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Spring/Summer 2010

Spring 2010 Honors

THE PHYSICS DEPARTMENT GATHERED for the customary spring accolades on April 26 to celebrate the accomplishments of our students, faculty, and alumni. Dr. Soren Sorensen, professor and head, opened the festivities with the presentation of the Distinguished Alumni Award.

The 2010 recipient is Dr. Paul Huray, who earned a bachelor's degree in engineering physics at UTK in 1964, followed by a Ph.D. in physics in 1968. (See the alumnus profile on page 4.) He joined the physics faculty in 1969 and his many contributions include the creation of the Science Alliance, where he served as first director.

After a distinguished tenure in the department, he went to Washington, D.C., where he chaired the FCCSET Committee on Computer Research and Applications—a team that created an Interagency Network that would eventually be called the Internet. He then moved to the University of South Carolina where he is currently a professor of electrical engineering. He maintains a strong research program that bridges industry and academe and encourages students to tackle challenges. As he

said in his Honors Day address, “big ideas take time to mature.”

The ceremony continued with the honors, awarded as follows:

OUTSTANDING FIRST YEAR STUDENT
Caleb Redding

ROBERT TALLEY AWARD FOR OUTSTANDING UNDERGRADUATE RESEARCH
Geoffrey Laughon
Eric Martin
Oleg Ovchinnikov

ROBERT TALLEY AWARD FOR OUTSTANDING UNDERGRADUATE LEADERSHIP
George Duffy

DOUGLAS V. ROSEBERRY AWARD
Adrian Sanchez

OUTSTANDING GRADUATE TEACHING ASSISTANT AWARD
Scott Carr

OUTSTANDING TUTOR AWARD
Ben Graves

WAYNE KINCAID AWARD
Meagan White

COLLOQUIUM AWARD
Matthew Bailey

PAUL H. STELSON FELLOWSHIP FOR BEGINNING RESEARCH
Hua Chen

Continued on page 3



From left to right: Society of Physics Students President George Duffy presents Dr. Robert Compton with the Outstanding Teacher Award; Dr. Kate Jones presents Eric Martin with a Robert Talley Award for Outstanding Undergraduate Research; Scott Carr accepts the Outstanding GTA Award from Dr. Jim Parks.



New Graduate Education Opportunities

A Letter from Department Head Soren P. Sorensen

SIX YEARS AGO I used this newsletter (Volume 7, 2003) to describe the rich history of collaboration between UTK and ORNL, and specifically how this collaboration had positively impacted the Department of Physics and Astronomy. Our faculty and departmental leadership have always been among the vanguard in trying to increase this collaboration and trying to find ways to make it benefit our students. Most of the collaborative efforts have been well-balanced, so ORNL and UTK have contributed approximately equally and both have received substantial benefits. A good example of a successful program has been the Joint Faculty program, where UTK and ORNL typically share the salary of a professor/researcher. UTK now has more the 50 joint faculty members (11 in our department) and they have been instrumental in creating real collaboration at the “floor level” in research projects and numerous mentorships of graduate students.

On the other hand, there have also been programs that have not (yet) achieved a good balance between the benefits to the two institutions. For example, the joint institutes created as an outcome of UTK/Battelle assuming the management responsibility of ORNL have not really become truly joint enterprises. The three first institutes, JINS (Neutron Sciences), JICS (Computational Sciences), and JIBS (Biological Sciences) are all physically located at the ORNL campus. In many respects these three institutes seem to have been successful as seen from ORNL’s point of view, since ORNL has received additional buildings primarily funded by funds from the State of Tennessee, and two of the institutes have been used to attract large scale funding (> \$100M) to ORNL. However, as seen from UTK it is hard to identify benefits that are anywhere comparable to ORNL’s benefits. Obviously we hope that eventually this imbalance will change as the collaboration matures. The fourth joint institute (JIAM = Joint Institute for Advanced Materials) will hopefully be built on a new part of the UTK campus on the other side of the Tennessee River within the next two years. JIAM is poised to be a major center for materials research at UTK, but for all practical purposes it is not a joint institute between UTK and ORNL, but more a UTK institute with a small ORNL component.

So whereas all the joint institutes by several measures are (or will be) very successful enterprises, they have not yet really lived up

to their names as Joint Institutes. UTK and ORNL management have, however, learned many important lessons from trying to make these joint institutes a success, and some of this hard-earned experience is now being used in order to start two really remarkable and potentially truly collaborative graduate education initiatives: The UTK/ORNL Distinguished Graduate Fellowship Program and a truly innovative interdisciplinary doctoral program in Energy Science and Engineering within the new UTK/ORNL Center for Interdisciplinary Research and Education (CIRE).

