



RESONANCES

NEWS OF INTEREST TO FLORIDA STATE UNIVERSITY PHYSICS ALUMNI

Spring 2010



Members of the FSU Physics Department staff gathered for a recent group portrait

A special message from our chair

It is a pleasure for me to introduce you to the Department of Physics newsletter for Spring 2010! As always our students, staff and faculty have been performing brilliantly and it is always a tough job to select the specific highlights we put into the newsletter. We hope you enjoy this year's collection and invite you to our homepage at www.physics.fsu.edu for other items as well as the latest exciting news about the world of physics at FSU. As always, please do not hesitate to drop us a line; we would love to hear from you. It would be super to include in the future some news about what our distinguished alumni are doing.

One of the greatest strengths of our department is the fantastic staff that we have. They are truly dedicated and really make the department the special place it is. The group photo above was taken outside the teaching laboratories one cold morning in February. It may have been cold but the sun was still shining! I would like to finish by thanking Drs Yang, Bonesteel and Cao for working on the newsletter and the mega-talented graphic artists Scott Baxter and Ken Ford for putting it together. Very best regards and happy reading!

MARK RILEY
(CHAIR@PHYSICS.FSU.EDU)

Four FSU physicists named outstanding APS referees



From left to right: Kirby Kemper, Alex Gurevich, Joseph F. "Jeff" Owens III, Pedro Schlottmann

The American Physical Society recently recognized Florida State University's Vice President for Research Kirby Kemper as an "Outstanding Referee" for 2010. Kemper was one of only 130 members chosen to receive the honor out of the society's 44,000 article reviewers worldwide.

"The designee of 'Outstanding Referee' means that the editors and associate editors of the *Physical Review*, the major journal published by the APS and now probably recognized as the premiere physics research journal in the world, feel that my contributions to the quality of the published research have been valuable to them as they consider whether to publish papers or not," Kemper said. "I got an e-mail toward the end of December telling me I had been selected for this designation and was truly surprised."

Kemper has been a member of the APS since he was a graduate student in 1962.

Kemper said that one of the primary things the APS does is publish scientific journals that allow cutting edge research to be disseminated to the physics community at large.

"Articles submitted to the journals are sent out to other physicists for review," Kemper said. "The reviewers volunteer their time to work through the papers and provide an assessment of their results, which gets communicated to the editor of the journal, who then decides whether to publish the article or not based on the referees' comments."

Kemper said that in addition to publishing journals, the APS organizes annual meetings of physicists and works to produce policy papers that help national and state leaders develop plans for the needs of the country.

In addition to his research and service,

Kemper has taught introductory physics courses at FSU since he first became a faculty member in 1971.

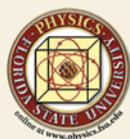
Kemper said he enjoys working with the beginning undergraduate students because he gets to help them figure out what type of science they like best.

"When I first came to FSU, Kirby and I taught introductory physics classes together for five years or so," said Mark Riley, FSU professor of physics. "The students called us 'The Dynamic Duo' — he was Batman and I was Robin."

Riley said that he has known Kemper for almost 20 years since he arrived at FSU from the UK in 1991. Riley said that Kemper is an incredible fellow and an inspiration to all.

"This is a magnificent and well-deserved acknowledgment of his contributions to sci-

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RESONANCES

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Scott S. Baxter

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Ken Ford

Please direct correspondence to: *Resonances*, Physics Department, Florida State University, Tallahassee, FL 32306-4350.

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APS referees — continued from page 2

entific publishing,” Riley said. “It is only because of the untiring efforts and expert knowledge of dedicated scholars like Dr. Kemper that the APS journals are considered the best physics publications in the world.”

Riley said that it is amazing how Kemper continues to be so involved in the physics research world given the enormous demands on his time as Vice President for Research.

“Back in my second year as a physics major, I was spending a great deal of time not being serious,” said Becky DiBari, a former student of Kemper’s. “Kirby sat me down for a honest talk, and it turned my path around.”

DiBari said she owes all of her success to Kemper and that his award is very well deserved.

“I don’t keep track of how many papers I referee and feel that refereeing papers is just

part of my job as a practicing physicist and regard it as service to the profession,” Kemper said. “I will continue to be a member of the APS as long as I live because of its importance to furthering our understanding of the world around us, as well as its work in furthering our understanding of things of great importance to society as a whole.”

APS has also honored three Florida State University physicists—Joseph F. “Jeff” Owens III, Pedro Schlottmann and Alex Gurevich—as “Outstanding Referees” for 2009.

Owens, an APS fellow, is the Guenter Schwarz Professor of Physics and associate dean for Research in Florida State’s College of Arts and Sciences; Schlottmann, a physics professor who began his career in Germany, is a Heisenberg fellow of the German National Science Foundation; and Gurevich, also an APS fellow, is a scholar/scientist and principal investigator in the Applied Superconductivity Center at the National High Magnetic

Field Laboratory.

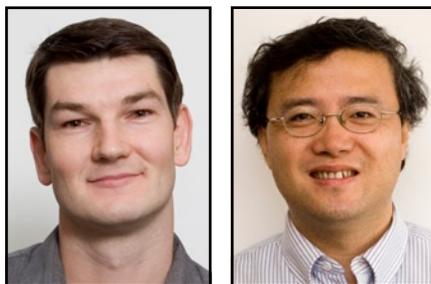
The “Outstanding Referee” award is designed to recognize scientists who have been exceptionally helpful in assessing manuscripts for APS journals. Currently, the APS has about 42,000 active referees, and it honored 534 of them in 2008 and 340 of them in 2009. Most of those honored in 2008 and 2009—what the APS refers to as the catch-up years of the award—have been dedicated reviewers for many years. In future years, the APS plans to honor about 130 referees per year. The 2009 honorees, which come from 35 countries, were chosen for the quality, number and timeliness of their reports, whether or not the scientists were members of the APS.

“Peer review is a vital endeavor within the academic and scientific enterprise,” said Physics Chairman Mark Riley. “It is wonderful that APS has initiated this program to recognize these previously unsung heroes.”

