The Wisconsin Physicist

WISCONSIN
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Vol. 18 Fall 2013

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On the Cover

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HAWC is a collaboration of more than 20 institutions in the US and Mexico. The HAWC group in the Physics Department at UW is the largest group in the collaboration, and has contributed extensively to the design of the detector electronics and the analysis of data from the observatory.

Picture taken by Antonio Marinelli on Monday 21st of October 2013 after a heavy hail storm.

Inside this Issue

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Greetings from the Chair

Robert Joynt
Department Chair

2013 has been a very eventful year for the Physics Department. This has kept your humble chair busy and out of trouble. Since it's my last year, however, I will be able to get up to some mischief starting pretty soon (I hope). Albrecht Karle has generously agreed to serve as the next chair—his three-year term will start in September, 2014. The Associate Chair Mark Rzchowski will be staying on in that capacity. Because of his knowledge and experience, he provides invaluable assistance to the chair. He is also very tactful when reminding me of my duties.

We have had some losses from the faculty this year. Prof. Michael Ramsey-Musolf, has departed for UMass-Amherst, Profs. Karsten Heeger and Reina Maruyama are now at Yale, and Prof. Bruce Mellado has left for the University of Witwatersrand. On the positive side, Prof. Jan Egedal has joined us from MIT. Jan is already a world leader in his area, the study of magnetic reconnection. The department has become perhaps the world's premier center for laboratory plasma astrophysics, and Jan will greatly strengthen that activity. There is a profile of Jan on p. 3. In addition, we will be searching for two new faculty members this year, one of them to be the project director of the Wisconsin IceCube Particle Astrophysics Center.

You can see that is a time of renewal for the department. It's a challenge to make sure that the new is better than the old. We'll be doing our best.

Researchers in the department made some remarkable discoveries this year. The most dramatic is the observation by the IceCube observatory of astrophysical neutrinos with energies of 1 PeV. Yes, that's P for peta: 1015 electron volts. They are the highest-energy fermions ever observed, hundreds of times more energetic than those produced at CERN. The big news in particle physics is of course still the Higgs boson. We highlighted the achievements of our experimental group at CERN last year. But what are the optimal search strategies in the first place? That's where our theory group came in, and that and some of their other achievements are described on p. 10. In other news, Prof. Stas Boldyrev has settled a striking and long-standing puzzle—the appearance of sheet structures in magnetohydrodynamical turbulent flows, which have now been shown to arise from a cooperative alignment of field lines and fluid flow. Prof. Mark Saffman has constructed a seven by seven lattice of atom traps, a key step on the way to the construction of a large-scale quantum information processing device. New projects are also starting up: Prof. Peter Timbie, in collaboration with the National Observatory of China, is starting construction of a Dark Matter Radio Telescope. These are only samples of the year's achievements in research.

The 12th Annual Awards Banquet was held in May 2013. 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 David Fahey and Lloyd Hackel. David is the Senior Scientist for Climate & Climate Change in the National Oceanic and Atmospheric Administration. He has served as a Principal Investigator and Project Scientist for a number of airborne sampling campaigns with NASAs manned and unmanned research aircraft. Lloyd is the Vice President for Advanced Technology at Curtiss-Wright. He has pioneered the technique of laser peening, which is revolutionizing the enormously important field of metal hardening. We also gave the Distinguished Service Award to Prof. Clint Sprott. "Mr. Physics" started the Wonders of Physics program that has introduced two generations of kids and other mentally active people to our subject in his hugely popular shows.

The favorite part of my job is giving out these awards. Seeing all these successful students and graduates makes me feel that we must be doing something right.

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 below. 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 Chris Glueck by phone at: 608-265-9952 or by e-mail at: chris.glueck@supportuw.org

I sincerely thank our generous alumni and friends who have financially supported the Department. Your gifts really allow us to do so many things for our students that would otherwise just not happen.

Faculty Updates

New Faculty

Jan Egedal joined the department in August 2013 as an assistant professor from MIT.

Promotions

Stanislav Boldyrev, plasma physics and astrophysics theorist was promoted to the rank of professor.

