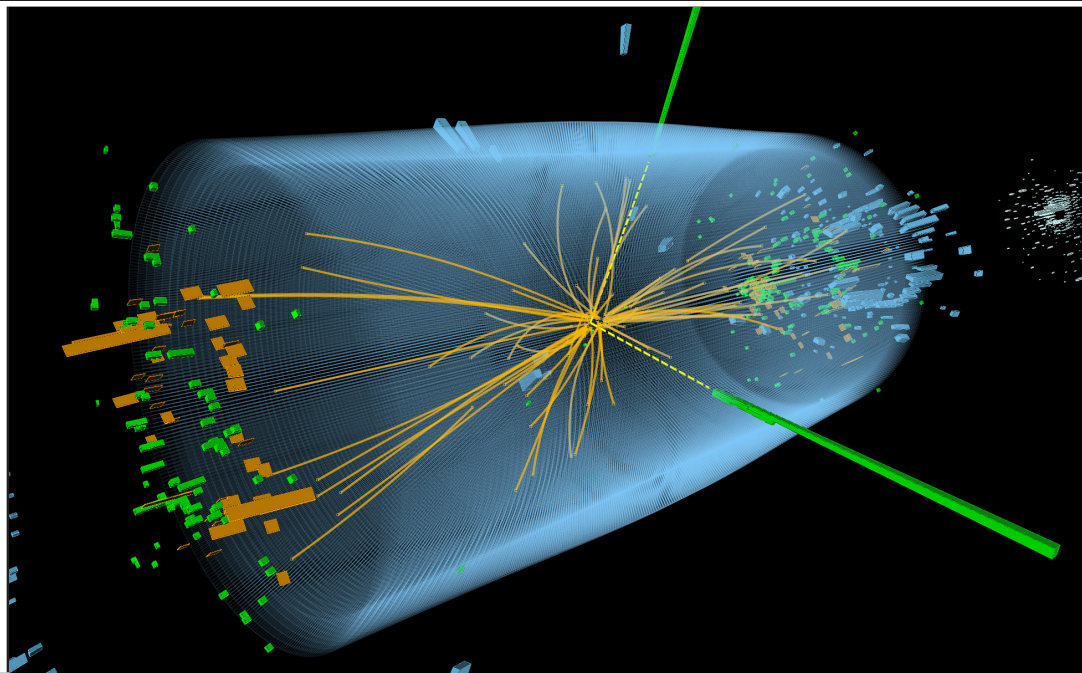


The Wisconsin Physicist



WISCONSIN
UNIVERSITY OF WISCONSIN-MADISON

Department of Physics

1150 University Avenue
Madison, WI 53706

Tel: 608.262.4526

Email: info@physics.wisc.edu

Web: www.physics.wisc.edu

Vol. 17

No. 2

Fall 2012



WISCONSIN

UNIVERSITY OF WISCONSIN-MADISON

University of Wisconsin

Department of Physics
1150 University Avenue
Madison, WI 53706

Tel: 608.262.4526
Fax: 608.262.3077

Email: info@physics.wisc.edu
Web: www.physics.wisc.edu

On the Cover

Computer generated picture of a candidate Higgs boson event reconstructed in its decay to two photons. The two large green bars signify the energy of the two photons measured in few of the 80 thousand crystals that make up the CMS calorimeter. Charge particle tracks and other energy deposits from the colliding proton remnants are also shown.

Inside this Issue

Table of Contents

Vol. 17 No.2 Fall 2012

Greetings from the Chair.....	2
Faculty Updates.....	3
New Faculty.....	3
Promotions.....	3
Awards.....	3
Board of Visitors.....	4
What's New.....	5
Garage Physics.....	5
UPS Club.....	5
Physics Library.....	5
2012 Physics Award Banquet.....	6
Undergraduate Awards.....	6
Graduate Awards.....	8
Department Awards.....	9
Alumni Awards.....	9
Fourth of July Celebration at CERN and The Wisconsin Particle Physics Group.....	10
Wisconsin ATLAS Group.....	12
Wisconsin CMS Group.....	12
UW Physics Degrees Awarded.....	13
Undergraduate.....	13
Graduate.....	13
2012 Fall Admissions.....	14
Foundation Accounts.....	15
Giving.....	16

Greetings from the Chair



Robert Joynt
Department Chair

I have now completed a year as chair of the department. It has been busier and more eventful than I expected. It makes me even more grateful to the all the chairs that served before me and left the department in such great shape. I feel a particular debt to the Associate Chair, Mark Rzczowski, who has shouldered a big part of the load.

At the start of the academic year 2011–12 the department was down to 44.75 faculty—the usual number has been about 49. So we are in a rebuilding phase. That is exciting, since we will be able to bring in young people with new skills and fresh ideas. So far, we have hired two Assistant Professors. Yang Bai joins us from SLAC—he is a theoretical physicist who has done great work in collider and dark matter physics. This will be a tremendous boost to the department's already strong phenomenology, particle astrophysics, and particle cosmology research efforts. Justin Vandembroucke also comes from Stanford. He plans to continue his work on the Fermi Gamma-ray space telescope and do research and development for the next-generation gamma ray instrument: the Cherenkov Telescope Array. Justin will play a role in the recently completed IceCube neutrino telescope. The department is also carrying out an ongoing search for an experimental plasma physicist.

We are slowly building back up to our full strength. And it all has to be done right, since the new people will determine the quality of the department for many years to come. I think we have made a great start.

This has truly been a fantastic year for research in the department. Particle physics has entered a new epoch with the discovery of the Higgs boson, and our folks have been right in the middle of that. The Wisconsin ATLAS group (Profs. Wu, Pan, and Mellado) was largely responsible for the analysis of the two-photon decays that gave the most convincing evidence for the particle's existence, and our CMS group (Profs. Smith, Carlsmith, Dasu, Herndon, and Sci. Loveless) played the major role in the detection of the two-tau channel. Sau Lan Wu's public lectures in Madison in September attracted over a thousand listeners. Prof. Thad Walker's group has obtained the first magnetic detection of a fetal heartbeat. This is a big breakthrough, since the present ultrasound methods have very poor time resolution. Prof. Pupa Gilbert has pioneered a possible new method for determining the history of temperature and pressure of earth by using fossil nautilus. The first plasma has been obtained (and filmed by the Discovery Channel) in the new Plasma Dynamo experiment run by Prof. Cary Forest. I could go on—this is only a selection of some of the year's achievements in research.

The first meeting of the Physics Department Board of Visitors was held on Sep. 21, 2012. A full description of this new project can be read on p. 4.