Research on Graphene chosen as APS ‘Editor’s Suggestion’

Assistant Professor Oskar Vafek and Professor Kun Yang, condensed matter theorists here at FSU Physics Department, are co-authors of the article “Many-body instability of Coulomb interacting bilayer graphene: Renormalization group approach”, which was chosen in January 2010 as an Editor’s Suggestion and featured in the APS journal *Physics: Spotighting Exceptional Research*.

Graphene is a new, essentially two dimensional, material made entirely of carbon atoms. Its remarkable electronic properties place it at an intellectual frontier of condensed matter physics and at the same time as a potential material for novel technological applications. The subtle interference of the electron waves in the presence of the honeycomb potential lead, in the single atomic layer graphene, to an effective loss of the electron mass: near the Fermi level the electrons disperse as massless Dirac particles in two spatial dimensions. Their velocity, which is therefore not necessarily proportional to their momen-



Oskar Vafek and Kun Yang

tum, is experimentally found to be about 300 times smaller than speed of light in vacuum. This ultra-relativistic-like dispersion gives the system a certain degree of robustness with respect to (weak) electron-electron interactions.

A bilayer graphene is a system of two carbon honeycomb lattices stacked in the so called A-B arrangement: atoms in the first layer and belonging to one of the sublattices have atoms directly above them in the second layer, while the atoms of the second sublattice sit below (above) the honeycomb plaquettes. The massless Dirac dispersion in this case is modified and instead

of two cones touching, two parabolic bands touch.

The authors of this paper argue that such a system is unstable even to infinitesimal electron-electron interactions and use renormalization group to identify the most likely broken symmetry ground state. In the parameter regime studied by the authors an interesting new electronic phase, called nematic, was found to have the most divergent susceptibility. This phase is characterized by broken lattice rotational symmetry, but unbroken lattice translational symmetry and the authors propose ways to detect it. At the moment, experiments on the bilayers are underway to further explore this system.

“Research on the special properties of graphene is red hot right now. So the fact that the paper by Drs Vafek and Yang was selected as an Editor’s Suggestion and as an APS Physics Spotlight featured article is indeed exceptional! My congratulations to them both.” says Mark Riley, chair of the physics department.

Hoffman wins 2010 National Dissertation Award

A recent doctoral graduate of The Florida State University has earned top honors in his discipline as the author of the nation's best doctoral dissertation in nuclear physics.

Calem R. Hoffman, who received his Ph.D. in nuclear physics from Florida State in April 2009, has been named the winner of the 2010 Dissertation in Nuclear Physics Award, presented by the Division of Nuclear Physics of the American Physical Society (APS). The award was formally presented to him Feb. 16 at an APS meeting in Washington, D.C.

"To have been nominated for the Dissertation in Nuclear Physics Award was already a great honor, and then to win it was truly amazing," said Hoffman, who also earned bachelor's and master's degrees in physics at Florida State in 2003 and 2006, respectively. "I am happy that this award will bring even more recognition to an already world-class physics department at FSU, and I was excited to represent my alma mater at the American Physical Society meeting.

"I simply had fun every day doing nuclear physics research at Florida State, and this honor was made possible by the opportunities Professor (Samuel L.) Tabor, the physics department and The Florida State University as a whole provided," Hoffman said.

Hoffman's dissertation experiment was performed at Michigan State University. He now is a postdoctoral research fellow at Argonne National Laboratory near Chicago, one of the leading nuclear physics laboratories in the United States. His long-term goal, he said, is "to continue on with fundamental nuclear structure research at the highest level. I hope to continue the advancement of knowledge as it pertains to the structure of nuclei and the fundamental nuclear force.

"Being given the chance to view and participate in top-level nuclear research, especially as an undergraduate, paved the way to my current research position," Hoffman said. "The knowledge and support I received from the physics department and the entire FSU faculty was truly wonderful."

At Florida State, Hoffman conducted research under the direction of Tabor, with



Calem Hoffman, at left, with Dr. Sam Tabor, after receiving his award

whom he worked as both an undergraduate and graduate student.

"Calem was the top student in my introductory physics class at FSU, and he just kept getting better!" said Tabor, the Norman P. Heydenberg Professor of Physics. "In his graduate studies, he became an absolute master of every aspect of nuclear physics research, from designing, constructing and performing experiments to conducting an extremely careful analysis of the results to a deep search for the meaning of his work in a wider context.

"His research answered longstanding questions about the structure of atomic nuclei under extreme conditions," Tabor said. "Calem published the research on which his dissertation was based in the leading nuclear physics journals in the world, and these have helped establish him as one of the world's leading young nuclear scientists."

Tabor's praise was echoed by Mark Riley, chairman of the physics department, who also taught Hoffman in several courses.

"This is a magnificent achievement," Riley said. "I remember him being the best student in my modern physics class and doing a great job working with Dr. Tabor as an under-

graduate researcher. He then went on to even greater success in graduate school with Dr. Tabor and the nuclear physics group. He is a star, and this award is shining light on this fact."

The Dissertation in Nuclear Physics Award was established to recognize and encourage outstanding scholarship as represented by an experimental or theoretical Ph.D. dissertation for a degree awarded by a North American institution within the past two years. It consists of a \$2,500 monetary award and an allowance for travel to the APS' spring meeting.

Hoffman also will receive a certificate from the APS containing the following citation: "For his dissertation describing the investigation of neutron-rich isotopes at the drip line, and, in particular, for the identification of a systematic reduction in the effective p-sd shell gap, indicating a weakening of the gap as neutrons are added."

In addition to his award, he will give an invited talk on his thesis work at the APS meeting.

Hoffman is an active member of the American Physical Society and the Sigma Pi Sigma and Phi Beta Kappa honor societies.

Department holds first Undergrad Research Poster Session



From left: David Page, Alison Pawlicki and Kristen Collar

The Physics Department has always had a number of undergraduate students involved in research. Much of this research is carried out in the physics department, or at laboratories affiliated with the Department in some way, such as the National High Magnetic Field laboratory in Tallahassee, and the Thomas Jefferson National Accelerator Facility in Newport News, Virginia.