Natalia Perkins, condensed matter theorist was promoted to the rank of associate professor.

Aki Hashimoto, theoretical subatomic physicist was promoted to the rank of professor.

What's New

BOV News

New Board Member

We welcomed one new member to the the Physics Depatment Board of Visitors

Craig Heberer is a 1981 BS graduate from the Applied Mathematics, Engineering and Physics (AMEP) program, in which he earned high honors. He presently hails from Portola Valley, CA. He brings some unique experiences and skills. In his own words Craig is a "business and technology professional specializing in program management, market intelligence and business strategy in settings that demand exactness". He has worked for a number of high-tech and consulting companies in the Bay Area, and is presently the V.P. for Strategy for Justshareit, Inc.

Board of Visitors Fund for Undergraduate Research

Inspired by the success and promise of Garage Physics, in the summer of 2013 the Physics Department Board of Visitors established a Board of Visitors Fund for Undergraduate Research. This fund will be used at the discretion of the department chair to support graduate student mentoring of undergraduates in the Garage; supplies and equipment for student projects; and student travel to domestic conferences. Two examples of the fund use include: the Garage purchased a 3-D printer; and paid for stuent travel to Austin, Texas for an undergraduate to learn about muography for archaeological applications.

Education Innovation 2013–14

Garage Physics

We announced Garage Physics last year: an active space for self-study, mentoring, and interdisciplinary innovation supporting the maker/synthetic biology/garage-physicist/entrepreneur generation of students joining our campus. It offers students a place to explore educational experiments and demonstrations in more depth, to learn safe procedures, hands-on skills, to explore their own creative ideas through project-oriented just-in-time learning, to form interdisciplinary teams, to explore entrepreneurship, and to conduct research of their own. www.physics.wisc.edu/garage

Garage Physics has had a terrific start: 75 people have taken the mandatory safety course and we have about 30 students active in the Garage. The Garage Physics style of learning and its subject matter lie outside the regular curriculum of the university. Integrity, creativity, resourcefulness, teamwork, imagination, ambition, inventiveness and the Wisconsin Idea are supported by Garage Physics in new ways. Garage Physics was initiated by Professor Carlsmith in collaboration with the Physics Instructional Laboratory Manager Brett Unks.

Physics Education Assessment

The department has is undergoing a comprehensive self-assessment project, which started this year with the preparation of an extensive self-study report authored by a committee chaired by Prof. Peter Timbie. With the support of the Provost's UW Assessment Council, we (http://www.provost.wisc.edu/assessment/Assessment_Funds.html), we are beginning an evaluation of learning out, focusing particularly on Physics 103 and 104.

Flexible Physics Mobile

The Flexible Physics for the Google World project creates video-based learning objects to prepare students and TAs for physics instructional labs. Begun in 2012 by Professor Carlsmith, the project created videos for Physics 207 and Physics 104. In 2013-14, the Flexible Physics Mobile project will extend coverage to Physics 207 and Physics 103 and explore educational technology for mobile platforms.

Physics Learning Center

The Physics Learning Center (PLC) provides a supportive learning environment and supplemental instruction for students taking calculus-based (Physics 207-208), as well as algebra-based physics (Physics 103-104). With funding from a Madison Initiative for Undergraduates Award, the PLC has almost doubled in size during the past 3 ½ years.

Students meet twice weekly in learning teams, most of which are led by undergraduate Peer Mentor Tutors. The tutors receive teaching and leadership experience and ongoing training regarding pedagogy and strategies for teaching specific course content. Peer Mentoring is considered to be one the University's high impact practices for undergraduate students.

A major goal of the PLC is to contribute to closing of achievement gaps in STEM courses. The PLC targets students in the large introductory courses that may feel isolated, including returning adults, students from historically underrepresented racial/ethnic groups, first generation college students, transfer students, students from families in lower income circumstances, veterans and students with disabilities. The PLC also works with faculty and teaching assistants who refer students who are working hard but struggling with their coursework.

