

2010 physics

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Message from the Chair

Greetings from Miami University Physics! Let me begin with the good news that this year, the American Institute of Physics recognized Miami Physics as graduating the largest number of undergraduate majors and awarding the second largest number of MS degrees among all MS granting physics departments in the United States. I should add that this is not a recent development, as we have historically ranked high in both categories and owe much to those who have gone before us in the Department.

As mentioned in last year's letter, the Department was asked to plan for relocation to a renovated Kreger Hall, since the Armstrong Student Center will be located at the current site of Culler, Rowan and Gaskill Halls. The design phase is completed for the renovation and we anticipate with excitement the improved teaching, research and administrative spaces. Construction is on hold pending capital improvement funding from the State of Ohio.

The Department has approved a new Biological Physics degree to address the burgeoning interest at the interface between physics and biology. Implementation awaits approval at the College and University levels.

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. Last year's first year class was among the strongest academically in recent memory. Our graduate program recruitment efforts are resulting in increasing selectivity as we are getting five times more applicants than we are able to admit.

As mentioned last year, the economic downturn continues to negatively impact the state of Ohio and Miami,

resulting in the removal of central administration funding for our Instrument Maker position. Last year, **Mike Eldridge** was supported part time in that position through the wonderful generosity of Miami alumna and non-physics major Mrs. Ann Cottrell. We would much appreciate any and all future donations in support of this important position within the Department.

Paul Urayama received the Outstanding Teaching Award, awarded by the graduating majors. **Janet Hurn** (Middletown) received a Faculty Innovator Award from the University System of Ohio. More about this later in the newsletter.

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Thanks!

The Department extends our appreciation to the family of Joe Priest for establishing the Mary Jean and Joseph R. Priest Scholarship this past year.

We are grateful to all our alumni who contribute to our scholarship funds, which include the *Culler Awards, Benjamin Lee, George and Carolyn Arfken, Ray L. Edwards Physics Scholar, George B. Arfken Physics Scholar, Raymond M. Hughes, Ray Lee Edwards, Andrew Wolf Bylenga, John E. Cocanougher, Drake Family, William E. Shoupp, Carl Frische, Philip and Cora Macklin, John and Genny Snider, James and Carole Garland and Votaw Scholarships.*

We also wish to thank all of 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 as to how you may further assist the program or the students, please contact Evan Lichtenstein, Senior Director of Development at (513) 529-1263 or lichtteec@muohio.edu or Jessica Schmitt, Assistant Director of Development at (513) 529-6054, or schmitja@muohio.edu.

Message from the Chair *continued*

Our Tenth Annual Arfken Scholar-in-Residence was Dr. Julio Gea-Banacloche (University of Arkansas), hosted by **James Clemens**. Arfken Scholars (shorter visits) were Stephen Nagler (Oak Ridge National Lab), **Leo Irakliotis** (University of Chicago), Axel Hoffman (Argonne National Lab), Marjatta Lyyra (Temple University) and **Joe Leach** (University of California, San Francisco). The 2010 Benson Lecture (42nd annual) entitled, "Non-destructive testing (NDT): applied principles of physics" was presented by **Craig Benson**, from Wyle Laboratories, Inc., Advanced Non-Destructive Inspection Division. Craig is the son of George Benson and a 1988 MS alumnus. We enjoyed seminars from several alumni speakers again this year. If you would like to speak to our faculty and students

please feel free to contact me.

During the past year the Oxford campus Physics faculty taught 24 undergraduate majors courses and 15 graduate courses, and taught 47 service courses to 2230 students. Our graduate students taught 65 sections of introductory laboratory courses to 1150 students. We graduated 12 undergraduate majors and five 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 33 papers in peer reviewed journals; made 43 presentations at regional, national and international meetings; submitted 12 proposals requesting more than \$5,800,000 and were awarded nine grants totaling in excess of \$965,000.

This research involved 24 graduate and 41 undergraduate students (past and present).

Finally, let me encourage you to visit our website and note the growing alumni spotlight section. If you are not in the "spotlight," please send us your information. Thank you for continuing to support Miami and the Physics Department. Your interaction with students and financial support is an added value that allows us to maintain excellence for those following your path.

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

Mick Pechan

Department News

We are excited to highlight the work of **Janet Hurn**, a senior instructor in physics at Miami University Middletown. She holds an undergraduate degree in physics and a master's degree in education from Miami University.

"I never thought that I would be teaching physics when I started at Miami all those years ago, but with some encouragement and mentoring from folks like Dr. T. William Houk, Dr. Don Kelly and the late Dr. Joe Priest, I am part of the Miami physics team and I love it," Hurn said.