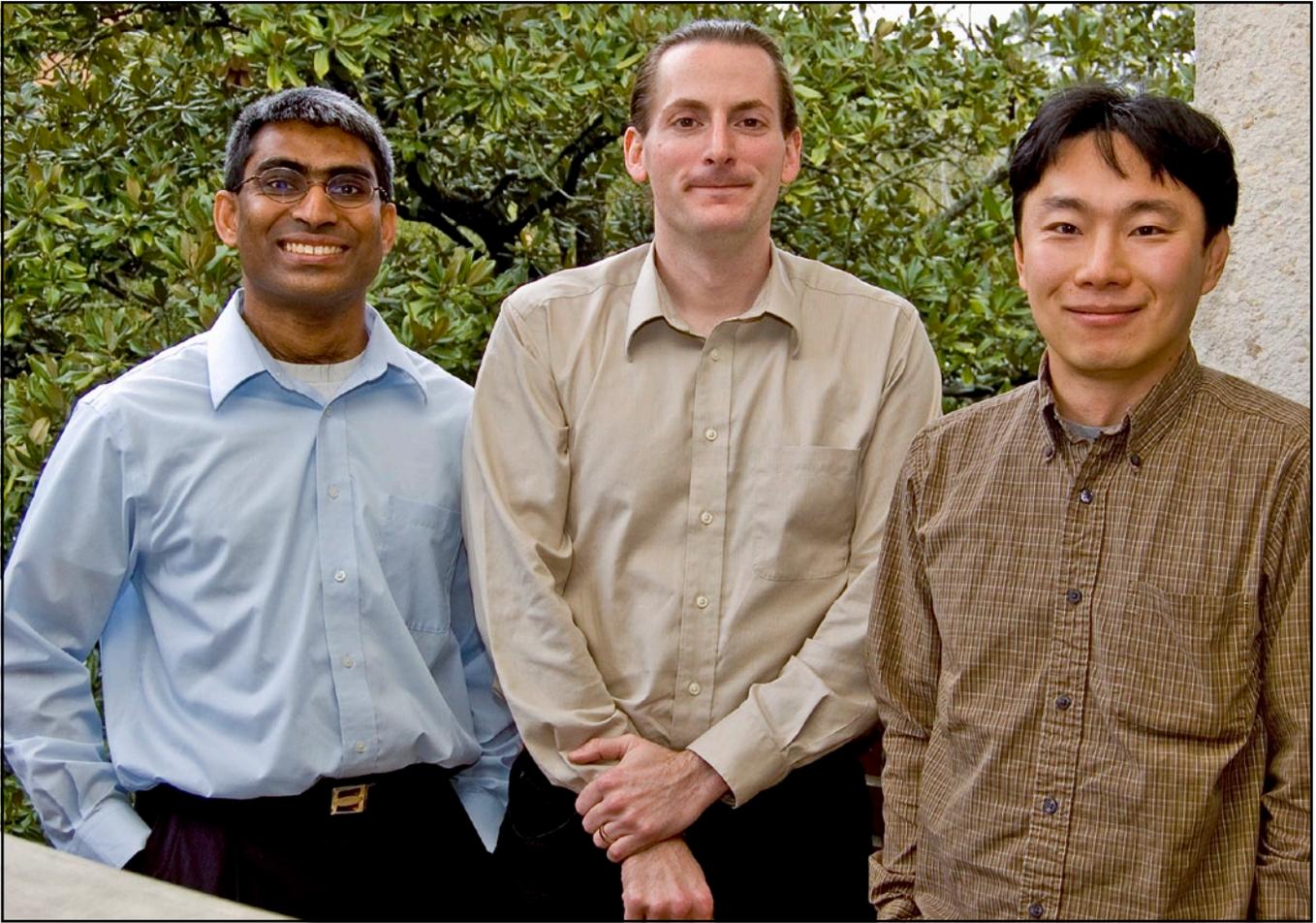
In 2009, it was decided to hold an Undergraduate Research Poster Session to showcase the broad range and quality of the research carried out by these undergraduates. In addition, the Lannutti Award Committee decided to use the poster session to choose the awardees for the Lannutti Awards, with cash awards of \$750, \$500 and \$250 going to the top three posters.

Nineteen students participated in the session, including a number of students from other departments working with physics faculty. A number of students presented posters from work they had done the previous summer as REU students at other institutions. The Lannutti Award winners were Kristen Collar, Alison Pawlicki and David Page.

This year's Poster Session was held April 1, 2010.



These students were selected into Sigma Pi Sigma based on excellent performance in their upper division physics classes. They represent the "cream of the crop" and are headed to very successful careers in physics and related fields. Many of them have performed research in collaboration with Physics Department faculty, and many are planning to attend graduate school. From left: David Page, Amy Rouinfar, Maksim Levental, Alison Pawlicki, Christopher Segal, David Morris, Nicholas Fitzsimmons, and Rutger Duggan.



From left to right: Maitri Warusawithana , Andrew Askew and Takemichi Okui

Department welcomes three new faculty

The physics department welcomed three new faculty members to its ranks in 2009, Andrew Askew, Takemichi Okui and Maitri Warusawithana. All three are doing research at the forefront of some of today's most exciting science.

Professor Askew, a graduate of Rice University, is an experimental particle physicist doing research both at Fermilab and the Large Hadron Collider (LHC) in CERN (Geneva, Switzerland). Having Professor Askew on the faculty strengthens FSU's already substantial involvement with the LHC, a proton-proton collider which will be probing matter at unprecedentedly high energies and short length scales in the coming years. By putting the standard model of particle physics to the test, the work of Professor Askew and his many collaborators both at FSU and around the globe has the potential to revolutionize our understanding of the fundamental constituents of matter.

Professor Okui, a graduate of the University of California at Berkeley, is a theoretical particle physicist whose research interests range from the possible existence of hidden extra

dimensions, to supersymmetry and strongly coupled dynamics. Much of Professor Okui's work is motivated by the prospect for new data coming from the LHC, and the ideas he is working on, which go beyond the standard model of particle physics, will help provide the framework for interpreting this data as the high energy community enters one of the most exciting times it has lived through for the past several decades.

Professor Warusawithana, a graduate of the University of Illinois at Urbana-Champaign, is a condensed matter experimentalist whose research involves the fabrication and study of oxide thin films and interfaces (work he will be carrying out at his lab at the National High Magnetic Field Laboratory). The oxide interfaces Professor Warusawithana has been studying show a wide range of fascinating phenomena associated with strongly correlated quantum systems, including ferromagnetism, superconductivity and ferroelectricity. In addition to being of great fundamental scientific interest in their own right, these systems have the potential to be useful in the development of new kinds of electronic devices.