One of the challenges when teaching physics is to help students learn to apply their knowledge to new situations. Students often look for an equation to plug into rather than first trying to understand the underlying physics concepts. The PLC strives to address these challenges by centering teaching to address common misconceptions. Most session time is spent with students actively working on problems. Students are encouraged to discuss concepts and approaches with other students in their learning team to solidify their knowledge and learn from other perspectives.

Peer Mentor Tutors receive ongoing training to prepare them to lead their learning teams. The training focuses on topics including creating a comfortable learning environment, active teaching techniques, asking leading questions to address conceptual understanding, group dynamics, peer review, test-taking anxiety, and stereotype threat. The tutors also participate in a second weekly meeting to address strategies for teaching specific course content and to review the materials to be taught during the upcoming week.

Participation

- Small Group Learning Teams 10-15% of the students
- On-Line Resources and Reviews 10% Additional Students
- Peer Mentor Team Leaders 15-20 undergraduate students.

High Altitude Water Cherenkov (HAWC)

HAWC

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2013 Physics Awards Banquet

The 2013 Physics Physics Banquet & Awards Ceremony to honor the Department Award Recipients and Alumni Fellows was held on Friday, May 3, 2014 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

Briana Indahl

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.

Briana Indahl

Dr. Maritza Irene Stapanian Crabtree Award

Andrew Alt | Natalia Antropova | Anna Christenson

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.

Andrew Alt

Natalia Antropova

Anna Christenson

Bernice Durand Undergraduate Research Scholarship

Ayah Almousa

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.

Ayah Almousa

Henry & Eleanor Firminhac Physics Undergraduate Scholarship

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.

James Sebald

L. R. Ingersoll Prize

Spring 2011–2012: Paul Merchant (103) | Mengcheng Qi (202) | Aaron Stemo (207) | Pornampai Narenpitak (208) | Chunling Yan (248)

Fall 2012–2013: Xiongcheng Gu (103) | Fengchun Miao (104) | Shane Wehler (201) | Joel Neher (202) | Zijian Tao (207) | Bai Wang (247) | Tianyao Wu (249)

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.


Paul Merchant


Mengcheng Qi


Aaron Stemo


Chunling Yan


Shane Wehler


Joel Neher


Zijian Tao


Bai Wang


Tianyao Wu

Liebenberg Family Research Scholarship


Brian Zutter

Brian Zutter

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


Laura Fleming

Laur Fleming

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.

2013 Physics Awards Banquet

Graduate Awards

Cornelius P. and Cynthia C. Browne Fellowship


Marty Lichtman


Michael Wood

Marty Lichtman | Michael Wood

This Award is presented to assist graduate students pursuing doctoral studies in the Physics Department. This award is possible through the generous support of Cornelius P. Browne.

Joseph R. Dillinger Award for Teaching Excellence


Nicole Vassh

Nicole Vassh

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.

Elizabeth Hirschfelder Award


Bethany Reilly

Bethany Reilly

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.

Karl Guthe Jansky and Alice Knapp Jansky Family Award


Christopher Anderson


Ian Wisher

Christopher Anderson | Ian Wisher

This Award is given to an outstanding graduate student, with preference to students interested in astrophysics and astronomy. This award is made possible through the generosity of the Jansky family in honor of their father and mother.

Mendenhall Graduate Fellowship


John Gamble

John Gamble

This Award is to be used for the support of a graduate students in experimental physics.

Emanuel R. Piore Award

William Cottrell (Fall 2012) | Mohandas Pillai (Spring 2013)

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

Van Vleck Award

Amrit Poudel | Vladimir Zhdankin | Yuxuan Wang | Samuel Ducatman

This Award is used to support graduate students in physics.


