a remarkable achievement and one that the entire institution can celebrate," said Sam Huckaba, dean of the College of Arts and Sciences. "It is representative of FSU's breadth and excellence in the physical sciences."

MagLab Director Greg Boebinger agreed.

"The single most important hallmark of an excellent research institution is the collective of its talent, the community of its researchers," Boebinger said. "This award recognizes individual expertise and accomplishment, of course, but having so many awardees in a single year is an extra recognition of Florida State University's growing stature as a research institution."

While the six researchers all received the same recognition as fellows, the nature of their research is actually quite varied.

Alamo, for example, works with "polyolefins," large plastic molecules that are able to assume a wide variety of shapes. Polyolefins are used almost everywhere, with two specific types—polyethylene and polypropylene—accounting for about 80 percent of the total worldwide production of plastics. Because they are so easy to fabricate into a wide variety of useful products, such as film wraps, greenhouses, automobile parts, hospital gowns and even carpeting, polyolefins have an ever-increasing list of potential uses. Alamo studies how these molecules "fold" to understand the performance of polyolefin materials—research that could lead to new and innovative applications.

In Florida State's Department of Physics, Xiong conducts research on superconductors and ferromagnets—what he calls "two of the most venerable classes of materials in solid-state physics."

At the MagLab, Balicas studies novel materials with special properties—in his case, superconductivity and magnetism.

"A growing number of new materials exhibit superconductivity, which is a state observed in metallic systems that allows electrical currents to flow through them without the loss of energy," Balicas said. "It has enormous potential for technological applications, but in these materials the properties of the superconducting state are quite different from our 'standard theory' for superconductivity. My research focuses on unveiling these properties with the hope of increasing our current understanding of this phenomenon."

Balicas' group also works to identify new materials with unique magnetic and electronic properties that can be used to create powerful magnets. Magnets of wide technological use are usually composed of rare-earth elements such as neodymium or samarium. By developing synthetic versions of these elements, future magnets can be more powerful and cheaper to build. He is also undertaking a program in nanotechnology based on single atomic layers of "exfoliable," or fire-resistant, materials that could revolutionize the future of electronics.

Another MagLab researcher, Popovic, studies how various types of composite materials possessing unique properties conduct electricity—knowledge that is crucial for the development of future technologies.

"The electrical transport properties of many 'novel' materials can be changed dramatically by adding even a small number of electrons," Popovic said. "Understanding and control of the electron motion may help us to develop materials with such applications as more efficient energy transmission and faster computer speeds."

In Florida State's Department of Physics, Xiong conducts research on superconductors and ferromagnets—what he calls "two of the most venerable classes of materials in solid-state physics."

"Understanding how these materials

behave at the nanoscale level and when they are put together is not only interesting at the fundamental level but also relevant for a broad range of practical applications," Xiong said.

While most of the new APS fellows study matter at its most basic level, another one looks at the bigger—much bigger—picture. Hoeflich, an astrophysicist, seeks to understand one of the great mysteries of the universe—the presence of so-called "dark energy."

"One of the most stunning discoveries of the past decade was the realization that the universe is undergoing an accelerated expansion and that a new form of energy that comprises 70 percent of the energy budget of the universe—dark energy—is pushing the universe apart," Hoeflich said. "This is unlike ordinary matter as we know it, which tends to 'clump' due to gravitational attraction. This discovery has triggered a new quest to understand the enigmatic nature of dark energy, which may be probed by measuring how it evolves with time or, equivalently, by observing objects so remote that it takes light billions of years to reach the Earth."

Cottle has conducted groundbreaking scientific research on exotic nuclei for more than a quarter-century. However, his APS recognition comes for his efforts to promote the increasing importance of STEM (science, technology, engineering and mathematics) subjects in K-12 and college curricula.

"Science and engineering careers offer some of the best opportunities for economic security our kids have now," Cottle said. "And physics courses at both the high school and college levels are the gateways into these fields. We owe it to our students to give them great opportunities to learn and understand physics so that they have the best possible chances to succeed in this new economy." ☀

'New particle'

—continued from page 2

expected around the end of July. While it is clear that a new particle has been discovered, scientists at ATLAS and CMS will need to collect more data and run further analysis to determine its properties, including whether it is the Higgs boson.

The Higgs mechanism is a very simple and far-reaching idea, which for particle physicists can explain the origin of one of the fundamental properties of truly elementary particles: mass. In 1964 six scientists working in three independent groups (Robert Brout, Francois Englert; Peter Higgs; and Gerald Guralnik, C. R. Hagen, Tom Kibble) proposed a new theory with a mechanism to dynamically generate the mass properties of existing particles, through the interaction with a new particle, namely the Higgs particle. Experiments at the Large Electron-Positron (LEP) Collider at CERN and the Tevatron collider at the Department of Energy's Fermilab have searched for the Higgs boson, but it has eluded discovery.