Jenkins looks for life in the multiverse

TAKEMICHI OKUI
SPECIAL TO RESONANCES

Dr. Alejandro Jenkins, a postdoc in theoretical high energy physics here at FSU Physics Department, is a co-author, with Dr. Gilad Perez of the Weizmann Institute in Israel, of the thought-provoking article “Looking for Life in the Multiverse,” featured as the cover story of the January 2010 issue of *Scientific American*.

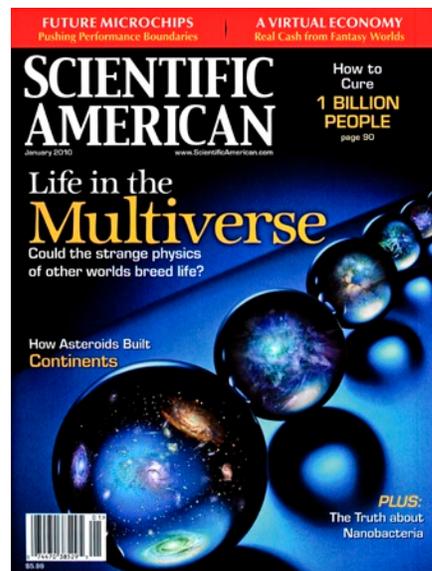
The term “multiverse” refers to a collection of many causally disconnected universes, and its existence follows robustly from the theory of cosmic inflation. The theory is fairly well understood and, during the past decade, astrophysical measurements have offered convincing experimental confirmation of some of its predictions. It therefore looks like we have to “live with” the multiverse, whether we like it or not.

But since other universes are causally disconnected from ours (by definition!), who cares? Some physicists have argued that the multiverse allows us to explain some of the fundamental constants of nature in terms of the so-called “anthropic principle.” Those

constants appear to have just the right values to allow the formation of galaxies, planets, life, etc., and the anthropic principle states that those constants are observed to have the values that they have because otherwise intelligent observers (such as ourselves) simply would not exist to measure them.

Clearly, such an argument works only if there are a large number of universes with different values of constants. A good analogy is the distance between the Sun and Earth, which seems “finely tuned” (at a percent level) so that we neither freeze to death or boil to death. But we know that there are countless planets with different temperatures in the universe and we just happen to be the lucky ones. Similarly, the multiverse (which seems to be there anyway because of inflation) could allow us to use anthropic reasoning to address fine tuning problems.

Note that anthropic reasoning becomes weaker as you vary more parameters. For example, the Earth-Sun distance can change drastically if we also vary the Sun’s temperature. Now, the standard model of particle physics and cosmology has over 20 parameters—which of them vary from universe to universe? All of them? Only one? No one



knows. Therefore, the most sensible thing to do is to allow many of them to vary and investigate how robustly the existence of galaxies, the laws of chemistry, etc., hold up against the variations.

Which fine tuning problems survive this test? Is anthropic reasoning actually useful for “explaining” the values of fundamental constants in this universe? Dr. Jenkins’s take on it is expressed eloquently in his *Scientific American* article.

Longtime machine shop supervisor Dan Baxter retires

In August 2009, Dan Baxter retired after 18 years as Supervisor of the Keen Physics Building Machine Shop. Beginning in 1998, he took on the additional duties of supervising the machine shop in the Collins Research Building. Through his consistent leadership, Dan molded his crew of engineers into a wonderfully productive and talented group. The instrument shops became key assets in a wide range of projects for the Physics Department. Dan was always able to find a way to schedule projects for many other research groups around campus. Dan instilled and fostered a sense of pride in work that carries forward even in his absence. We miss Dan (and the shop Christmas party), and wish him the best in retirement as he pursues his love of antique vehicles.



Dan Baxter, third from right, led the Keen Building machine shop for 18 years.

Physicists get first look at single top quarks

Scientists at the U.S. Department of Energy's Fermi National Accelerator Laboratory (Fermilab), including six from The Florida State University, have made the first observation of the production of single top quarks, one of the elementary particles of matter. Researchers believe that top quarks provide clues to solving longstanding mysteries of the universe.

The observation of single top quarks resulted from the painstaking analysis of billions of proton-antiproton collisions recorded by the DØ (DZero) detector in Fermilab's Tevatron, the world's highest-energy particle collider. Physics researchers from Florida State who participate in the DØ collaboration are Associate Professor Todd Adams, Professor Susan Blessing, staff physicist Sharon Hagopian, Professor Harrison Prosper, postdoctoral research associate Jedranka Sekaric and Professor Horst Wahl, along with their graduate students.

Previously, top quarks had only been observed when produced by the strong interaction between elementary particles. That process leads to the production of pairs of top quarks. The production of single top quarks, which involves the weak nuclear force, is much harder to identify experimentally. But almost 14 years to the day after the top quark discovery in 1995, the production of single top quarks has now been observed.

"I am simply elated," said Prosper, the Kirby W. Kemper Professor of Physics at Florida State. "Fourteen years ago, the search for single top quarks seemed an almost impossible task. Yet several Ph.D.s later—including two from Florida State—my colleagues and I finally succeeded."

Searching for single-top production is an extremely difficult business because only one in every 20 billion proton-antiproton collisions produces a single top quark. Moreover, the signal of these rare occurrences, called "events," is easily mimicked by other processes, referred to as "background," that occur at much higher rates.



From left — Horst Wahl, Susan Blessing, Todd Adams, and Harrison Prosper

At 200 times the mass of a proton, which is roughly the mass of a gold atom, the top quark is by far the heaviest elementary particle -- yet it has no discernable size. Understood as an ingredient of the particle soup created just after the Big Bang, today top quark pairs exist only fleetingly within atoms, according to the laws of quantum theory. Therefore, in order to study the top quark in detail it must be created experimentally in a high-energy particle accelerator, such as the Tevatron, that can recreate the conditions of the very early universe.