The 11th Annual Awards Banquet was held in May 2012. The generosity of our alumni now allows us to give out many awards to outstanding students. A description with pictures can be found on p. 6. We gave the Distinguished Alumni Awards to Eric Braaten, Allen Caldwell, and Ron Lockwood. The Distinguished Scientist Award was given to Gary Hill, and Bob Leach received the Distinguished Service Award. Eric is Professor of Physics at Ohio State. The award recognized his important contributions to theoretical particle physics. Allen is a Professor at MPI-Munich and has a very distinguished career in experimental high-energy physics. Ron is a Scientist at Lincoln Labs. He has been the chief expert on IR background radiation in the atmosphere, very important for military and other applications. Gary is a Professor at the University of Adelaide in Australia. Gary played a major role in deploying the AMANDA detector at the South Pole and in extracting the first neutrinos; his work represented the proof of concept for the IceCube experiment. Bob had a distinguished career at SAAIC and has rendered very significant service to the department. It's always gratifying to discover once more how well all our graduates have done.

Whether you are an alumna, friend, employee, or student, we appreciate your interest in and loyalty to the University of Wisconsin Physics Department. We wish to include a substantial section of alumni news in future newsletters. To do that, we need to hear from you—please just keep us up to date on what you are doing. Also, send along any memories or anything else that people would like to read. The contact information is on the cover. You can also donate to the Physics Department online by going to www.physics.wisc.edu/giving/index.html.

If you wish to consult with a UW Foundation development officer on future gifts or other options, including estates, trusts, gifts-in-kind, or planned giving please contact Dani Luckett at 608/265-2713 or dani.luckett@supportuw.org

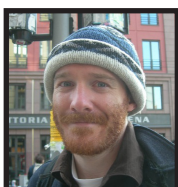
I sincerely thank our generous alumni and friends who have financially supported the Department. This support is truly our margin of excellence.

Faculty Updates

New Faculty

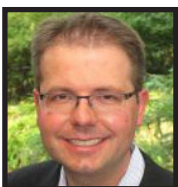


Yang Bai joined the department in August 2012 as an assistant professor from SLAC National Accelerator Laboratory. He earned his PhD in 2007 from Yale University and his BS in 2002 from University of Science and Technology of China. Professor Bai's research is in theoretical particle physics. His research mainly focuses on particle physics beyond the Standard Model including: the dark matter phenomenology, the Large Hadron Collider physics, the electroweak symmetry breaking models, and the underlying dynamics of quark and lepton masses.

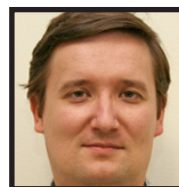


Justin Vandenbroucke joined the department in August 2012 as an assistant professor. Professor Vandenbroucke is on leave during the 2012–2013 academic year as a NASA Einstein Fellow at KIPAC, the Kavli Institute for Particle Astrophysics and Cosmology (Stanford University and SLAC National Accelerator Laboratory). From 2009 to 2012 Dr. Vandenbroucke was a Kavli Fellow at KIPAC. He earned his PhD in 2009 from the University of California, Berkeley, and his BA in 2002 from Stanford University. Dr. Vandenbroucke is an experimentalist interested in gamma-ray astronomy, neutrino astronomy, neutrino physics, and cosmic rays.

Promotions



Karsten Heeger, experimental neutrino physicist was promoted to the rank of professor.



Maxim Vavilov, condensed matter theorist was promoted to the rank of associate professor.

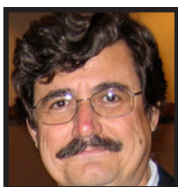


Matthew Herndon, experimental elementary particle physicist was promoted to the rank of professor.



Stefan Westerhoff, experimental particle physicist was promoted to the rank of professor.

Awards



Baha Balantekin, Eugene P. Wigner Professor of Physics, has been elected as the Chair of the Scientific Advisory Board for the European Centre for Theoretical Nuclear Physics and Related Areas (ECT*) at Trento, Italy. This Centre aims to facilitate in-depth research on topical problems at the forefront of contemporary developments in theoretical nuclear physics and related areas such as particle physics, astrophysics, and condensed-matter physics by arranging workshops and collaboration meetings. It also contributes to the training of the next generation of theorists through several programs aimed at graduate students. It is supported by the member states of the European Union. Chairs of the ECT* Advisory Board are usually elected from a group of prominent theoretical physicists at the European universities and laboratories. Balantekin is the first chair of ECT* employed by a U.S. institution.



Karsten Heeger, Professor of Physics, is one of four UW-Madison faculty that were recently selected as National Academy of Science Kavli Frontiers of Science Fellows. They all participated in the Kavli Frontiers of Science Symposium at the Arnold and Mabel Beckman Center of the National Academies of Sciences and Engineering in Irvine, CA, November 2-4, 2012.

To learn more: www.nasonline.org/programs/kavli-frontiers-of-science/about.html

Board of Visitors

The inaugural meeting of the Physics Department Board of Visitors took place at the Wisconsin Institutes for Discovery on Sep. 21, 2012. The board currently has 12 members, 11 of whom are alumni of the department. Capsule profiles of the members follow. Jay Davis, President of the Hertz Foundation, is the Board chair. The functions of the Board are to:

- Advise and assist the Department in increasing awareness among alumni, students, peers, and the general public of the Department's achievements.
- Assist the Department and the UW Foundation in fundraising for needs that are not met by general purpose revenue.
- Serve as ambassadors and advocates for the Department.
- Advise on mechanisms for optimizing the collective impact of the Department's research activities.
- Provide mentoring, networking, and career assistance to Physics undergraduates, graduate students, and post-doctoral associates.
- Help the Department assess the impact of new research directions on society.

The members were in agreement that the first meeting was very productive. As of this writing, a draft of the initial report of the Board has been prepared and action items both for the department and for the Board are included. We anticipate that the ultimate size of the Board will be 18–20: members. If you have suggestions, or wish to serve on the Board yourself, please contact Robert Joynt at 608/263-3279 or rjjoynt@wisc.edu.



Dr. Jay Davis, University of Wisconsin, PhD–Physics (1969). He is the Chair of the Board of Visitors and President of the

Hertz Foundation.



Dr. Carl J. Anderson, University of Wisconsin, PhD–Physics (1979). He is currently a fellow in the Systems &

Technology Group at IBM.

Thomas Dillinger, University of Wisconsin, BS–AMEP (1977), MS–EE (1978). He is currently at Oracle Corporation.



Dr. Casey Durandet, University of Wisconsin, BS–Physics (1989), MS–Physics (1991), PhD–Physics (1995). She is currently

a physics professor in the Maricopa County College District in Phoenix, Arizona.



Dr. Lloyd Hackel, University of Wisconsin, BS–AMEP (1971), MIT, PhD–Applied Physics (1974). He is currently Vice President

for Advanced Technologies for Curtiss-Wright Corporation's Metal Improvement Company.



Dr. Yung-Lung (Bill) Ho, University of Wisconsin, PhD–Physics (1988). He currently works as a telecom consultant and as an inventor.