She has a passion for educational technology, serving as faculty support for the Regional's E-learning Initiatives assisting faculty in developing online and hybrid courses. Last spring, Ms. Hurn received one of the University System of Ohio's first Faculty Innovator Awards. She was recognized by Governor Strickland and Chancellor Fingerhut at the Ohio General Assembly for her efforts. These awards are given to 10 faculty members and teams recognized for work they have done to introduce digital course materials in the classroom



that enrich learning and make textbooks more affordable for their students.

For example, the nursing school urgently needed to develop curriculum for associate degree nursing students who were seeking a bachelor's degree in nursing. Most of the nurses worked odd shifts, so attending traditional lecture classes was not an option. Led by Hurn the evaluation team recommended Articulate Rapid E-Learning Studio as the technology to assist creating the online courses. She and her team assisted the department in moving all of the BSN completion courses to the online format.

Hurn took what she learned in her work for the nursing school and applied it to her physics classes. She introduced a hybrid learning approach. Instead of meeting three days a week, she now holds

class two days a week and creates interactive lectures that students review over the weekend. The Monday class begins with a short concept-based quiz. Students can use notes they took from the online presentation and answer questions via a real-time response clicker. Based on instant results, she is able to customize her Monday review session for areas that need additional attention.

The results have been impressive. Hurn has observed the following:

- What previously took one hour in a classroom lecture, she's now able to deliver in a 15-minute e-learning presentation.
- The Articulate-authored courses provide for easy navigation and allow students to repeat sections or even skip sections altogether. This allows students to learn at their own pace.
- Class time can be used for more lab-oriented or collaborative activities.
- Student satisfaction and performance improved: 88% of students agree that the presentations help their learning.

Department News *continued*

"I continue to challenge myself to improve my teaching approaches," she said. "I really want to improve the quality of my e-learning presentations. I'm an educator at heart. I'll continue to explore ways to make physics easy to learn and to work with other interested faculty."

As a faculty member, Hurn has been providing both video and audio recordings to students, (materials have also been transitioned from CD format to web-based podcasts and vodcasts,) allowing them to review material as often as needed to maximize learning. Students report that her videos are extremely useful, and increase their understanding of the more complex concepts covered in physics.

In addition to her own courses, she has assisted Miami faculty developing their digital content by offering easy-to-use tech solutions, finding low-cost options for recording digital content, and

encouraging faculty to work with library staff to find digital resources to supplement or replace textbooks. Hurn currently encourages students to purchase the digital version of their text book which is a less expensive alternative to the paper version. She also utilizes a web-based homework application (WebAssign). This not only reduces student costs but also ensures that students have access to more timely material.

Most recently, she is incorporating the Eno board, which is a type of smart board, into her daily interactive classroom activities. Work that is done during class can be saved at the touch of a button and uploaded to Blackboard for students to review as needed. "I want to find the best tools to get the job done efficiently and keep it current for the students. They seem to appreciate my efforts."

Samir Bali's group measured sub-MHz shifts in the hyperfine energy levels of ultracold atoms, induced by weak illumination of the atoms. They published their observations in *Laser Physics Letters*. They also measured the complex refractive index of highly scattering tissue-like media, and developed a theoretical model for total internal reflection that was, for the first time ever, consistent with the data. They published their results in *Optics Letters* and *Journal of Dairy Science*.

Jennifer Blue, Burcin Bayram, and Doug Marcum's paper, "Creating, implementing, and sustaining an advanced optical spectroscopy laboratory course", was published in the *American Journal of Physics* in 2010. **Jennifer Blue** was also invited to be a discussion leader at the 2010 Gordon Conference on Physics Research and Education: Experimental Research and Laboratories in Physics Education.

Mick Pechan and his wife Kathy are delighting in their first grandchild, Ezra Rose Keeton, born to Cory and Jessica on March 14, 2010. Former MS students **Willis Agutu** and **Sarah Hernandez** began their PhD. programs in physics this fall at Texas Tech University and U of Texas – Arlington respectively. This past spring, Mick completed his service on the executive committee of American Physical Society's GMAG, the topical group on magnetism.

Dr. Burcin Bayram's spectroscopy group, **Dave Fisher, Sean Baumgartner, Rob Misconin** and **Sarah Lauber**, welcomes new graduate student **Oleg Popov**. Dave recently presented his research studies at the APS Division of Atomic, Molecular and Optical Physics in Houston, Texas and is writing his thesis to graduate in the fall 2010. We congratulate Rob for his internship at NASA Glenn Research Center last summer. Besides scholarly activities, Dr. Bayram has been advising and directing Tri-State area middle and high school students, especially minority and under-represented, for their science projects. Also, our group has several musicians—Sean plays violin and piano; Dave plays harmonica, jazz trumpet, and banjo, and is also a trained opera singer; and Sarah plays flute.



