

2011 physics

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Message from the Chair

Greetings from Miami University Physics! Let me begin by announcing the establishment of a new Biological Physics degree in our Department. This exciting development addresses the burgeoning interest at the interface between physics and biology and will be described in more detail later in the newsletter. **Paul Urayama** guided the proposal through the various approval levels within the University. In a related development, the department received approval to fill the James C. and Carole Garland Assistant Professorship in Experimental Biophysics beginning in August 2012.

Both **Jennifer Blue** and **James Clemens** received tenure and were promoted to Associate Professor this past year. When **Jeff Clayhold** left the faculty last fall to take a position with Kodak in Rochester, NY, we hired **Chris Beer** (MS '05) as a Visiting Assistant Professor. Chris has a Science Doctorate in Physics from Ball State with an emphasis on Physics Education. His excellent work in the classroom and strong interest in pedagogy led the Department to appoint him to the position of Lecturer – a continuing position with primary duties in teaching.

As I have mentioned before, plans are complete for our move to a renovated Kreger, but construction is on hold pending capital improvement money from the State of Ohio, or funding from other sources. However, Phase I construction of the Armstrong Student Center is underway next to our building, which is generating quite a bit of

‘excitement’. Culler Hall will be incorporated into the ASC in Phase II of the project.

We again worked hard at recruitment of highly qualified undergrad and grad students. We hosted a class (primarily minorities) from Stiver’s School for the Arts in Dayton; participated in an NSF funded Miami Bridge program and STEM Exploration Day; were deeply involved in “Make It Miami” recruiting activities throughout the spring. We currently have 80 undergraduate majors and 20 MS students which ranks us among the top of all MS physics departments in the United States.

Bill Houk retired in 2011 following several decades of faithful service and leadership to the Department and University. He plans to teach one semester a year for the next three years. We wish him well in this new stage of his life. We mourn the passing of emeritus professors **Dave Griffing** and **Jim Poth**,

both having courageously fought long illnesses. They will be greatly missed.

James Clemens received the Outstanding Teaching Award, awarded by the graduating majors; **Perry Rice** was named the 2011 Distinguished Teaching Award for Excellence in Graduate Instruction and Mentoring; and **Beverley Taylor** received the Miami University Hamilton's MUH Excellence in Scholarship Award.

Our 11th Annual Arfken Scholar-in-Residence was Dr. Evgeny Tsymlal of the U of Nebraska, hosted by **Khalid Eid**, and Arfken Scholars (shorter visits) were Bediha Beser, Temple; Andrew Kunz, Marquette; Chris Leighton, Minnesota; Mark Havey, Old Dominion; Brian Stewart, Wesleyan; and Luis Orozco, Maryland.

The 2011 Benson Lecture (43rd annual)
(continued on pg.2)

Thanks!

The Department extends our appreciation to Russ Starkey ('64) for establishing a four-year scholarship for two incoming students. We are grateful to our alumni who contribute to our scholarship funds. We also wish to thank our alumni who so generously support our general account. These gifts are critical in providing discretionary funds essential to maintaining the vitality of our physics program. If you would like additional information, please contact Evan Lichtenstein, Sr. Director of Development for CAS at (513) 529-1263, lichteec@muohio.edu, or Diane Koury '78, Associate Director of Development at (513) 529-9356, kouryd@muohio.edu.

Message from the Chair *continued*

entitled, "What does physics have to do with nutrition, omega-3 fatty acids and brain development?" was presented by 1972 Miami alumnus **Dr. Norman Salem, Jr.**, Chief Scientific Officer and VP for Research, Martek Biosciences Corporation.

In the past year, the Oxford campus Physics faculty taught 21 UG majors courses and 13 graduate courses and taught 50 service courses to 2460 students. Our graduate students taught 64 sections of introductory laboratory courses to 1100 students. We graduated 16 undergraduate majors and nine

graduate students in this same period. Among these students were one Goldwater Scholar nominee and one Astronaut Scholar nominee. Also during this period, the faculty published 21 papers in peer reviewed journals; made 55 presentations at regional, national and international meetings; submitted 20 proposals requesting nearly \$5,900,000 and were awarded 11 grants totaling in excess of \$495,000. This research involved 24 graduate and 48 undergraduate students (past and present). This year the department was awarded two Phase II Shoupp Awards (Jaeger/Pechan and Bali) in support of

research involving industrial collaboration – the first Phase II awards in the history of the Shoupp program.