"This was a difficult analysis, carried out by a very dedicated and persistent group," said Blessing, a professor of high-energy physics and director of Florida State's Women in Math, Science and Engineering program. "Their search began 15 years ago and required that we understand our detector and the data extremely well. This bodes well for future searches."

To make the single top quark discovery, the researchers spent two years combing through the results of proton-antiproton collisions recorded by the DØ experiment.

The DØ collaboration is an international team of nearly 500 scientists studying high-energy particle collisions.

The Fermilab collaborators identified several thousand events that looked the way single top events are expected to appear. Using sophisticated statistical analysis and detailed modeling of background processes, the team showed that a few hundred collision events produced the real thing.

The researchers submitted their results to *Physical Review Letters* on March 4, 2009.

"This discovery, in which Florida State University scientists played a pivotal role, is a spectacular example of the truism that, even in a collaboration of some 500 scientists, individuals can make significant contributions," Prosper said.

High-energy physics is about what makes up the world and what holds it together. Its Standard Model is the most comprehensive theory ever created and explains in detail the interactions between all elementary particles.

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Book sheds light on Dirac—‘The Strangest Man’

COURTNEY GRIFFIN
SPECIAL TO RESONANCES

A standing-room-only crowd turned out at the Alumni Center on October 1, 2009 to hear the author of a new biography talk about “Paul Dirac’s Road to Tallahassee.”

The author, Graham Farmelo, traced the Nobel Prize winner’s life from his childhood in England to his work as a physics professor at Florida State from 1971-1984. Based on previously undiscovered archives, the book, titled *The Strangest Man: The Hidden Life of Paul Dirac, Mystic of the Atom*, has received much critical acclaim.

A reviewer for *The New York Times* calls it “the most satisfying and memorable biography I have read in years,” while *Publisher’s Weekly* says Farmelo’s “great affection for his odd but brilliant subject shows on every page, giving Dirac the biography any great scientist deserves.” While he was researching the book, Farmelo spent time at the Dirac Science Library as well as elsewhere on campus collecting Dirac anecdotes from FSU faculty members and friends. In fact, Farmelo featured comments from Dirac’s friend Kurt Hofer, Robert O. Lawton Distinguished Professor Emeritus of biology at Florida State, extensively in the prologue.

The talk marked the U.S. launch of the book, and the following day the author was a guest on National Public Radio’s *Science Friday*. The event was hosted by Dean Joseph Travis of Arts & Sciences, Dean Julia Zimmerman of University Libraries, the Department of Physics, and Friends of FSU Libraries.

The name Paul Dirac is attributed to the campus science library and to the late Nobel Prize winning Florida State University professor, but a new book by Graham Farmelo sheds light on the life of a remarkable man who held ranks with the likes of Albert Einstein and Issac Newton in the field of 20th century physics.

Farmelo, biographer and senior research fellow at the London Science Museum, hosted a presentation on his book, *The Strangest Man: The Hidden Life of Paul Dirac, Mystic of the Atom* with the help of several FSU departments on Thursday, Oct. 1 in the FSU Alumni Center. Farmelo depicted Dirac as a man of great modesty and a lack of conversational skills (typically limiting his responses to “yes,” “no” and “I don’t mind” after 30 seconds of thought) but also of immense achievement.

Dirac contributed to the early development of quantum mechanics as well as to the prediction of the existence of antimatter. Farmelo interspersed discussions of scientific discovery with stories of Dirac’s love of Cher, Mickey Mouse and James Bond films and the physicist learning to water ski in his mid-70s.

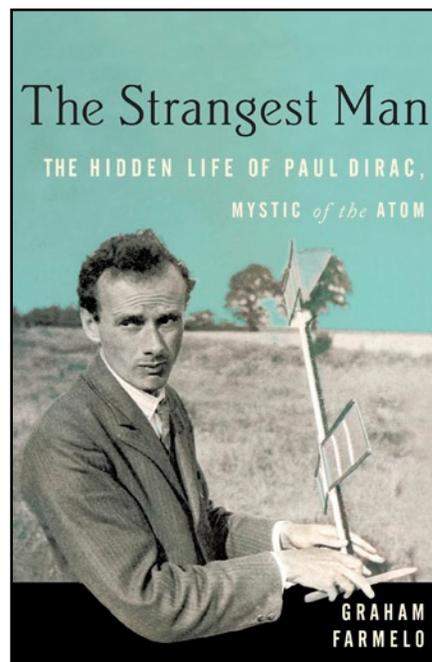
“He is a hero to modern theoretical physicists,” Farmelo said. “I knew he had an unusual life, but I didn’t realize how rich a life he had, and that’s why I wanted to write it.” Farmelo’s book has already made *Time* magazine’s online “Top 5 Things to Do” for the week of Sept. 18, 2009.

Over 200 people attended the presentation to learn more about the book and Dirac himself.

“The event marked the official U.S. launch of the new book by Graham Farmelo about Dirac,” said Mark Riley, chair of the Department of Physics. “It was a spectacular success. Extra chairs had to be brought in for the huge crowd, and even then, many people had to stand.”

Riley said that the presentation was designed to allow community members to learn more about the man who spent his last 14 years in Tallahassee. He said the feedback he’s received of the event has been universally glowing.

“Although (Dirac) is probably FSU’s most famous faculty member ever, very little is actually known about him by the



general population,” Riley said. “If you can imagine having Shakespeare as a member of the English Department, then you can understand what it was to have Dirac as a faculty member in Physics.”

Dirac held the position of Lucasian Professor of Mathematics at Cambridge from 1932 until 1969, when he retired and moved to Florida.

“Dirac has been an idol of mine since I was a teenager and picked up my first book on quantum mechanics,” Riley said. “Very early on, I learned he was a very gentle quiet fellow, a man of very few words indeed.”

Following the presentation, several audience members stood up and spoke about their personal interaction with Dirac during his time here and how his presence influenced them.

“I used to talk to him as he was walking from his house to the physics building,” professor of biology Marc Freeman said. “He didn’t have much to say, but I’ve read a great deal about him and he was fantastic.”