Amrit Poudel


Vladimir Zhdankin


Yuxuan Wang


Samuel Ducatman

Department Awards

Best TA & Rookie of the Year

Nicole Vassh Best TA
Ryan Foote Rookie of the Year


Nicole Vassh


Ryan Foote

Alumni Awards

Distinguished Alumni, Distinguished Scientist, & Distinguished Service Awards

David Fahey (Alumni) | Lloyd Hackel (Alumni) | Clint Sprott (Service) | Gary Hill (2012 Scientist)


David Fahey


Lloyd Hackel


Clint Sprott


Gary Hill

Theoretical Cosmology, Theoretical Nuclear Physics, and Theoretical High Energy Physics

The quest to understand natures fundamental interactions, and how they have shaped the evolution of the cosmos, is among the most compelling in modern science. The Standard Model of particle physics a comprehensive and detailed picture of the electroweak and strong interactions is a triumph for that quest. Indeed, this triumph reached a new pinnacle with the 2012 discovery by the ATLAS and CMS collaborations at the Large Hadron Collider of a particle that is presumed to be the long-sought Higgs boson, whose predicted existence as the origin of mass was awarded the 2013 Nobel Prize in physics. Yet, despite the spectacular success of the Standard Model, the theory is known to be incomplete, most likely as the low-energy limit of a more fundamental theory involving new interactions and new degrees of freedom. In searching for those new interactions, there are many questions that can be asked, ranging from understanding the origin of the new physics that sets the scale of the Higgs sector, the nature of neutrinos and how they shaped the evolution of the cosmos, the origin of dark matter, dark energy, and the preponderance of matter over antimatter, and the nature of the fundamental physics that unies the gravitational interactions along with the electroweak and strong interactions. The UW-Madison physics department's faculty in theoretical cosmology, theoretical nuclear physics, and theoretical high energy physics pursue research programs that collectively address all of these fundamental questions.

Professor Yang Bai is widely recognized as one of the leading particle physics phenomenologists of his generation and is the newest member of the department's faculty in high energy physics. Bai's research interests focus on understanding the data from dierent experiments, synthesizing the phenomenological inputs from both collider and dark matter experiments, and constructing a more fundamental theory that governs physics at the TeV scale. He uses data-driven methods to explain the new discoveries at the Large Hadron Collider with phenomenological models based on eective eld theory, and eventually ts such models into a broader theoretical framework. He provides particle physics model explanations for the results observed at dark matter direct and indirect detection experiments, and he proposes new dark matter models and studies their phenomenological consequences.

Bai is also an experimentalist-friendly phenomenologist who provides detailed search strategies for looking for new particles beyond the Standard Model at the Large Hadron Collider. Many of his proposed strategies have been adopted by both the ATLAS and CMS collaborations.

Professor Baha Balantekin focuses on the question of how neutrinos shaped the evolution of the universe. His work primarily deals with neutrinos in the laboratory, in astrophysical settings, and in the cosmos. All of the neutrino properties may gure prominently in key astrophysical environments, for example in core collapse supernovae, in the early universe and Big Bang Nucleosynthesis. This connects fundamental neutrino physics to the breathtaking advances in astrophysical numerical modeling and to the exponential increase in the volume and scope of observational data obtained from both from ground- and space-based observatories. The reasons for the neutrino-astrophysics tie-in are twofold: i) neutrinos can carry and transport the bulk of the entropy and energy in these environments, along the way infuencing composition; and ii) the weak interaction, including neutrino interactions, is unique in being able to change isospin (converting neutrons and protons into one other). The charge to neutrino physicists and astrophysicists is then clear and Balantekin works on answering this charge. He calculates how neutrinos change their avors as they move from dense nuclear matter-like environments (either in the early universe or in supernova proto-neutron star cores) to relatively low density environments (like the supernova envelope or the post-weak decoupling epoch in the early universe).

In particular, core-collapse supernovae, like some epochs in the early universe, are neutrino-1 dominated dynamical systems. In these supernovae essentially all the gravitational energy released during collapse escapes in the form of intense neutrino fluxes emerging from the newly-born neutron star. During the rst ten seconds or so of the existence of the neutron star, these neutrino fluxes drive a wind from its surface in which various nuclear species may be synthesized. In a core-collapse supernova environment neutrino-neutrino interactions are not negligible, as the gravitational binding energy of the progenitor massive star is entirely converted into neutrinos. The interactions between those copious neutrinos lead to novel collective and emergent eects, such as conserved quantities, discovered by Balantekin and his collaborators, and interesting features in the neutrino energy spectra. It is interesting to note that core-collapse supernovae are the only many-body systems driven by the weak interactions, unlike the many-body systems in condensed-matter (driven by electromagnetism) and nuclear (driven by the strong force) physics.