Dr. Thomas K. (Tom) Holley, University of Wisconsin, PhD–Physics (1982). He is currently the Director of the Petroleum

Engineering Program at the University of Houston.



Dr. Robert (Bob) K. Leach, University of Wisconsin, PhD–Physics (1972).

He is currently at Science Applications International Corp

(SAIC).



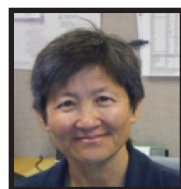
Dr. Greg Piefer, University of Wisconsin, BS–Physics and ECE, PhD–NE (2006). He is the founder of SHINE Medical Technologies

and presently serves as its CEO.



Glen Porter, University of Wisconsin, BS–Political Science (1978). He currently operates his family's business Highland Memorial

Park in New Berlin Wisconsin.



Dr. Dai Dee Pun, University of Wisconsin, PhD–Physics and Math (1987). She is currently the Director of Quality and Reliability

at Skyline Solar, a startup company working on enabling affordable utility scale solar energy using concentrated photovoltaic technology.



Dr. Wesley Traub, University of Wisconsin, MS – Physics (1964), PhD–Physics (1968). He is currently the Chief Scientist for NASA's

Exoplanet Exploration Program at JPL.

What's New

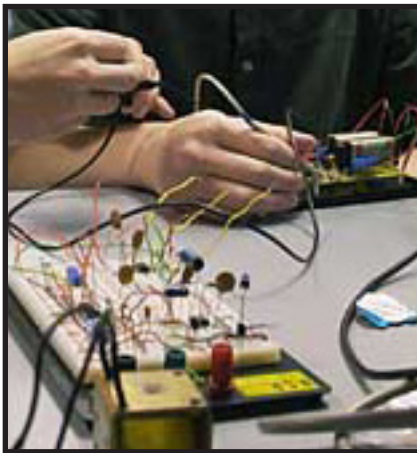
UPS Club

The University Physical Society, also known as the Physics Club, is a student organization for people interested in physics and related fields at the UW. Our goal is to promote Physics in the University community. The Physics Club organizes events such as seminars, tours, trips, and socials for its members, and offers free drop-in tutoring. Members use the club-room as a study room, and a place to socialize between classes. Every semester we organize a field trip to national research facilities, or science related facilities. This semester we visited the Adler Planetarium, the Museum of Science and Industry, and the Field Museum.

Starting from this year, the Physics Club and the Physics department have started "Garage Physics". "Garage Physics" is a space where undergraduates can conduct experiments that are not normally included in Physics lab courses, allowing our members to explore areas of Physics that appeal to them. The Physics department will supply most equipment, which is mostly equipment not in use anymore.

UPS's website (<http://ups.physics.wisc.edu/>)

Garage Physics



Garage Physics is a new facility for students proposed by Professor Duncan Carlsmith. It is intended to be an open lab—a sandbox—for UW-Madison physics students to experiment and be creative. It will provide our students with a place to explore, collaborate, learn laboratory procedures, and ultimately create their own research projects—all in an unstructured, safe environment.

The space will offer opportunities for students at all levels. Novice and intermediate students can explore labs from their courses in great depth. They will have access to electronics, sensors, and data acquisition systems to allow them to build on their experiences. Advanced students can design and construct their own novel experiments or take the lead on large collaborative projects.

Garage Physics, housed in B651 Sterling, is just getting started. It is being outfitted with surplus equipment from our instructional program and generous donations from a few research groups. If you would like to make a donation or have any questions about this program, please contact the Instructional Lab Manager, Brett Unks (unks@wisc.edu, 608.262.0075).

Physics Library



Physics Library Fund

The Physics Library recently received a very generous donation of \$10,000 for our Physics Library Fund from an anonymous donor. The Physics Library Fund was set up several years ago with gift funds from Ken Frazier, who was then the Library Director. We hoped to create an endowment which will eventually be used to support the purchase of materials in physics. With this recent gift we have now reached the level needed for an endowment. If you wish to contribute to the Physics Library Fund please see <http://physics.library.wisc.edu/giving.html>

Reconnect to Reading

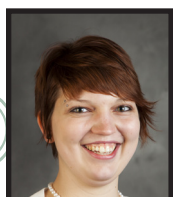
Students in introductory physics classes are introduced to a handful of physicists and their experiments at the beginning of each semester. These physicists usually don't reappear until the final exam. This is a shame because it's the people—physicists—that make physics happen. The Physics Library has a pretty good collection of popular physics, much of it biographical or autobiographical in nature.

2012 Physics Awards Banquet

The 2012 Physics Physics Banquet & Awards Ceremony to honor the Department Award Recipients and Alumni Fellows was held on Friday, May 4, 2012 at the Fluno Center. We honored our award winners with a reception, dinner, and awards ceremony for the family and friends.

Undergraduate Awards

Fay Ajzenberg-Selove Award



Laura Fleming



Amanda Joers

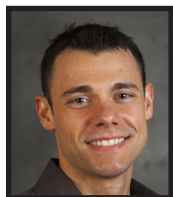
Laura Fleming | Amanda Joers | Karissa Metko

This award is presented to undergraduate women majoring in Physics, Astronomy, or Physics/Astronomy to encourage them to continue their careers in science. Dr. Ajzenberg-Selove, who received her Ph.D. in Physics in 1952, is currently a Professor Emerita the University of Pennsylvania.

Dr. Maritza Irene Stapanian Crabtree Award

Blaine Law | Mohandas Pillai | Antonio Puglielli | Adam Wright

This fund was established by William Crabtree to honor his wife, Dr. Maritza Crabtree, who graduated with a Physics degree in 1971. This annual award benefits undergraduate students in physics based equally on merit and need.



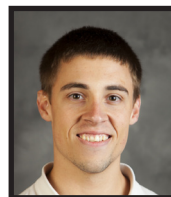
Blaine Law



Mohandas Pillai



Antonio Puglielli



Adam Wright

Bernice Durand Undergraduate Research Scholarship



Danny Jones



Alexandra Schroeder

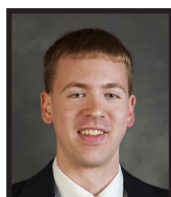
Danny Jones | Alexandra Schroeder

This award was established by Emerita Physics Professor Bernice Durand to promote meaningful undergraduate research and to support and encourage women and ethnic minorities as undergraduate majors in Physics and Astronomy.

Henry & Eleanor Firminhac Physics Undergraduate Scholarship



Natalia Antropova



Eric Hendries

Natalia Antropova | Eric Hendries

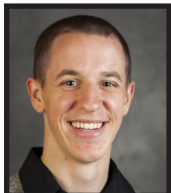
This scholarship is given to undergraduates in Physics with financial need as the primary consideration. Funding provided by Ralph Firminhac in honor of his parents.