Cook-offs have become an occasional, fun addition to the Physics Department. Whether the challenge is chili or macaroni & cheese, faculty, staff, and students enjoy showcasing their culinary talents. **Teresa Kolb** and **Judy Eaton** of the office, and former grad student **Noah Opondo** are sampling the mac & cheese. Pitch-in lunches are also popular for various holidays and the superbowl.

Paul Urayama received the *Outstanding Faculty Award* for 2009-10. He was chosen by the senior class and presented with a plaque at the awards presentation in May 2010. He is shown here with **Peter Harnish**, president of SPS.



Perry Rice continues to work in quantum optics with **Dr. James Clemens** and researchers at the Joint Quantum Institute. He is also investigating aspects of quantum information theory, the motion of cold atoms, and atomic analogs of Hawking radiation.

News of our Students

(Where appropriate the faculty mentor appears in parenthesis)

SPS Outstanding Senior Award

Lauren Regueyra

Outstanding Undergraduate Research Awards

Peter Harnish (Bali)

Luke Keltner (Rice)

OARS Undergraduate Research Awards

Juan Pedro Cascales Sandoval (Bali)

Peter Harnish (Bali)

Jeffrey Kleykamp (Bali)

Eric Williams (Bali)

Certificate of Achievement in Research

Andrew Hesselbrock (Alexander)

Eric Williams (Bali)

Robert Tolley (Eid)

Grant Riley (NIST, Eid)

Megan Marshall (NIST, Alexander & Bali)

Ryan Bratton (NIST)

Sally Watkins (Pechan)

Tyler Brest (Rice)

William Konyk (Rice)

Lauren Regueyra (Urayama)

Jordan Ryan (Urayama)

Erik Zachwieja (Urayama)

Daniel Wentzel (NASA White Sands)

2010 Undergraduate Summer Scholars

Andrew Hachtel (Bali)

Donald Kane (Bali)

Jeffrey Kleykamp (Bali)

Corey McDonald (Clemens)

Erik Rotterman (Urayama)

Sigma Pi Sigma Inductees

Donald Kane

Jordan Ryan

Megan Marshall

Todd Van Woerkom

2010 Summer Research off campus

NIST – Alexis Denton (Eid & Jaeger)

Baylor University – Megan Marshall

University of Akron – Grant Riley

2010-11 College of Arts and Science

Dean's Scholar

Megan Marshall (Bali)

Jordan Ryan (Urayama)

2010-11 Department Scholarship

Recipients

Matthew Ciccone

Zachary Hornberger

Kyle Kissick

William Konyk

Geoffrey Neuman

Taylor Reid

Ethan Stanifer

Peter Siegfried

Eric Thomas

Donald Kane

Justin Guenther

Ryan Bratton

Jonathan Ehrman

Jacob Martin

Corey McDonald

Alyssa Olson

Grant Riley

Erik Rotterman

Neal Schick

Cathalee Soergel

Andrew Hachtel

Jeffrey Kleykamp

Megan Marshall

Alexis Denton

Jordan Ryan

Outstanding Graduate Student

Research Award

Todd Van Woerkom (Rice)

Jia Ying (Eid)

AAPT Outstanding Graduate Student Teacher Award

Erik Alquist

Todd Van Woerkom

Degree Awards 2009/10

Physics MS:

Erik Alquist (Urayama)

Aaron Godfrey (Clayhold)

Ian Steward (Clayhold)

Todd Van Woerkom (Rice)

Jia Ying (Eid)

Physics BS:

Peter Harnish

Andrew Hesselbrock

Lucas Keltner

Physics BA:

Christopher Schwartz

Robert Tolley

Engineering Physics BS:

Andrew Aseltine

Tyler Brest

Joshua Ebel

Lauren Regueyra

Brian Sympton

Sally Watkins

Eric Williams

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

Alumni News

Several alums were featured in the 2009-10 Seminar Series.

Leo Irakliotis MS, University of Chicago, "The Turk and the Mainframe: A Physicist's Retro(per)spective."

Craig Benson MS, Wyle Laboratories, Inc. "Non-Destructive Testing (NDT): Applied Principles of Physics."

Joseph R. Leach BS MS, University of California San Francisco, "Patient-Specific Mechanical Analysis of Atherosclerotic Arteries with Resolved Pre- and Post-Rupture Intraplaque Composition."

You can add or update your information in the *Alumni Spotlights* on the physics website by emailing muphysics@muohio.edu.