Professor Vernon Barger pursues a broad and vigorous research program in particle physics phenomenology that includes collider physics, neutrino physics, and cosmology. His early work on matter eects in long-baseline neutrino oscillations and the identication of an eight-fold degeneracy in neutrino parameter measurements underlie the ongoing neutrino program at Fermilab. He invented collider physics analysis tools such as transverse mass and cluster transverse mass that are now ubiquitous in experimental studies of W-boson, top-quark and supersymmetry signals that have missing transverse momentum. He developed the strategies of forward jet tagging and central jet vetoing to identify Higgs boson and strong WW scattering. His diverse contributions include pioneering studies of the minimal supersymmetric model and its extensions, and the theory motivation for a neutrino factory and a muon collider. He has actively explored the interface of particle physics with dark matter and dark energy, and he has made analyses of data on the cosmic microwave background, big bang nucleosynthesis, supernovae and large scale structure.

Currently, Barger is focusing on a variety of research questions, ranging from the interpretation of the Large Hadron Collider data on the Higgs boson and an assessment of discovery potential of the particles of supersymmetry in

the context of theoretical naturalness, to studies of dark matter models, to explanations of the anomalous neutrino events at PeV energies that have been observed by the Ice Cube experiment.

Professor Daniel Chung's research focus is at the interface of high energy theory and cosmology. The basic idea underlying Chung's research program is that early universe cosmology involving high energy physics can have important ramications for physical observables today. In other words, by looking at the sky, we can learn something about fundamental physics, and by looking at terrestrial experiments, we can learn something about the earliest history of the universe.

For example, the recent discovery of the Higgs at the Large Hadron Collider has given us an important clue to the question of whether the currently observed preponderance of protons and neutrons over their antimatter counterparts can be explained through a phase transition that may have taken place early in the history of our universe. The current data rules out a particular symmetry class that can lead to such an explanation and points to another class as a favored candidate. Chung is working on building testable models that are consistent with the favored symmetry class. Another recent advance in Chung's research involves discovering novel models connected with the slow-roll in ationary theory which arguably is the most plausible falsiable theory for the initial conditions of the currently observable cosmology. Until Chung's recent work, it was thought that only quantum fluctuations of bosons during the explosive period called in ation can be responsible for a class of observables called isocurvature perturbations. Chung and his collaborators constructed a model within which they computed for the rst time in the literature an isocurvature imprint of quantum fluctuations of fermions during in ation.

Professor Lisa Everett pursues a research program that seeks connections between observable particle physics and the domain of fundamental theory. Her research goals are to understand and improve the extent to which collider, cosmological, and neutrino detection experiments can probe Planck and/or string scale physics. A primary research direction is the model-building and phenomenology of TeV-scale theories with an emphasis on supersymmetry and Higgs physics. Everett has made major contributions to models of supersymmetry breaking, superymmetric CP violation and flavor, and extensions of the minimal supersymmetric standard model with nonminimal gauge and/or Higgs sectors. She is currently pursuing novel models of supersymmetry breaking in light of Large Hadron Collider constraints on the Higgs and superpartner sectors of such theories.

Everett also actively explores the origin of the Standard Model fermion masses and mixings in light of the measurements of the lepton mixing angles { measurements which began in 1998 with the first detection of neutrino oscillations and culminated in 2012 with the measurement of the reactor mixing angle. The data have revealed striking dierences between the quark and lepton mixing angle patterns that challenge the theoretical paradigm of quark-lepton unication as suggested by the quantum numbers of the Standard Model particles. Everett is an expert on this so-called "flavor puzzle" and has built many models of fermion masses and mixings. She plans to focus on the predictions for CP violation within these models, as detecting CP violation is a primary theme of the experimental neutrino physics program over the next decades.