Freeman said that it was the students who always benefited the most from

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Berg elected Secretary-Treasurer of DCOMP

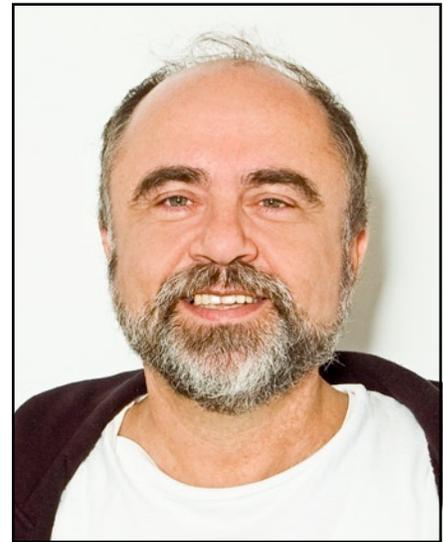
Bernd Berg, Dirac Professor in the Department of Physics, was elected for a three year term as Secretary-Treasurer of the Division of Computational Physics (DCOMP) of the American Physical Society (APS).

DCOMP has more than 2000 members and the objective of the Division is the advancement and dissemination of knowledge regarding the use of computers in physics research and education. This includes, among other areas, their application to experiments, theory, and education as well as the application of physics to the development of computer technology. The division provides to its members, and to all APS members, an opportunity for coordination and a forum for discussion and communication. In addition, the Division promotes research and development in computational physics; enhances prestige and professional standing of its members; encourages scholarly publication; and promotes international cooper-

ation in these activities.

In particular DCOMP is instrumental in awarding once a year the Rahman Prize, which is the highest APS award for Computational Physics and the Metropolis Prize for the best Ph.D. Thesis of the year in Computational Physics. As other APS Divisions, DCOMP awards annually its share of the prestigious APS Fellowships.

According to Berg, a strength, but also a difficulty of DCOMP is its diversity, which brings together physicists from many subfields, held together by the common interest in computational techniques. This is an opportunity of true interdisciplinary work, which also incorporates neighboring disciplines like Computer Science, Applied Mathematics and Computational Chemistry and Biochemistry, to name a few. On the other hand it faces often severe communication problems due to rather distinct scientific cultures in the various



Bernd Berg

disciplines.

Besides keeping track of the budget, the duties of the Secretary-Treasurer include preparing the agenda of Executive Committee meetings and Business Sessions.

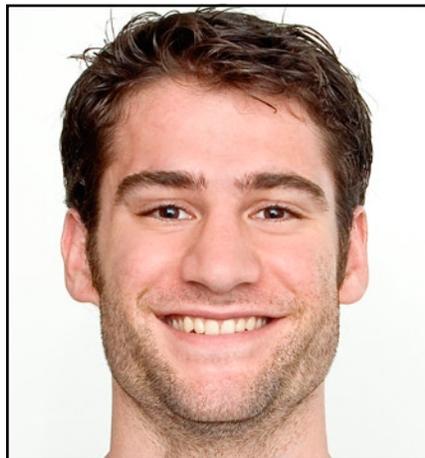
Thayer gets prestigious National Fellowship

LAURA REINA

SPECIAL TO RESONANCES

With the imminence of the first proton-proton collisions at the Large Hadron Collider (LHC), located at CERN (Geneva, Switzerland), the world of particle physics stands at the verge of a “golden age” in exploring the universe at the smallest of distance scales. Such explorations hope to shed light on fundamental problems such as the origin of Dark Matter in the universe, the possible existence of new forces and extra spatial dimensions, and the origin of mass in fundamental particles such as electrons and the quarks.

To aid in these endeavors, starting in 2007 the National Science Foundation has announced the Large Hadron Collider Theory Initiative (LHC-TI) Fellowships. These prestigious Fellowships assist selected young theoretical particle physicists, either graduate students or postdocs, with a competitive salary and extra funds for research, computing



Benjamin Thayer

and travel needs, for a maximum of two years. Awardees are selected by a national committee of renowned particle physicists on the basis of their scientific merits and the relevance of their scientific work to the physics of the LHC.

In 2009, three Graduate Student and two Postdoc Fellowships were awarded nation-

wide. One of the recipients of the Graduate Student LHC-TI Fellowship is Benjamin Thayer, from Florida State University's Department of Physics. Working under the guidance of Prof. Laura Reina, Thayer's research seeks to answer some of these fundamental problems by improving the precision of theoretical calculations for particularly important particle reactions at the LHC, such as the production of heavy quarks (known as bottom and top quarks) with pseudoscalar particles, known to appear in several extensions of the Standard Model. Utilizing some recently proposed mathematical techniques, Thayer hopes to develop and test more efficient methods for calculating particle physics observables than the traditional techniques used presently. If successful, the new techniques will help significantly improve the precision of particle reaction cross sections, and thereby help physicists at the LHC better distinguish between signals of “new physics” from background Standard Model processes.

Serbia lauds native son with award in physical science

JEFFREY SEAY

SPECIAL TO RESONANCES

A Florida State University physicist who is a native of Serbia has been awarded that nation's highest professional award in the field of physical science for his "exceptional research in physics."

Professor Vladimir Dobrosavljevic, who directs the Theory Program at the National High Magnetic Field Laboratory, received the Marko V. Jaric Prize for Outstanding Scientific Achievement in Physics for his contribution to the development of the theory of correlated disordered electronic systems.

The award was presented during a March 17, 2009 ceremony at the University of Belgrade by Bozidar Djelic, Serbian deputy prime minister for European Union integration and minister of science and technological development.

Dobrosavljevic studies the fundamental properties that tell electrons to stop or go. This is important in the design of electronics — from TVs to iPods — where electrical currents need to be turned on and off inside increasingly miniaturized parts.

In metals, electrons move around freely at high velocities, conducting electricity. In other materials known as insulators, electrons can be trapped, stopped dead in their tracks.

Understanding a correlated disordered electronic system hinges on understanding how effectively electrons can repel each other. Electrons can move only if other electrons get out of the way.

Deputy Prime Minister for EU integration and Minister of Science and Technological Development Bozidar



Vladimir Dobrosavljevic

Djelic presented Vladimir Dobrosavljevic with the award for exceptional research in physics, established by the Professor Marko Jaric Fund.

"Imagine that you are on Fifth Avenue in New York City the day before Christmas," Dobrosavljevic said. "There is a huge crowd of people trying to find their way to the stores, but it's very hard for you to move around unless the person next to you moves out of your way. You can't just freely move, but you have to look where the others let you bump into them."