Many of our graduate students have worked on their doctoral research at ORNL or in collaboration with ORNL researchers. Over the past decade ~70% of our doctoral students fall in that category. All of these educational collaborations have in general been established by peer-to-peer relations between UTK faculty and ORNL researchers and not through centrally-organized programs. The graduate program in Genome Science and Technology is probably the only exception from that pattern. However, now UTK and ORNL management have started a Distinguished Graduate Fellowship program in three core research areas: materials science and engineering, computational science and engineering, and nuclear science and engineering. It is a very competitive program, where only truly exceptional students will be accepted. This year we had 46 applicants and only 3 students were eventually accepted into the program. One of them, Robert Van Wesep from the University of Michigan, will study theoretical condensed matter physics in our department, and has already started his research with Professor Zhenyu Zhang. Eventually we expect that 10-to-12 students will be accepted into the program annually. The students are primarily funded by UTK during the first 1-2 years, while they primarily take courses at UTK. When in their third year they are able to devote all of their attention to research, they will be paid by the ORNL research group they work with. Our initial experiences have been very positive. There seems to be a lot of interest from top-notch students, and many research groups at ORNL have also been very interested in getting access to having these students work on their research projects. Undoubtedly, both the students and their ORNL mentors hope that they might end up as ORNL researchers after their graduation.

The interdisciplinary graduate program in Energy Science and Engineering, which is initially the cornerstone of the new

into **SIGMA PI SIGMA, THE PHYSICS HONOR SOCIETY:**

PAUL H. STELSON FELLOWSHIP FOR PROFESSIONAL PROMISE

Stanley Paulauskas

FOWLER-MARION AWARD

Jun Zhao

SOCIETY OF PHYSICS STUDENTS TEACHER OF THE YEAR AWARD

Robert Compton

As part of the ceremony, the department also inducted the following deserving students

Zachary Barnett
George Duffy
Hangwen Guo
Leland Harriger
John Hills
Jason Lambert
Alex McCaskey
Matthew Musgrave
Oleg Ovchinnikov
Georges Papadimitriou
Stephen Pittman
Michael Roberts
Daniel Snyder
Alaska Subedi
Andrew York

MORE ON HONORS DAY

For background on the names behind the awards, please see the Honors Page at: <http://www.phys.utk.edu/honors.html>.

To see a photo album of the Honors Day 2010 celebration, visit: <http://www.phys.utk.edu/events/HonorsDay2010/index.html>

More information on the physics alumni award is online at: http://www.phys.utk.edu/alumni_physics/alumni_awards.html



UTK/ORNL CIRE center, is a really visionary, transformational program. Many of the details of the program are still being worked out, and the final approval by UTK, ORNL, and THEC is still many months away, so what I can write here is very limited and still subject to change. The initial one-time funding for CIRE of approximately \$6M is included in Governor Bredesen's budget for FY2011, and will provide the start-up funding for the program. On a long-term basis the steady-state funding for the envisioned 200-400 doctoral students will be provided by programmatic funds from ORNL.

There are two ways this program is really remarkable. First of all, it is to the best of my knowledge by far the largest initiative by any national laboratory into graduate education. All students will have to perform their doctoral research on projects that are directly related to the Department of Energy's mission, but since energy is such a large topic and since so much exciting research is taking place at ORNL in this field, this constraint is of minor concern. The other truly exceptional aspect of the program is the interdisciplinary aspect of the program. It is envisioned that a large number of the students in the program will receive their degree directly from CIRE without being associated with a particular UTK department. The program will of course be academically overviewed by UTK to ensure educational integrity, and students can also choose to receive their Ph.D. degree from a "normal" UTK department and then receive a graduate minor or concentration in energy science and engineering. Making this program work will not be easy, and a search is now being carried out for a dynamic and experienced director for CIRE, who will be able to transform these exciting plans into reality.

The curriculum for the graduate program has been developed by a task force during this spring semester. A key component will be an initial two-semester course on Energy required by all students in the program. The details of the course will still have to be worked out, but the course on Energy developed by our own

Lee Riedinger over the last two years is a very good candidate once the course has been upgraded to the graduate level. Many of the additional courses in the 6-to-8 different paths of the program will be covered by already existing courses at UTK. But it is also envisioned that many new courses will be taught by ORNL researchers, who will be part of the CIRE faculty. In contrast to our current peer-to-peer efforts in graduate education, CIRE will have an extensive "clearing house" for doctoral research projects that will make it much easier for the students to find the right match for the research interests.

CIRE is from the start designed to be a well-balanced joint UTK and ORNL collaboration, where UTK provides the educational infrastructure and know-how and ORNL provides the research opportunities. UTK will benefit by substantially increasing our graduate programs in natural sciences and engineering with students, who are likely to be even stronger academically than our current students, and ORNL will benefit by getting a large influx of very talented young researchers with the option of potentially being able to attract the best of them to be ORNL employees.