Professor Akikazu Hashimoto is working on string theory and quantum eld theory with emphasis on formal aspects. The broad theme of this program is to identify and understand the framework to formulate the principles governing nature at extremely small length scales. An important part of this study then is to infer the dynamics at large length scales as is implied by the specic short distance dynamics, a property of dynamical systems generally referred to as \phase structure." Hashimoto is currently interested in phase structures of a class of supersymmetric eld theories in various dimensions, using techniques motivated by string theory to explore their properties.

Professor Gary Shiu focuses on the synergistic interface between string theory, particle physics, and cosmology. The goal of this string phenomenology program is to uncover new insights into high energy physics and cosmology while adhering to the rigor of ultraviolet consistency. His research program adopts a two-pronged approach: theoretical studies aimed at revealing the structure and properties of string compactications, and phenomenologically studies aimed at exploring their experimental consequences. String theory, which unies particle physics with gravity, provides an overarching framework to address questions at the energy, cosmic, and intensity frontiers. Many central issues in these three frontiers are deeply intertwined. An important goal of his research is to nd novel observables connecting them, and to explore how experimental results at these frontiers can be used to probe high scale physics. Progress in this research program is thus vital to bridging the gap between fundamental theory and experiment.

Shiu has contributed to many exciting developments in a wide range of areas in string phenomenology. His recent research focuses include understanding particle physics beyond the Standard Model, in ationary cosmology, dark matter and dark energy through the lens of string theory.

Former Student Wins Outstanding Doctoral Thesis Award

Dr. Carlos Paz-Soldan has won the Marshall N. Rosenbluth Outstanding Doctoral Thesis Award of the APS/DPP. He is a former student of Professor Dasu.

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 Kwunyie
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 2012

Cook, Carson Raymond (M.A)
Feintzeig, Jacob Aaron (M.S.)
Lowitz, Amy Elizabeth (M.S.)
Maurer, Leon Nathaniel (M.S.)
Riedel, Benedikt (M.A.)
Shanahan, Brendan William (M.A.)

Spring 2013

Hinrichs, Paul T. (M.S.)
Odden, Tor Ole Bigton (M.A.)
Reilly, Bethany Nicole (M.S.)

Summer 2013

Duff, James Robert (M.S.)
Morton, Lucas Anthony (M.S.)
Parker, William Chesluk (M.S.)
Yoast-Hull, Tova Michelle (M.A.)

Doctoral Degrees

Fall 2012

Dhokarh, Dhananjai Bhanwarlal (Advisor: Chubukov)

Gray, Lindsey Andrew (Advisor: Dasu) Post-doc at Fermilab

Huynh, Don Van (Advisor: Boldyrev)

Kaplan, Elliot James Ph.D.
Forest

Koh, Teck Seng (Advisor: Coppersmith) Ministry of Education, Singapore

Sikes , Daniel Edward (Advisor: Yavuz) Instructor at Portland Community College

Zhang , Siyuan (Advisor: Saffman) KLA-Tencor in San Jose

Spring 2013

Ejzak, Larissa Meighan (Advisor: Heeger) Editor with American Journal Experts

Gamble, John King (Advisor: Coppersmith) Post-doc at Sandia National Lab

Gong, Yutao (Advisor: Gilbert) Consultant at American College of Radiology

Plaus, Valerie Elizabeth (Advisor: Everett) Assistant Professor of Physics at St. Gregory's University in Oklahoma

Sendelbach, Steven L (Advisor: McDermott) NIST

Swanson, Joshua James (Advisor: Smith) Post-Doc at Brown University

Summer 2013

Gault, Amanda Charlotte (Advisor: Timbie)

Hart, Steven Robert (Advisor: Williams) Assistant Professor at Mercy College of Health Sciences

Hernandez, Tomas (Advisor: Rzchowski) Intel Corporation in Portland, Oregon

Huang, Peisi (Advisor: Barger) Post-doc at University of Chicago

Maiti, Saurabh (Advisor: Chubukov) Dirac Post-doc at the University of Florida

Makwana, Kiritkumar Dhirubhai (Advisor: Terry) Post-doc at the University of Chicago