Finally let me encourage you to visit our website at www.muohio.edu/physics. If you haven't done so yet, please consider submitting information for the alumni spotlight section.

To all our valued physics alumni and friends, best wishes for a blessed year.

Mick Pechan

Department News

Jennifer Blue has been granted tenure and promoted to Associate Professor. She earned a bachelor's degree in physics from Haverford College, and her MS in physics and PhD in science education from the Univ of Minnesota.



President at the local level. She has reviewed manuscripts in physics education research in five of the most respected science education publications. On campus, she serves on the steering committee for the Women's, Gender, and Sexuality Studies program, is on the advisory board for the living-learning community for science students, and is a faculty associate for the Center for the Excellence of Learning Teaching, and University Assessment.

Dr. Blue taught at Saint Mary's School in Raleigh and at the University of Maine in Farmington. She joined Miami physics as a Visiting Assistant Professor in 2002 and entered the tenure track in 2005.

Her research is in physics education. She has worked with ten students, four of whom have continued in education. She has published 11 peer-reviewed or invited articles. Additionally, she has given more than 30 talks and workshops, including four invited talks at national meetings. She has brought in \$1,800,000 in external funding, mostly from the state of Ohio for use in improving the science knowledge of K-12 teachers.

Dr. Blue has been an active member of the Am Assoc of Physics Teachers at the national and local level, serving on committees at the national level and as

James Clemens has been granted tenure and promoted to Associate Professor. Clemens earned his BS in Physics in 1997 and MS in 1999 from Miami. He earned a PhD in physics from the U of Oregon in 2003. After doing postdoc work on quantum error correction at the U of Arkansas, he joined Miami in 2005.

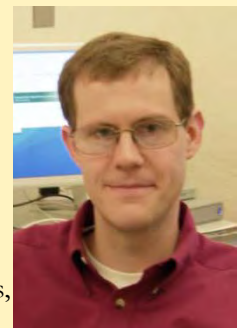
Dr. Clemens' research focuses on the intersection of theoretical quantum optics and quantum information processing, investigating the ability to use controlled interactions between light and atoms to carry out quantum information processing tasks such as quantum teleportation. He has collaborated with the experimental group of Luis Orozco at

the Joint Quantum Institute at Maryland and his colleague Perry Rice at Miami.

Dr. Clemens has published seven articles in journals such as Optics Letters, A, and JOSA B and three short articles in an edited book, "Coherence and Quantum Optics IX". His research has been funded by Research Corporation. He has involved more than a dozen undergraduates in a variety of research projects and he has supervised two graduate students.

Dr. Clemens teaches courses including Physics for Music, aimed at non-science majors, sophomore level computational physics, upper level/graduate theory courses in classical and quantum physics, and a graduate level special topics course on quantum information processing.

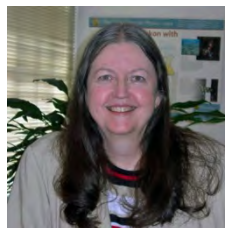
In his free time, Dr. Clemens likes to play Wii games with his kids ;-), ride the rolling countryside surrounding Oxford on his road bike, and explore the mountain bike trails at Hueston Woods State Park in Ohio and Versailles State Park in Indiana.



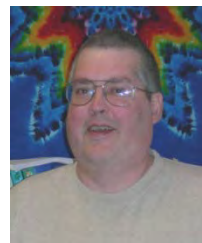
Department News *continued*

The **Jan Yarrison-Rice** Nano Research Group has been highly successful in the past year. Two NSF grants are funded to 2014. Areas research include utilizing nanowires in photovoltaic solar energy devices; development of a biosensor utilizing plasmonic-assisted resonator on semiconductor nanowire devices; investigating the behavior of hetero-structured semiconductor nanowires in the quantum regime. Recent members had great experiences in computational modeling, optical spectroscopic and photocurrent characterization, chemical synthesis, and device fabrication and testing - all on nanoscale materials. Undergraduate Chris Burnett worked on computational models of simple nanoparticles. MS graduate, Nick Geitner, worked in conjunction with chemists to synthesize Au bipyramidal nanoparticles and study their temporal and morphological evolution. He published an 8-page article entitled, "The morphology and evolution of bipyramidal gold nanoparticles," in the journal *Nanotechnology*. Finally, the Jan Y-R Nano Research Group has been joined by Andrew Makepeace, MS Candidate for 2013.