L. R. Ingersoll Prize

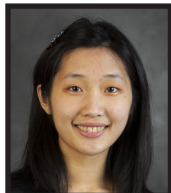
Spring 2010-2011: Zachary Zinda (103) | Rachael Ann Lester (104) | Patrick Bollom (207) | Sharon Lu (207) | Eric Hendries (248) | Stephane Cooperstein (248)

Fall 2011-2012: Tory Nestler (103) | Aaron Follansbee (104) | Jincheng Huang (207) | James Sebald (247)

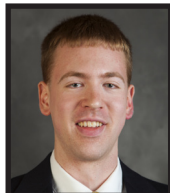
This prize is given for distinguished achievement in introductory physics. It is underwritten by a fund established by the family and friends of the late Professor Ingersoll, a distinguished physicist and teacher at the University who served as Department Chair for many years.



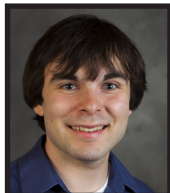
Patrick Bollom



Sharon Lu



Eric Hendries



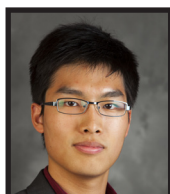
Stephane
Cooperstein



Tory Nestler



Aaron Follansbee



Jincheng Huang



James Sebald

Liebenberg Family Research Scholarship

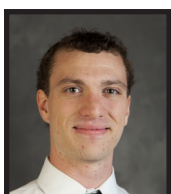


Georgios Stratis

Georgios Stratis

This scholarship is awarded is for Physics, AMEP, or Astronomy/ Physics majors. This scholarship opportunity was initiated by the Liebenberg family for the purpose of promoting undergraduate summer research opportunities.

Albert Augustus Radtke Scholarship Award



Graig Price

Craig Price

This scholarship is is given to outstanding junior or senior students majoring in Physics or Applied Mathematics Engineering and Physics. This award was made possible by a bequest of the late Mrs. Elizabeth S. Radtke in honor of her husband, a 1900 degree recipient from UW-Madison.



2012 Physics Awards Banquet

Graduate Awards

Joseph R. Dillinger Award for Teaching Excellence

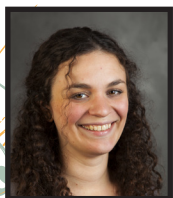


Michael Wood

Michael Wood

This Award for Teaching Excellence was made possible by the family of Joseph Dillinger in honor of their father. The award provides recognition to an outstanding teaching assistant in undergraduate-level Physics. Prof. Dillinger was a faculty member of the department with a special interest in improving undergraduate education.

Phyllis Jane Fleming Graduate Student Award



Kara Maller

Kara Maller

This Fund was created by colleague, Linda B. Miller, in honor of Phyllis J. Fleming, Sarah Frances Whiting Professor of Physics, Emerita, Wellesley College and alumna. Phyllis received her Ph.D. in 1955 under Professor Dillinger. This fund provides support for a female doctoral candidate in physics.

Elizabeth Hirschfelder Award

Peisi Huang | Christine Lewis | Meghan McGarry | Isobel Ojalvo | Andrea Peterson

This award is made possible through a fund established by Elizabeth Hirschfelder for graduate women in Physics, Math, and Chemistry. The purpose of the fund is to provide funding for research related activities and to encourage graduate women in science.



Peisi Huang



Meghan McGarry



Isobel Ojalvo



Andrea Peterson

Germond Graduate Award



Saurabh Maiti

Saurabh Maiti

This award is used to support graduate students in mathematics and physics.

Mendenhall Graduate Award



Tomas Hernandez



Joshua Weber



Ian Wisher

Tomas Hernandez | Joshua Weber | Ian Wisher

This award is used to support graduate students in experimental physics.

Emanuel R. Piore Award

Huaike Guo (Spring 2012)

The award is made possible through the generosity of the Piore family. It is awarded to the graduate student with the highest score on the qualifier examination.

Van Vleck Award

Christopher Anderson | Tomas Hernandez | Saurabh Maiti | Kenny Rudinger | Joshua Weber | Ian Wisher



Christopher Anderson



Tomas Hernandez



Saurabh Maiti

This award is used to support graduate students in physics.



Kenny Rudinger



Joshua Weber

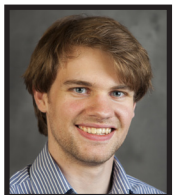


Ian Wisher

Department Awards

Best TA & Rookie of the Year

James Hostetter (Spring 2011) | Michael Wood (Fall 2011) | Brendan Shanahan (Rookie of the Year)



James Hostetter



Michael Wood



Brendan Shanahan

Alumni Awards

Distinguished Alumni, Distinguished Scientist, & Distinguished Service Awards

Eric Braaten (Alumni) | Allen Caldwell (Alumni) | Ronald Lockwood (Alumni) | Gary Hill (Scientist) | Robertson Leach (Service)



Eric Braaten



Allen Caldwell



Ronald Lockwood



Robertson Leach



Fourth of July Celebration at CERN and The Wisconsin Particle Physics Group

Wisconsin ATLAS and CMS particle physicists celebrated with the rest of the world, the Fourth of July announcement of their discovery of a new particle in the searches for the elusive Higgs boson of the Standard Model of particle physics. This long awaited science event, which attracted unprecedented media attention worldwide, marks the beginning of the exploration of the puzzle of electro-weak symmetry breaking mechanism. Never has a science event taken the media by a storm like this one did, especially one announcing discovery of an elusive particle. So, what is the Higgsteria all about?!

While the dubbing of the Higgs particle as the “God particle” and the massively impressive infrastructure put together at the CERN laboratory certainly contributed to the universal excitement about this announcement, this discovery of a new boson is indeed well deserving of all this attention, considering the nature of the elusive Higgs boson.

Although the gauge field theory describing quantum electrodynamics (QED) was tremendously successful, remaining to this day as the most well tested theory of all time, its extension to describe the weak interactions immediately gave rise to a problem. The massless photon carrying the electromagnetic force was exactly what was needed, where as the weak interaction mediators, the W and Z bosons, must be massive to confine that interaction within the nucleus. Unfortunately, including mass terms for W and Z bosons breaks the very gauge invariance that is essential to the theory. This conundrum was broken with the introduction of a complex doublet of spin-0 fields in the theory with a non-zero vacuum expectation value everywhere in the universe, saving the day for gauge field theories. Three of the four degrees of freedom of the spin-0 field resulted in masses for W^+ , W^- and Z, where as the photon remained massless. The fourth degree of freedom manifested as a scalar boson with unknown mass, which was called the Higgs particle. This mechanism due to Higgs, Englert, Brout, Guralnik, Hagen and Kibble, was inspired by the theory of superconductivity, in which the Cooper-pairs of electrons are formed in condensed matter systems. This surreal Higgs mechanism of the early 1960's not only predicted an ether-like field that pervades the entire Universe but also a massive spin-0 particle with an unknown mass. It quickly became the basis for the Standard Model of particle physics, but the hunt for the Higgs boson took an arduous path all the way to the LHC in 2012.