McGarry, Meghan Brianna (Advisor: Den Hartog) Post-doc at UW-Madison

Miao, Jinlu (Advisor: Saffman) Product Development Engineer at KLA-Tencor in San Jose

Patel, Hiren H (Advisor: Ramsey-Musolf) Post-doc at MPIK Heidelberg

Poudel, Amrit (Advisor: McDermott) Post-doc at Dartmouth

Ross, Ian Ackerman (Advisor: Dasu) Software developer at EPIC

Santander, Juan Marcos (Advisor: Westerhoff) Post-doc at IceCube, UW-Madison

Waksman, Jeff Lawrence (Advisor: Sarff) Researcher at IBM

Wang, Haichen (Advisor: Wu) Post-doc at Lawrence Berkeley National Laboratory

Yip, Stephen Shingfan (Advisor: Jeraj) Post-doc at Brigham and Women's Hospital in Boston

Yu, Chiu-Tien (Advisor: Barger) Post-doc at SUNY Stonybrook

Football

Badger Head Football Coach Bret Bielema resigned suddenly in January, 2013 and the Physics Department rushed to help. Tragically, the Athletic Department failed to take advantage of this opportunity, as you can see below. As of this writing, the team has already lost two games.

Letter of Application

December 6, 2012

To whom it may concern:

Greetings. My name is Kenneth Rudinger. I am writing to apply to the position of Head Football Coach at the University of Wisconsin-Madison. I am currently a fourth year graduate student in the Department of Physics. My work is focused on developing quantum algorithms. (Quantum algorithms are algorithms for quantum computers, a type of computer we haven't built quite yet. My job is similar to being a computer programmer in 1935.)

One might think that such work is unrelated to football. Not so. One problem I have worked extensively on is called the graph isomorphism problem. This problem examines relationships between collections of points and lines; truly it is the "x's and o's" problem of mathematics. This is to say nothing of the study of kinematics (moving objects) and dynamics (forces), both of which are intimately related to the Sport of Football, and both of which I have learned most studiously. My ability to educate student-athletes about the physics of football would be an invaluable asset. I might also add that in physics, one problem of great import is something called the three-body problem; as head coach, I would bring all of my experiences and knowledge to bear on solving the twenty-two-body problem of football. Let me now briefly discuss my actual football experiences. I have always had an abiding love for the game. Tragically, my overprotective parents forbade me from playing Pop Warner Football. Unable to compete on the field, I channelled my gridiron desires into calling the shots from the sidelines.

Over the years, I have amassed extensive coaching experience, as head coach of the Buffalo Bills, via the classic PC hit Madden NFL '97. According to my records, since acquiring this software in the fifth grade, I have led the Bills to a remarkable 570-0 record, winning 30 Super Bowls, while erasing Western New York's collective heartache of the early 1990s.

I should also take a moment to detail my intense devotion to the Badger football program. As an undergraduate, I attended former Big Ten school University of Chicago, an institution as known for its academic prowess as it is not for its athletic accomplishments. My would-be fandom rolled over to UW, making me now twice as an enthusiastic fan as I otherwise would be. (I have held football season tickets since my arrival in Madison.) Thus, after witnessing dozens of Badger games, I not only know how to jump around and sing Varsity, but am acutely attuned to Badger football strategy.

Lastly, I note that the salary for this position is negotiable. To demonstrate my commitment to the program, and to help the University in these tough economic times, I volunteer to take this position pro bono.

I am confident that, given the chance, I would excel as head coach of the Wisconsin Badgers. Failing that, I humbly offer my services as Team Physicist, a position, like quarterback, no football team should be without.

Sincerely,

Kenny Rudinger

Rejection Letter

From: Wisconsin Athletics Employment <employment@athletics.wisc.edu>

Date: Thu, Dec 27, 2012 at 1:19 PM

Subject: University of Wisconsin Head Football Coach Position

To:

We have now completed the search for the Head Football Coach position at the University of Wisconsin-Madison Division of Intercollegiate Athletics. We received a large number of applicants making the final decision difficult.