Beverley Taylor received the 2010 Miami University Hamilton Excellence in Scholarship award, for her contribution to the field and the impact of that contribution on a national or international level. Dr. Taylor is well-known for her work with in-service teachers to improve middle school science, particularly for developing curriculum materials using toys to teach science. In 1999, she was elected an APS Fellow in honor of this work. She has published five books, four book chapters, and 20 peer-reviewed articles. Dr. Taylor is the first person to win all three of the Miami Hamilton faculty awards, receiving the 2006 Excellence in Service Award and the 2001 Excellence in Teaching Award.



Perry Rice was selected to receive the Award for Excellence in Graduate Instruction and Mentoring by the graduate school at Miami University. For over 23 years, he has directed 16 MS students, and has published 40 papers, half with student co-authors. Dr. Rice says this reflects mainly on the quality of graduate education in the Physics Department and the wonderful things they go on to do. His students have earned nine PhD's, and four more are currently working on a PhD. Several others have gone on to play key roles in computer and information technology companies.



Paul Urayama, associate professor of physics, has been awarded a \$141,556 grant from the National Science Foundation to develop a cellular biophysics program. The award will support the project "Cellular NADH Fluorescence as a Metabolic Indicator under Pressure: Piezophysiological Studies at a Predominantly-Undergraduate Physics Department." The project emphasizes research, mentoring of graduate and undergraduate students, and integration of research discovery elements into biophysics courses for STEM and non-STEM majors. Since he joined Miami in 2003, Dr. Urayama has been mentor to more than 30 undergraduates from a variety of majors, including zoology, mathematics, microbiology, biochemistry, and exercise science. The average length of involvement of undergraduates in his research laboratory is 3.3 semesters, and students graduate to pursue careers in physics, biophysics, medical physics, biomedical engineering, public health, and medicine.

Summary of Society of Physics Students Activities

SPS had an active 2010-11 year. Highlights were monthly movie nights, where people voted on whether to watch a "good-physics" or a "bad-physics" movie; volunteer tutoring to introductory physics courses; picnics at Peffer Park; outreach to Talawanda Schools, including Science Night at Shriver; GRE prep sessions; and a memorable visit to a uranium enrichment facility, organized with the help of department alum **Russell Starkey**. SPS was also awarded \$3,693.25, through Miami's Associated Student Government, to fund purchase of physics demos for educational outreach. Special thanks to 2010-11 officers: President **Megan Marshall**; Vice-President **Eric Todd**; Fall Treasurer **Sarab Makkar**; Spring Treasurers **Jeff Kleykamp** and **AJ Hachtel**; Secretary **Trevor Cook**; Outreach coordinator **Emmy Mills**; and Webmaster **Bill Konyk**.

New Bachelor of Science Degree Program in Biological Physics

Starting Fall 2011, the department will offer a new program leading to a Bachelor of Science degree in Biological Physics. Biological Physics is the science investigating the physical behavior of biological and biologically inspired systems, applying physical techniques to solve problems in physics, biology, and medicine. The program combines a broad science curriculum with physical and mathematical rigor. In addition to courses in physics, core coursework includes biophysics, molecular and cellular biology, general and organic chemistry, calculus, and applied statistics. Advanced electives draw from physics, mathematics, biology, chemistry, engineering, and kinesiology, and are flexible enough to serve students pursuing a wide range of career options, including biological physics and biophysics, medical physics, medicine, biomedical engineering, and public health. The program is enhanced by several physics faculty with ongoing research in the field, including nanowire-based nanoscale biosensors for environmental toxins or for medical applications (**Prof. Yarrison-Rice**), optical imaging and sensing in highly-scattering biological media (**Prof. Bali**), and the monitoring and imaging of pressure effects on biomolecules and on cellular physiology (**Prof. Urayama**). A tenure-track faculty search in biological physics is in progress, further enhancing this degree program.