Wisconsin particle physicists mounted research programs at CERN, Geneva, where the highest energy collisions began to be provided by the Large Hadron Collider in 2010. The detailed measurements of the properties of W and Z bosons and earlier searches for the Higgs boson at the CERN's LEP electron-positron collider left a narrow window of mass for the Higgs boson. Since the couplings of the Higgs boson to matter, and W and Z bosons is constrained in the Standard Model, the production and decay rates of the Higgs boson are fully predicted. The LHC operated late in 2011 and in 2012 at high enough energy and luminosity to enable definitive Higgs boson searches. Late in 2011 both experiments began to see some hints of Higgs boson like object emerge.

The search for a resonant structure in the invariant mass of four leptons, which has the least amount of background, is the most sensitive analysis. ATLAS and CMS experiments have both found a handful of events clustered at a mass of about 126 GeV. The search for a resonant structure in the invariant mass of two isolated high-energy photons, which sits on a smoothly falling distribution, is also a sensitive analysis. ATLAS and CMS experiments have again found a significant excess of events at a mass of about 126 GeV, matching the four-lepton excess. The combined significance of this excess was determined to be ~ 5 sigma in both experiments. Consequently, this discovery was announced with much fanfare on the Fourth of July, resulting in an unprecedented level of public interest in particle physics.

So far, it is established that this new particle production and decay rates are consistent with that of the predicted Standard Model Higgs boson. The Standard Model Higgs boson also decays to pairs of W bosons, pairs of bottom quarks and pairs of tau leptons. Searches for these decay modes are not yet sensitive to make definitive conclusions. The establishment of the spin-0 nature of the particle, precise couplings to bosons and fermions and its self-coupling strength are needed before concluding if this new particle is indeed the Higgs boson. The Standard Model Higgs mechanism is only the most minimal version. There are several theoretical ideas predicting an extended Higgs sector, with multiple Higgs bosons. The exploration of the Higgs sector has only begun, and the Wisconsin experimenters are continuing to lead this exciting hunt.

Sridhara Dasu, Professor of Physics

Figure 1

Invariant mass of four leptons reconstructed in the CMS detector. The sharp peak at 91 GeV is due to the rare decays of the Z boson to four leptons, and the evidence for a Standard Model like Higgs boson decaying to four leptons is seen at ~126 GeV. Wisconsin CMS group was intimately involved in unearthing this evidence of a handful of Higgs-like events from amongst billions that were seen by the CMS experiment.

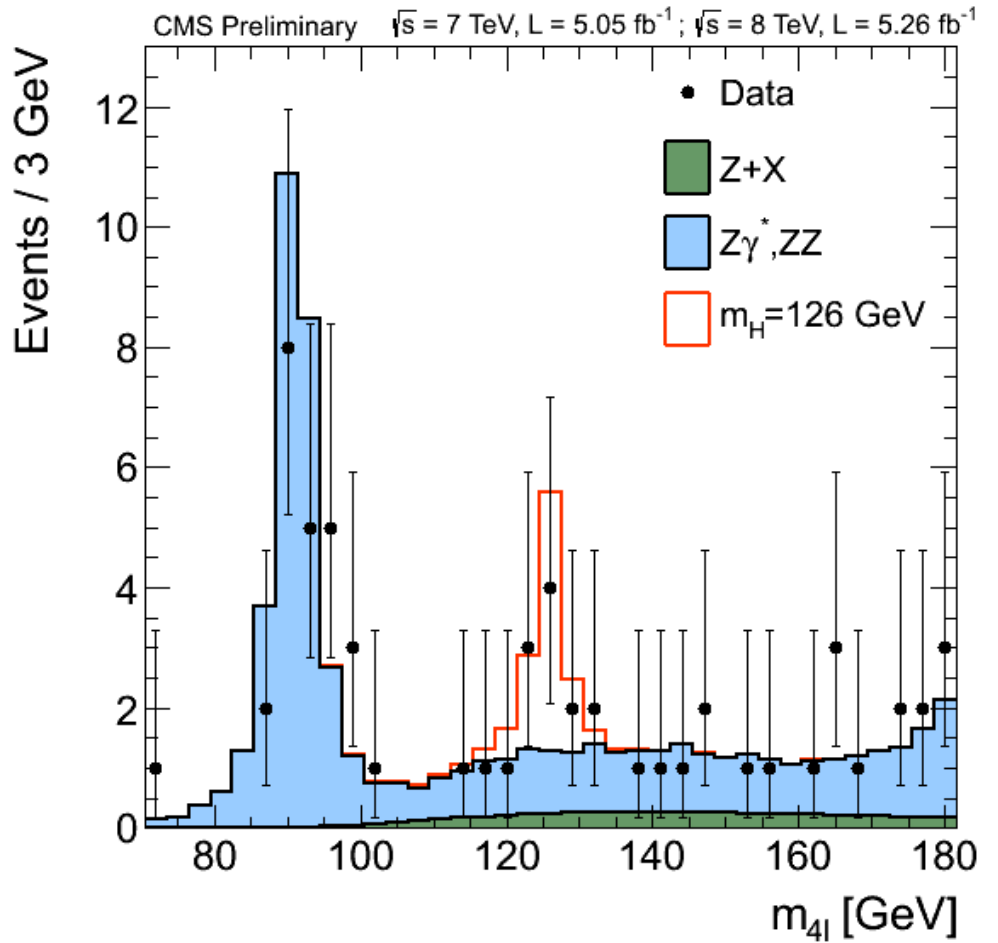
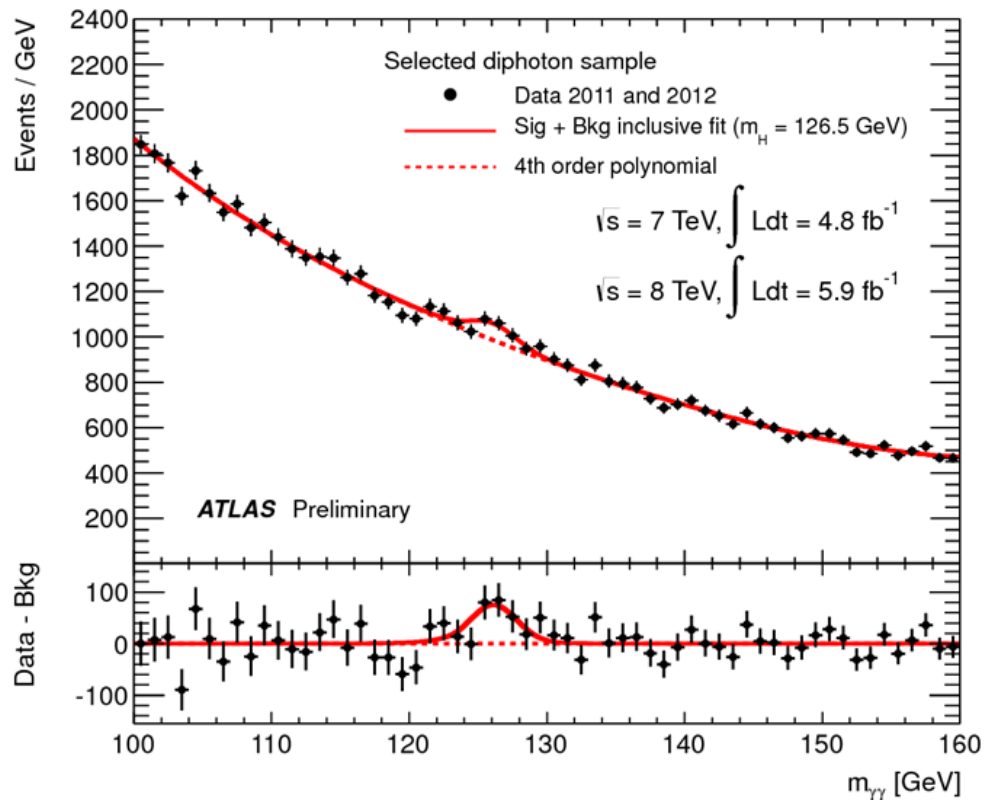