Fermilab's experiments recently presented final results on the search for the Higgs that showed hints of a new particle, but the data was insufficient to be a discovery. Only now, after decades of developments in accelerator and detector technology and computing—not to men-

tion advancements in the understanding of the rest of the Standard Model—are scientists approaching the moment of knowing whether the Higgs was the right solution to this problem.

On Tuesday, July 17, 2012, the HEP group and the Physics Department sponsored a public event to discuss the exciting discovery. Approximately 200 to 250 people came out to Moore Auditorium to hear directly from Prof. Prosper, who explained the importance of the Higgs boson and the evidence of discovery. Audience members asked questions throughout the evening, which lasted nearly two hours.

Other members of the FSU HEP group working on the CMS experiment include Associate Professor Todd Adams, Assistant Professor Andrew Askew, Emeritus Scientist Sharon Hagopian, Emeritus Professor Vasken Hagopian, post-docs Jie Chen and Marc Weinberg, and nine graduate students. Professors Susan Blessing and Horst Wahl, post-doc Dmitry Bandurin, and two graduate students currently work on the D0 experiment at Fermilab. Theoretical HEP physicists at FSU are Professor Bernd Berg, Professor Jeff Owens, Professor Laura Reina, Assistant Professor Takemichi Okui, post-docs Alejandro Jenkins and Thomas Schutzmeier, and six graduate students. The theorists investigate deepening our current

understanding of particle interactions along with exploring models of new physics.

When protons collide in the Large Hadron Collider, their energy can convert into mass, often creating short-lived particles. These particles quickly decay into pairs of lighter, more stable particles that scientists can record with their detectors.

Theoretical physicists have predicted the rate at which the Higgs boson will be produced in high-energy, proton-proton collisions at the LHC and also how it decays into certain combinations of observable particles.

"In the last two years I've been part of a group of theorists and experimentalists that provided an updated set of predictions for Higgs boson searches to be used by ATLAS and CMS, using start-of-the-art theoretical calculations," Reina said. "I'm at the same time amazed and humbled by the fact that this incredible effort has indeed contributed to the discovery of a particle that could be the Higgs boson. It is one of the most exciting moments in my scientific career, and I feel so lucky to have been part of it."

"This new particle is a big piece of the grand puzzle," Askew said. "But it is still only one piece, the very beginning of the LHC program. We expect to learn a lot more of the bigger picture as the program continues." ☀

Two FSU physics professors lead APS committees



Paul Cottle and Susan Blessing

JEFFERY SEAY

SPECIAL TO RESONANCES

Two Florida State University physics professors—Susan Blessing and Paul Cottle—have been appointed to chair committees that make policy decisions for the American Physical Society, the national organization of physicists.

Blessing is chairing the Committee on the Status of Women in Physics and Cottle is leading the society's Committee on Education.

"Susan and Paul have been active in the physics community both locally and nationally for years, and the significance of their contributions have been confirmed by these appointments," said Sam Huckaba, dean of Florida State's College of Arts and Sciences. "It is a bonus that the committee assignments bring high visibility to both Florida State physics and Florida State in general."

Blessing, the Nancy Marcus Professor and an experimental particle physicist whose research focuses on searches for

new phenomena in proton-antiproton collisions, also is director of the university's Women in Math, Science and Engineering living-learning center. She won the Ross Oglesby Award from Florida State's Garnet and Gold Key student honor society in 2011. The award is given for exemplary service to the university's students.

The Committee on the Status of Women in Physics addresses the issues that arise from the significant underrepresentation of women in the field. As of 2006, only 12 percent of physics faculty members at American colleges and universities were women. Blessing's committee addresses policy issues for physicists and physics students at all levels from college faculty down to the high school level, and conducts reviews of university physics departments around the nation.

Cottle's Committee on Education addresses questions regarding physics education at all levels, from K-12 to graduate school. The committee is presently providing advice on a proposed set of national science education standards for K-12

schools, conducting an award program for undergraduate physics programs and working to make graduate study in physics more hospitable for students and more relevant for employment in the private sector.

Cottle was named a fellow of the APS in 2012 for "his efforts to improve university physics education, especially for precollege teachers, and his advocacy for effective precollege science education standards and policy in Florida and nationally," according to the citation. Cottle is an experimental nuclear physicist who studies the behavior of exotic isotopes.

"Susan's and Paul's service really helps to further Florida State's prestige on the national stage because these two committee assignments are two of the most important in the whole of the American Physical Society," said Mark Riley, chair of Florida State's Department of Physics. "Their appointments to these committees is a well-deserved recognition of their status, leadership skills and dedication to the study of physics." ☀