When electrons are correlated or synchronized in a particular way, they can either move around or, under certain conditions, stop.

"The electrons form this kind of quantum dance," he said. "It's very coordinated, like an troupe of choreographed belly dancers moving together, instead of individual belly dancers doing what-

ever they want."

Former Marko V. Jaric Prize laureates and members of Dobrosavljevic's family attended the March 17 award ceremony, along with scientists representing all of Serbia's national research institutions, including the Serbian Academy of Arts and Sciences and the Serbian Physical Society.

Dobrosavljevic left Serbia for the United States almost 26 years ago after earning his bachelor's degree.

"My friends threw me a big going-away party where they broke all the furniture in my parents' house," Dobrosavljevic joked. "If I had come back as a failure, my parents wouldn't have been happy! So it was a good feeling to come back with some measure of success."

Now that he has attained such distinction in his career, Dobrosavljevic is enthusiastic about the new opportunities it will afford him, especially in terms of giving back to his native Serbia. After wrestling with the challenges of privatization in a post-communist economy, Dobrosavljevic says Serbia is striving to develop scientific programs with grants it has received from the European Union with which to reach out to scientists around the world.

"Serbia has built a very large supercomputer, which is larger than the one we have at FSU," he said. "So now, they are seeking collaborations and projects. In fact, one of my former Ph.D. students is now an assistant professor in Serbia. The two of us have started a cooperative effort. I'm very excited about it because Serbia has a lot of very well-trained younger students, so I think this will be a source of cooperation for me, and it will also be helpful to them."

Brown wins 2009 ACM Gordon Bell Prize

A team including Florida State University's Gregory Brown was named a winner of the 2009 ACM Gordon Bell Prize, which honors the world's highest-performing scientific computing applications. The results were announced in Portland, Ore., during the SC09 international supercomputing conference.

Dr. Brown, a scientist with Parallax Research, Inc., in Tallahassee, holds a courtesy appointment in the FSU Department of Physics, where he has a long-standing collaboration with Prof. Rikvold and co-supervises his graduate students. Prof. Rikvold says: "My students and I are extremely lucky and very honored that a superb computational physicist like Dr. Brown chooses to be an advisor to my research group. Through his courtesy appointment he makes his unique expertise in extreme high-performance computing available to our graduate students."

Led by Markus Eisenbach the team, consisting of colleagues from Oak Ridge National Laboratory, Florida State Uni-



Gregory Brown

versity, and the Institute for Theoretical Physics and Swiss National Supercomputing Center, achieved 1.84 thousand trillion calculations per second (1.84 petaflops) using an application that analyzes

the effect of temperature on magnetic systems. The application achieved this performance on ORNL's Cray XT5 Jaguar system, making use of more than 223,000 processing cores and reaching nearly 80 percent of Jaguar's peak performance.

The application combines a method which solves the Dirac equation describing the relativistic wave equation for electron behavior with a Monte Carlo method known as Wang-Landau algorithm which guides the relativistic calculation. This sets aside empirical models and allows accurate calculation from first principles of the temperature above which a material loses its magnetism. By accurately revealing the magnetic properties of specific materials—even materials that have not yet been produced—the project promises to boost the search for stronger, more stable magnets, thereby contributing to advances in such areas as magnetic storage and the development of lighter, stronger motors for electric vehicles.

Top Quarks — continued from page 6

Having more precise information about the top quark gives scientists clues in their search for another missing puzzle piece, the Higgs boson, which many physicists believe will solve longstanding mysteries about the universe, such as why particles like electrons have mass. The work done by FSU scientists is also helping to prepare the ground for what many believe will be a new era of discovery at the Large Hadron Collider (LHC), the world's highest-energy particle accelerator. The \$10 billion LHC is located at CERN, the European Laboratory for Particle Physics, in Geneva, Switzerland.

Major funding for the study was provided by the U.S. Department of Energy.

Fermilab, located in Batavia, Ill., is the United States' top facility for research in the field of high-energy physics. Read more about it at www.fnal.gov.

Dirac book — continued from page 7

Dirac.

"As opposed to most prima donnas who don't teach courses, he taught courses and enjoyed it, and the students loved him as well," Freeman said. "I only hope that he could have lived longer."

Freeman said that this book was a long time coming — too long.

"It is a wonderful book which brings long overdue insight and recognition to this towering scientist," Riley said. "I hope FSU students will appreciate that Dirac is not just a curious statue next to the library but one of the greatest scientists of all time, someone who fundamentally changed the way we think about our universe (and) someone who laid the foundation of modern technology."

Riley described Dirac as someone who helped Einstein when Einstein was hav-

ing problems with physics, whose name will be taught in classrooms a thousand years from now, who lived on Chapel Drive just around the corner from Doak Campbell Stadium and who has a gravestone in Westminster Abbey right next to Isaac Newton but chose to be buried here in Tallahassee.

Farmelo said he hopes the book will give people a three-dimensional picture of Dirac and allow them to fully appreciate the extent of his achievements in physics.

"FSU has many very distinguished faculty (members), but I suspect he will long remain perhaps the most distinguished," Farmelo said. "He was an incomparably bright man who is still productive even after death because of the rotundity of his contributions."



2009 DREB conference attendees gather for a group portrait.

Physics Department hosts 2009 DREB

The VI International Workshop on Direct Reactions with Exotic Beams (DREB 2009) was hosted by The Florida State University nuclear structure group in the Department of Physics from December 15th to 18th. The meeting is a major biannual scientific event, previously held in 1999 at Michigan State University (USA), in 2001 at IPN Orsay (France), in 2003 at the Univer-

sity of Surrey (England), in 2005 at Michigan State University (USA), and in 2007 at RIKEN (Japan).

One hundred physicists from all over the world came to Tallahassee to discuss issues related to studies of nuclear structure and nuclear astrophysics using nuclear reactions induced by beams of exotic, short-lived nuclei. Detailed descriptions of the

workshop, oral presentations slides and workshop Photo Album are posted online at <http://dreb2009.physics.fsu.edu>.

"This is a major event indeed, and is a strong indicator of the international recognition and strength of our department," said Mark Riley, Florida State's Raymond K. Sheline Professor of Physics and chair of the physics department.