Figure 2

Invariant mass of two photons from the ATLAS experiment. A bump in the spectrum at ~126 GeV sitting on top of the smoothly falling distribution is the evidence for the new particle. Wisconsin ATLAS group was instrumental in extracting this evidence.



The Search for The Higgs Boson

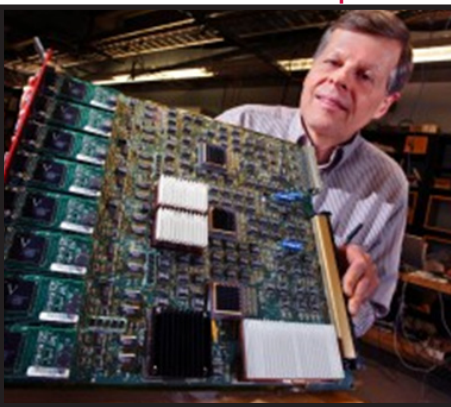
Wisconsin Atlas Group



Leader of the Wisconsin ATLAS group Vilas and Hilldale Professor of Physics Sau Lan Wu with Prof. Peter Higgs at the July 4th announcement of the LHC discovery at CERN, Geneva, Switzerland. Prof. Wu said, "I have been looking for you for over 20 years." Prof. Higgs replied, "Now you have found me!"

Vilas and Hilldale Professor of Physics Sau Lan Wu founded the Wisconsin ATLAS Group in 1993 to continue searches for the Higgs boson she began at the LEP collider at CERN. Prof. Wu's group was responsible for mounting some of the most sensitive searches for the Higgs boson using the ALEPH detector at LEP. The Higgs boson eluded the LEP searches, although several discoveries and sensitive measurements of the Standard Model parameters were made under her leadership at ALEPH. Her dedicated effort and leadership in the searches for the elusive Higgs particle finally paid off this summer grandly. Prof. Wu's group played a pivotal role in all aspects of the ATLAS Higgs searches, originating several critical ideas that resulted in major advances in improving their sensitivity for discovery. Specifically, her group made outstanding contributions in the Higgs to di-photon and Higgs to four lepton channels, and the combination of all Higgs decay channels, which yielded a significance of 5 sigma. These efforts led to the Higgs discovery announced on July 4, 2012 at CERN. Prof. Wu's group also contributed to the building of the ATLAS experiment High Level Trigger systems, reconstruction software development and computing systems. Her collaboration with the Condor group of the Department of Computer Sciences brought to bear high-throughput computing resources to aid the Higgs discovery in a timely fashion. Several former post-doctoral fellows and graduate students that Prof. Wu mentored now lead the Higgs searches and other physics at both the ATLAS and CMS experiments at LHC. Wisconsin ATLAS group is supported by grants from the US Department of Energy, the Wisconsin Alumni Research Foundation, the Vilas Foundation and the Helen Junnik Research Fund for Women.

Wisconsin CMS Group



Leader of the Wisconsin CMS group, Bjorn Wiik Professor of Physics, Wesley H. Smith, holding the CMS trigger processor electronics board.

Wisconsin CMS group was established in 1993 under the leadership of Prof. Wesley H Smith and Prof. Emeritus Don D Reeder to pursue the high-energy frontier at the Large Hadron Collider in Geneva, with the CMS experiment. Wisconsin group played major roles in the construction of the CMS experiment. Distinguished Scientist Dr. Richard Loveless, Professors Duncan Carlsmith and Don Reeder played prominent roles in designing, building and operating the CMS muon detector with Associate Scientist Armando Lanaro. Muon reconstruction, which they contributed to along with Prof. Matt Herndon, played a critical role in the discovery of the four-lepton final state. Professors Sridhara Dasu and Wesley Smith designed, built and are now operating trigger electronics and software systems, with Electronics Engineer Tom Gorski, Associate Scientists Pamela Klabbers and Alexander Savin, Post-doctoral Associates Maria Cepeda and Evan Friis. The innovative algorithms of this group selected the events, from which the discoveries of this summer were made. Professors Dasu and Smith established a successful collaboration between the Wisconsin CMS group and the Condor group of the Department of Computer Science to build the Grid Laboratory of Wisconsin, and integrated it with Wisconsin CMS Tier-2 computing center, as part of the World-wide LHC Computing Grid (WLCG). Senior Systems Programmer Dan Bradley, Senior Researcher Ajit Mohapatra and Assistant Scientist Tapas Sarangi are operating one of the most productive WLCG computing centers, where the data is sifted to identify rare events amongst which lie the elusive footprints of the higgs boson. Eight graduate students, Jessica Leonard, Marc Weinberg, Michael Anderson, Kira Grogg, Christos Lazaridis, Michalis Bachtis, Jeff Klukas and Lindsey Gray obtained their Ph.D. degrees in the Wisconsin CMS research program. Graduate students Joshua Swanson, Ian Ross, Isobel Ojalvo and Austin Belknap continue to study the new particle discovered this Summer, under the supervision of the senior members of Wisconsin CMS group. Wisconsin CMS group is supported by the grants from the US Department of Energy, National Science Foundation and the Wisconsin Alumni Research Foundation

UW Physics Degrees Awarded

Undergraduates

AMEP

Fall 2011

Broerman, Benjamin Lowell

Spring 2012

Chang, Kevin Han
Cryns, Jackson Werner
Meyers, Cedric
Smetana, Gregory Stephen
Thompson, Ellen R

Astronomy–Physics

Fall 2011

Bramson, Ali Marie
Herbst, Hanna Ann
Larson, Elise Kay
Nathanson, Alex Jon
Stanchfield, Sara Marie