News of our Students (Where appropriate the faculty mentor appears in parenthesis)

Outstanding Undergraduate Research

Donald Kane (Bali)
Jordan Ryan (Urayama)
Bradley Worth (Bali)

OARS Undergraduate Research

Miao (Millie) Dong (Bali)
Andrew (AJ) Hachtel (Bali)
Jeffrey Kleykamp (Bali)
Megan Marshall (Bali)

Certificate of Achievement in Research

Miao (Millie) Dong (Bali)
Andrew (AJ) Hachtel (Bali)
Jeffrey Kleykamp (Bali)
Sarab Makkar (Bali)
Christopher Burnett (Eid)
Steven Heston (Eid)
Grant Riley (Eid)
Jacob Martin (Jaeger)
Michael Sinko (Pechan)
William Konyk (Rice)
Erik Rotterman (Urayama)
Eric Todd (Urayama)
Michael Zatt (Urayama)

2011 Undergraduate Summer Scholars

Kashika Goyal (Bali)
Sarah J. Lauber (Bayram)
Taylor Reid (Eid)
Jacob Martin (Jaeger)
William Konyk (Rice)
David Knowles (Urayama)

2011 Summer Research off campus

NIST – Alexis Denton, Andrew Hachtel,
Jeffrey Kleykamp, Doug McNally, Corey
McDonald

2011-12 College of Arts and Science Dean's Scholars

Jeffrey Kleykamp & William Konyk

Sigma Pi Sigma Inductees

Charles Baldwin
Jun Cheng
Matthew Ciccone
Justin Guenther
Andrew Hesselbrock
Corey McDonald

2011-12 Dept Scholarship Recipients

Derrick Arrington
Tristan Clark

Trevor Cook
Matthew Gillette
Andrew Hachtel
Zachary Komon
Steven Neff
Peter Siegfried
Anthony Silvidi
Michael Sinko
Taylor Sullivan
Alex Thomas
Thomas Bouscher
John Camenisch
Jessica Hall
William Konyk
Shamal Lalvani
James Morton
Justin Guenther
Jeffrey Kleykamp
Eric Thomas
Doug McNally
Corey McDonald
Neal Schick
Daniel Welsh

Geoffrey Neuman
Ethan Stanifer
Jacob Martin
Alexis Denton
Kyle Kissick
Christopher Burnett
Taylor Reid

SPS Outstanding Senior

Megan Marshall

Outstanding Grad Student Research

Nicholas Geitner (Yarrison-Rice)
Brian Kaster (Pechan)

Outstanding Grad Student Teachers

Charles Baldwin, Department Award
Nicholas Geitner, AAPT Award

Degree Awards 2011

Physics MS

David Fisher
Ian Steward
Charles Baldwin
Sean Baumgartner
Jason Calloo
Jun Cheng
Nicholas Geitner
Brian Kaster
Mary Elizabeth Mills
Calford Otieno

Physics BA

Michele Lally
Matthew Ciccone
Alyssa Olson
Cathalee Soergel
Joseph Kinney

Physics BS

Ryan Bratton
Jonathan Ehrman
Donald Kane
Megan Marshall
Robert Misconin
Grant Riley
Jacob Scherger

Engineering Physics BS

Daniel Wentzel
Steven Heston
Erik Rotterman
Jordan Ryan
Bradley Worth II

Please note: We are no longer preparing the newsletter for bulk mailing, and we have received very few requests for printed copies. If you know of someone who would like to continue receiving the newsletter by mail, please call us at (513)529-5625, or email us at muphysics@muohio.edu.



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The 2011 Superbowl of Chili offered good food for everyone, especially the Packer and Steeler fans of the department. Snacks came in variations of black & gold and green & gold, and the Physics office was decorated half with Steelers décor and half with Packers décor. Held each year at lunchtime on the Friday before the Superbowl, enough chili was brought in to feed a small army! The “carry-in” menu featured several pots of traditional southwestern chili in hot and mild, white chili, and vegetarian chili. The side dishes included chips, salsa, crackers, cheese, fruit and veggie trays, and plenty of sweets. (Pictured are **Mick Pechan**, **Judy Eaton**, and **Brian Kaster**.)