Although you were not selected, we sincerely appreciate your interest in this position. We wish you the very best in your career endeavors, and again thank you for your interest in the Division of Intercollegiate Athletics at UW-Madison.

****

Division of Intercollegiate Athletics
University of Wisconsin - Madison

2013 Fall Admissions

Shaun Alsum
Calvin College
Walker—AMO

Torrin Bechtel
Rensselaer Polytechnic Institute
Hegna—Nuclear Engineering

Phillip Bonofiglo
Univ of Michigan at Ann Arbor
Forest—Plasma

Jonathan Brown
University of Virginia
Shiu—High Energy Theory

James Bourbeau
Univ of Texas at Arlington
Bai—High Energy Theory

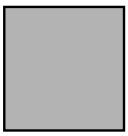
Adam Frees
Brown University
Coppersmith/Friesen—
Condensed Matter Theory

David Gold
Grinnell College
Yavuz—AMO

Zachary Griffith
University of Northern Iowa
Westerhoff—Astroparticle/
Cosmic Ray

Michael Heubeck
University of St Andrews
Joynt—Condensed Matter
Theory

Julian Irwin
Goucher College
Rzchowski—Condensed Matter
Experiment



Xiangyang Ju
Nanjing University
Wu—High Energy Experiment

Ali Kheirandish
Shiraz University
Halzen—IceCube

Dahan Kim
University of Maine
Dasu—High Energy
Experiment

Cameron King
Univ of Southern California
Everett—High Energy Theory

Trevor Knapp
St Olaf College
Coppersmith—Condensed
Matter Theory

Samuel Kritchevsky
UNCat Chapel Hill
McDermott—Condensed
Matter Experiment

Stephanie Kubala
Cornell University
Terry—Plasma Theory

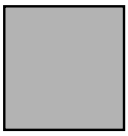
Emily Lichko
Univ of Michigan at Ann Arbor
Coppersmith—Condensed
Matter Theory

Kenneth Long
Tennessee Technological
University
Dasu—High Energy Experiment

Vanessa Lopez Barquero
Universidad de Costa Rica
Lazarian—Astronomy

Matthew Meehan
Kutztown University of
Pennsylvania
Coppersmith—Condensed
Matter Theory

Erin Middlemas
East Tennessee State University
Karle—IceCube



Yao Ming
University of Science &
Technology of China
Wu—High Energy Experiment

Takashi Nishizawa
Tohoku University
Sarff—Plasma

Ethan Peterson
Massachusetts Institute of
Technology
Forest—Plasma

Duncan Pettengil
University of Massachusetts
Lowell
Hashimoto—String Theory

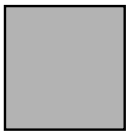
Zhenyi Qi
Fudan University
Saffman—AMO

Tyler Ruggles
Colorado College
Eriksson—Condensed Matter
Experiment

Claire Salling
University of Chicago
Gilbert—Biophysics

Richard Sayanagi
Harvey Mudd College
Rzchowski—Condensed Matter
Experiment

Nicholas Smith
University of Minnesota-Twin
Cities
Smith—High Energy Experiment



Brandur Thorgrimsson
University of Iceland
Eriksson—Condensed Matter
Experiment

Daniel Thrasher
Brigham Young University
Lawler—AMO

Justin Walker
University of Chicago
Boldyrev—Plasma Theory

Logan Wille
University of Kansas
Halzen—IceCube

Zachary Williams
University of Central Florida
Forest—Plasma

Aaron Wright
Lawrence University
Herndon—High Energy
Experiment

Guodong Zhang
Shanghai Jiaotong University
Saffman—AMO

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)

000000000. 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. Durandet 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.

12697999. Quantum Computing Research Center Fund provides support for research in quantum computing in the physics department.

Support Physics

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University of Wisconsin Foundation
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PO Box 78807
Milwaukee, WI 53278-0807

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

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

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Name: _____ Home Phone: (_____) _____

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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: Chris Glueck, University of Wisconsin Foundation at 608-265-9952 or chris.glueck@supportuw.org.

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Department of Physics
1150 University Avenue
Madison, WI 53706

University of Wisconsin Department of Physics