Spring 2012

Armentano, Vincent Alan
Cheng, Edward
Chopra, Nitish
Guinn, Ian Stuart
Hayes, Edward James

Hopkins, Robert Joseph
Hutchinson, Timothy Alan
Jones, Megan Leigh
Qutaishat, Nadia Salah
Soffa, Aaron Michael
Swan, Jacob Brian

Physics

Fall 2011

Bramson, Ali Marie
Driver III, James Ogden
Eklof, Nathan David
Herbst, Hanna Ann
Larson, Elise Kay
Pang, Rich Kwunye
Peters, Carli Julia
Stanchfield, Sara Marie

Spring 2012

Carbone, Ryne Michael
Cheng, Edward
Chopra, Nitish
Goebel, Karl John
Goglio, Josh Henry
Guinn, Ian Stuart

Hayes, Edward James
Jones, Megan Leigh
Krohn, Michael D
Lua, Kian Loong
Martin, Antoine Pierrick
Moxon, Jordan Emrys
Ollmann, Garrett Walter
Plesh, Ryan Steven
Price, Craig Chandler
Rasmus, Alexander Martin
Reese, Ingrid Morgan
Schroeder, Alexandra Breanne
Soffa, Aaron Michael
Swan, Jacob Brian
Wojtaszek, Michelle M
Zhao, Ruxiu

Summer 2012

Chew, Shih Yuin

Graduates

Master's Degrees

Fall 2011

Johnson, Phillip Steven
Ruiz, Richard Efrain
Sabbatini, Luca
Santander, Juan Marcos
Shi, Zhan

Spring 2012

Gao, Yuanfeng
Henneberg, Sopia Ingeborg Amalie
Lichtman, Martin Tom
Morton-Park, Frank Webster
Schroeder, Daniel Paul
Weisberg, David Brook
Wu, Xian
Zhang, Fangzhou

Summer 2012

Douglass, Scott
Mohr, Robert Tristan
Ramakrishnan, Varsha

Doctoral Degrees

Fall 2011

Baker, Michael Francis (Advisor: Montaruli) M.I.T. Lincoln Lab

Barrentine, Emily Margaret (Advisor: Timbie) Staff Scientist at NASA Goddard

King, Jacob Robert (Advisor: Sovinec) Research Scientist at Tech-X Corporation

O'Murchadha, Aongus Starbuck (Advisor: Halzen) Post-doc Brussels, Belgium

Reusch, Joshua Adam (Advisor: Forest) Post-doc at UW Madison Physics

Stockett, Mark Hugo (Advisor: Lawler) Post-doc at Stockholm University, Sweden

Spring 2012

Bachtis, Michail (Advisor: Dasu) Post-doc at CERN

Crowder, Sarah Gwynne (Advisor: McCammon) Post-doc at the University of Minnesota

Dong, Zhe (Advisor: Han) J.P. Morgan Chase in Beijing, China

Kecskemeti, Steven Ryan (Advisor: Mistretta) Post-doc at UW Madison Waisman Center

Klukas, Jeffrey Eli (Advisor: Herndon) EPIC Systems

Littlejohn, Bryce Richard (Advisor: Heeger) Post-doc at the University of Cincinnati

Whitehorn, Nathan Alexander (Advisor: Halzen) Post-doc at UW Madison IceCube Research Center

Wyllie, Robert (Advisor: Walker) Post-doc at NIST

Summer 2012

Gonderinger, Matthew Charles (Advisor: Ramsey-Musolf) Post-doc at Wayne State University

Long, Andrew Jonathan (Advisor: Chung) Post-doc at Arizona State University

Paz-Soldan, Carlos Alberto (Advisor: Forest) Post-doc at General Atomics

Pfendner, Carl Gilbert (Advisor: Westerhoff) Post-doc at The Ohio State University

Schmitthenner, Jared Andrew (Advisor: Han)

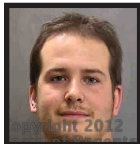
Zhou, Peng (Advisor: Chung) Ph.D. candidate in Mathematics at Northwestern University



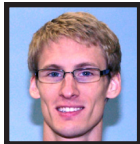
2012 Fall Admissions



Carlos Arguelles
Pontifica Univ Catolica del Peru
Halzen—Particles/High Energy



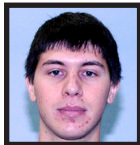
Matthew Beck
Illinois Institute of Technology,
McDermott—Condensed Matter/Solid State



John Boguski
Purdue University
Forest—Plasma



James Buchanan
University of Chicago
Hashimoto—String Theory



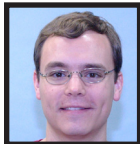
Kyle Bunkers
University of Nebraska-Lincoln
Sovinec—Plasma



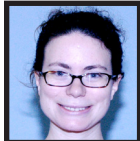
William Cottrell
University of Chicago
Shiu—String Theory



Diptaranjan Das
Indian Institute of Technology
Kharagpur
Eriksson—Quantum Computing



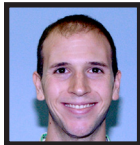
Ross Devo
Creighton University
Chung—Quantum Computing



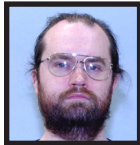
Laura Dodd
Duke University
Smith—Particles/High Energy



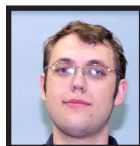
Kenneth Flanagan
Swarthmore College
Forest—Plasma



Ryan Foote
Massachusetts Institute of Technology
Eriksson—Quantum Computing



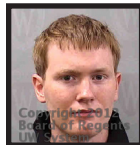
Karl Goebel
Univ of Wisconsin-Madison
Ramsey-Musolf—Particles/High Energy



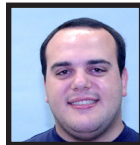
Konstantinos Horaïtes
University of California Berkeley
Boldyrev—Plasma



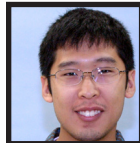
James Hanson
University of Minnesota-Twin Cities
Kyle Jerome
University of Wisconsin-River Falls
Hashimoto—Particles/High Energy



Olafur Jonasson
University of Iceland
Knezevic—Condensed Matter/Solid State



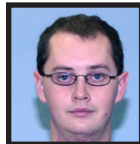
Laser Kaplan
University of Florida
Wu—Particles/High Energy



Jung-ha Kim
Cornell University
Forest—Plasma



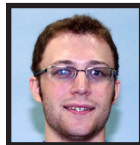
Minho Kwon
Yonsei University
Saffman—Quantum Computing



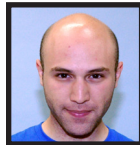
Gregory Lau
Michigan Technological University
Terry—Plasma



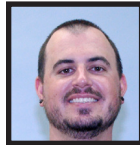
Edward Leonard
Michigan Technological University
Eriksson—Quantum Computing