2009 Hadron conference attendees in a large group portrait.

FSU hosts 2009 Hadron conference

The Thirteenth International Conference on Hadron Spectroscopy (HADRON 2009) took place at Florida State University from Sunday, November 29, 2009 to Friday, December 4, 2009. The conference featured 35 plenary talks and 32 parallel sessions and was attended by approximately 220 scientists from 24 countries.

This conference was the latest in a series of successful conferences which takes place every two years. The first conference in the series started at the University of Maryland in 1985, and the follow up conferences took place at Tsukuba/Japan, Corsica/France, Maryland/USA, Lake Como/Italy, Manchester/UK, New York/USA, Beijing/China, Protvino/Russia, Aschaffenburg/Germany, Rio de Janeiro/Brazil, and Frascati/Italy. The next conference, the Fourteenth International Conference on Hadron Spectroscopy (HADRON 2011) will take place in Munich/Germany.

The scope of HADRON 2009 was to bring together theoretical and experimental experts in all areas of physics relevant to hadron spectroscopy and related aspects of hadron dynamics. Hadron spectroscopy

studies the structure of the hadrons, the nature of their constituents and the interactions between them.

In this conference, many of the latest results from different experiments were presented and the latest theoretical ideas and calculations were discussed.

Perspectives on the theoretical status of mesons and baryons were presented by a number of speakers. Specific topics included: charmonium production, lattice-QCD calculations of baryon and charmonium spectroscopy and radiative transitions, and exotic mesons. Other theory reviews discussed scalar mesons, multi-quark states, chiral dynamics, the large- N_c formalism, and light-front holography.

Among the recent experimental results presented were observations and confirmations of new heavy-quark mesons from BaBar, Belle, BES, and CLEO, the first observation of a meson decaying into three photons, heavy baryon measurements by BaBar, CDF, and D0, new experimental results on the X, Y, Z heavy meson exotic candidates, and observation of the $\omega(1600)$

light hybrid meson candidate by COMPASS. Presentations were made about continuing work at Jefferson Lab and in Germany on the light baryon spectrum, with the theme of performing "complete" experiments with polarized targets and beams. Many measurements in progress at CLAS, ELSA, MAMI and COSY were discussed.

Finally, future facilities were covered in a number of talks, including PANDA at FAIR, GlueX & CLAS-12 at Jefferson Lab, J-PARC at KEK/Japan, and the Super B factories.

Members of the Local Organizing Committee were FSU Physics Professors Paul Eugenio (Chairman and Co-Editor), Volker Crede (Co-Editor), Todd Adams, Simon Capstick, Winston Roberts, and FSU Research Physicist Alexander Ostrovidov.

The conference was sponsored by Florida State University, Jefferson Science Associates, Thomas Jefferson National Accelerator Facility, Fermi National Accelerator Laboratory, U.S. Department of Energy, the International Society of Technical Environmental Professionals, and the *European Physical Journal*.

'Flying Circus' brings fun to physics



The paper airplane contest is one of the fun highlights of the biennial 'Flying Circus of Physics' — and a way to interest all ages in the wonders of science.

PARTH DESAI

SPECIAL TO RESONANCES

The physics department at Florida State University hosted its biennial open house, known as the Flying Circus of Physics, on Saturday, Oct. 17. The event featured hands-on activities, scientific demonstrations, science videos and live presentations.

The open house tradition began in 1991 and typically hosts about 400 to 500 guests every other year.

Children and parents, some local and some from farther away, participated in the hands-on activities and interactive experiments. One experiment, which fascinated some onlookers, demonstrated how particles of light reflect off water.

"I'm kind of interested in how light moves," said Augusta Raa Middle School seventh grader Harrison Reid. "I like how the particles reflect off of things."

The wide variety of experiments there was something people of all ages could

learn and enjoy. Some of the children at the event particularly enjoyed an experiment where a demonstrator manipulated the air content in a marshmallow, causing it to expand and contract.

"(My favorite experiment was) probably the marshmallows," said first grade student Robert Kustom. "Because they are big, and then they go little."

The event highlighted basic concepts of physics such as friction, torque and the conservation of energy in an accessible manner to better capture the interest of the young students. To educate students on basic principles of aerodynamics, volunteers facilitated a paper plane making and flying contest. Graduate students explained to the students why the plane held up in air.

"If you show them the math, they're not going to like it," said FSU physics graduate student and event volunteer Anthony Kuchera. "But if you show them the results, it's impressive."

One of the marquee exhibitions at the

Flying Circus of Physics was a planetarium show called "Dawn of the Space Age," which honored the 40th anniversary since the first moon landing. The show detailed space exploration from the launch of the first artificial satellite, Sputnik, to modern times.

In a presentation titled "Physics of Sports," FSU physics professor David Lind demonstrated how fundamental principles of physics apply to a variety of sports.

He explained that a curveball pitch takes on a curvilinear path due to the effects of spin on fluid flow.

Also, Lind demonstrated how friction provided by the edges of skis is important for turning when skiing, while a lack of friction on the bottom of skis enables skiers to move forward at high speeds.

"There's this perception that physics is hard and boring," said FSU physics professor Grigory Rogachev. "We definitely want to fight that perception and we want to inspire kids really to do physics — that's the major goal of this event."

RESONANCES

PHYSICS DEPARTMENT
FLORIDA STATE UNIVERSITY
TALLAHASSEE, FL 32306 - 4350

Former administrative assistant Maureen Jackson passes away

Longtime administrative assistant Maureen Jackson, who joined the FSU Physics Department in 1997, died on February 14, 2010, following a long battle with cancer.

In an e-mail message to faculty and staff, which included a photograph of Maureen and a post card from Paris that she sent to the department last year, department chair Dr. Mark Riley said, "It is with great sadness that I inform you that our beloved Maureen Jackson lost her brave fight with cancer and passed away yesterday.

Maureen joined the physics family in 1997 and I think we all agree she was an amazing person. She loved this department and everyone in it. We will all miss her deeply.

Our love and sympathy go out to her family."

Maureen is survived by her husband, Louis T. Jackson, Jr, and her children Thomas Adam Jackson and Tamara Gilbert.