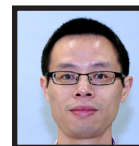
Joseph Olson
Pacific Lutheran University,
Forest—Plasma



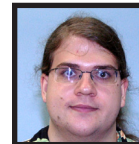
Emre Doruk Onal
Koc University
Herndon—Particles/High Energy



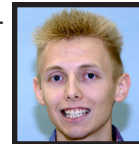
James Osborne
University of California Berkeley
Shiu—Particles/High Energy



Tao Peng
Peking University,
Ramsey-Musolf



Robert Siller
University of Rochester
Boldyrev—Plasma



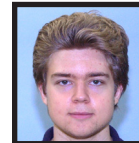
Benjamin Stefanek
Michigan State University
Chung—String Theory



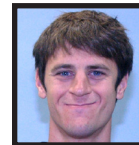
Devin Taylor
Rice University
Carlsmith—Particles/High Energy



Gandhari Wattal
University of Delhi
McCammon—Astrophysics



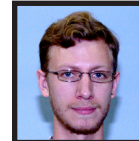
Garth Whelan
Indiana University
Terry—Condensed Matter/Solid State



Christopher Wilen
Carleton College
Yavuz—Quantum Computing



Nathaniel Woods
Middlebury College
Smith—Particles/High Energy



Dallas Wulf
Luther College
McCammon—Particles/High Energy



Zichuan Xing
Cornell University
Sarff—Plasma

Foundation Accounts

Student

12691618. Fay Ajzenberg-Selove Undergraduate Scholarship provides encouragement for undergraduate women majoring in Physics, Astronomy or Physics-Astronomy to continue their careers in science. (Undergraduate)

12693412. Dr. Maritza Irene Stapanian Crabtree Undergraduate Scholarship provides assistance to undergraduate students based on merit and need. (Undergraduate)

12693561. Bernice Durand Research Scholarship promotes meaningful undergraduate research opportunities, plus supports and encourages women and ethnic minorities as undergraduate majors in the Departments of Physics and Astronomy. (Undergraduate)

12693645. Henry & Eleanor Firminhac Scholarship provides assistance to students in Physics with financial need. (Undergraduate or Graduate)

12692683. Liebenberg Family Research Scholarship supports Physics, AMEP or Astronomy-Physics majors in summer research experiences. (Undergraduate)

12692082. Cornelius P. & Cynthia C. Browne Endowed Fellowship Fund provides support to graduate students pursuing doctoral studies in the Physics Department. (Graduate)

00000000. Jeff & Lily Chen Wisconsin Distinguished Graduate Fellowship (Contact department directly.) Provides a full year fellowship to an outstanding graduate student in the department. (Graduate)

12691359. Joseph R. Dillinger Teaching Award Fund provides recognition to an outstanding teaching assistant in the Department of Physics. (Graduate)

12696175. Phyllis Jane Fleming Graduate Student Support Fund provides support for a female doctoral candidate in any year of training in physics. (Graduate)

00000000. Ray & Anne Herb Wisconsin Distinguished Graduate Fellowships (Contact department directly.) Provides a full year fellowship to one or two outstanding graduate students engaged in materials research in the department. (Graduate)

12693190. Elizabeth S. Hirschfelder Endowment supports women graduate students in Physics research. (Graduate).

12693916. Karl & Alice Knapp Jansky Fellowship Fund provides alternate year funding to an outstanding graduate student in Physics and Astronomy. (Graduate)

12692106. Graduate Student Recruiting provides assistance in recruitment expenses of Physics graduate students. (Graduate)

12696443. Anderson & Huber Graduate Support Fund provides a number of awards as part of a financial aid package to new graduate students entering the department. This award is in honor of Profs. L. Wilmer Anderson and David Huber. (Graduate)

12697201. Albert R. Erwin, Jr.—Casey M. Durand Graduate Student Fund provides support for graduate students working in experimental high energy physics.

12697430. Robertson Leach Graduate Student Fund provides support for incoming, first year graduate students in the Department of Physics.

12692082. Cornelius P. and Cynthia C. Browne Fellowship Fund provides support for graduate students pursuing degrees in the Department of Physics.

Other

12694421. Barschall Enterprise Fund was established in 2005 in honor of former Professor Heinz Barschall. Provides unrestricted-use fund for Chair in recruiting senior researchers to faculty.

12694069. Friends of the Physics Ingersoll Museum currently provides funding for display upgrades and student docents, with hopes to someday create an endowment for future needs.

12691418. Elementary Particle Physics Institute provides funding for activities of the institute.

12692106. Atomic Collision Research Fund. Encourages and supports research on atomic collision processes and their application to studies of weakly ionized gases in perpetuity.

12694622. Physics Community-Building Fund provides funding for Chair in establishing and reaffirming a sense of community among the faculty, staff, students, and alumni of the Department.

12906418. Physics Library Fund provides funding for the acquisition of books and other materials related to physics.

Support Physics

Mail This Form

University of Wisconsin Foundation

US Bank Lockbox
PO Box 78807
Milwaukee, WI 53278-0807

My gift of \$ _____, payable to the University of Wisconsin Foundation, is enclosed.

Or charge my: Master Card VISA American Express in the amount of \$ _____

Card Number _____ / _____ / _____ / _____ / Expiration Date _____

Cardholder Name (As it appears on card—Please Print): _____

Cardholder Signature: _____ Date: _____

Name: _____ Home Phone: (_____) _____

Address: _____

City, State, ZIP: _____

For a description of all UW Foundation Physics Funds, go to: www.physics.wisc.edu/giving/fund-details.html

My Gift

I wish to designate my Gift to the following fund(s)

Physics Newton Fund (#1269172)—An unrestricted general fund—greatest need.

Undergraduate Support—General (#1269172)

To provide for undergraduate student special needs.

Undergraduate Support—Specific

Indicate fund name and number below. Select from list of “undergraduate” funds on previous page.

Fund Name: _____ Fund Number: _____

Graduate Support—General (#1269172)

To provide for graduate student special needs.

Graduate Support—Specific

Indicate fund name and number below. Select from list of “graduate” funds on previous page.

Fund Name: _____ Fund Number: _____

Other

Indicate fund name and number below. Select from list of “Other” funds on previous page.

Fund Name: _____ Fund Number: _____

- Should you prefer to make your donation electronically by credit card on a secure server, please go to: www.physics.wisc.edu/giving/fund-details.html. Click on the fund in which you are interested for information and then complete the UW Foundation secure site form.
- If you wish to consult with a UW Foundation Development officer on your gift or other options including estates, trusts, gifts in kind, or planned giving, please call or email: Dani Lockett, University of Wisconsin Foundation at 608-265-2713 or dani.lockett@supportuw.org.





University of Wisconsin Department of Physics

University of Wisconsin

Department of Physics, 1150 University Avenue, Madison, WI 53706