You will undoubtedly hear more about CIRE in the months to come. There will probably be a lot of concerns and reservations both at UTK and at ORNL about a program as radical as the currently envisioned CIRE. However, I am convinced that CIRE's interdisciplinary graduate program will be approved, and UTK and ORNL will once again have shown that they are at the forefront of utilizing the combined strength of universities and national laboratories for the benefit of education and research.

Paul G. Huray and the Art of the Possible

IT SEEMED, AT THE TIME, THE WORST NIGHT OF HIS LIFE.

He had planned to capitalize on his chance to play tailback; to prove his mettle on the football field. Those plans for glory quickly dissipated, however, in the instant he slammed into a player from the opposing team and felt his freshly-broken arm dangling like spaghetti in the aftermath. In the midst of his disappointment, a young lady named Susan Lyons came down from the stands, intent on finding out just *who* the injured Oak Ridge High School Wildcat was, and *how* he was. It turns out he was a kid named Paul Huray, and they have been married since 1962.

“So it turned out to be the best night of my life,” Huray recalled affectionately.

And as for his fellow Wildcats, well, the self-described “worst player on the best team” still carries the memory of seeing that squad go on to national championship status and credits the experience with showing him how there are no small contributions when a bigger goal is in sight.

That’s the thing about Paul Huray—everything has potential; everything can be an opportunity if you just approach it from the right perspective. He has taught classes and steered committees;

given talks and written textbooks.

He has been in the service of the White House and a classroom full of electrical engineering majors.

And he is very much of the opinion

that it’s always a good idea to at least try something, because even if events don’t unfold as planned, something even better may come along.

Building Partnerships

Huray was born in Knoxville in 1941. When he was three years old his family moved to Oak Ridge, where his father worked for the Manhattan Project. He went on to graduate from Oak Ridge High School, where he fell in love not only with the girl named Susan but also with science and math. Because he was a member of the football team, however, not everyone was assured of his academic success.

“I had a guidance counselor tell me, ‘You’ll never make it at the university; you should join the Navy,’” Huray said. “That made me mad, and I thought, ‘I’ll show you.’”

So he came to the University of Tennessee and did precisely

that, earning a bachelor’s degree in engineering physics in 1964 at the top of his class and following that up with a Ph.D. in physics in 1968.

After a year as a post-doc at the University of North Carolina at Chapel Hill, he returned to UTK as an assistant professor of physics. He conducted research on transamericium elements at Oak Ridge National Laboratory and taught both undergraduate and graduate courses (for which he won the Alumni Outstanding Teaching Award). When the management contract for ORNL came up for bid, Huray told then-Chancellor Jack Reese that the university should go after it. They formed a committee, including Physics Professors Ivan Sellin and Lee Riedinger, to work on the bid. The competition, Huray knew, would be stiff.

“We were trying to figure out how in the world we could beat 60 companies who were also bidding,” he said.

The trio assembled around Huray’s dining room table one evening to come up with a strategy. Because the university is a non-profit organization, they realized they could take the laboratory management fee and invest it in hiring top people, an idea that came to be known as the Distinguished Scientist program. A snag in the plan, however, was that the winning bidder would have to manage the weapons plant along with the national laboratory, something for which the university’s leadership had no enthusiasm.

“The board of trustees said, ‘We’re not going to want to manage nuclear weapons,’” Huray explained. “So they said, ‘Here’s the deal. You guys figure out who the winner is. And you make sure you have a partnership with them.’”

This was easier said than done, considering the sheer number of bidders, but the finalists for the contract turned out to be Westinghouse, Martin Marietta (who eventually won) and Rockwell Scientific. It took hours in airports and meeting rooms, Huray said, but “by the time it was announced that the three finalists were those three companies, we had a partnership agreement with all three of them.”

As a bonus, all three companies supported the idea of the Distinguished Scientist program and agreed to fold in a portion of

Alumnus Profile



Dr. Soren Sorensen presents Dr. Paul Huray (left) with the department’s Distinguished Alumni Award at the 2010 Honors Day Celebration in April.

the management fees to support it. The committee was still somewhat disappointed, however, that the university wouldn't be managing a national laboratory.

"We thought we had failed," Huray said.

But a silver lining was soon to be revealed.

"Lamar Alexander was governor at the time," he continued.

"He had heard about the Distinguished Scientist program, and he thought it was a great idea."

The state set out to build Centers of Excellence for public higher education. They would leverage the strengths of Tennessee's colleges and universities to expand the state's research base, and in the process increase its economic competitiveness.

The legislature set aside a pool of money and asked for ideas. Huray wrote a proposal titled "An Alliance between the Sciences at Oak Ridge and UT." Eventually the name was shortened to "The Science Alliance" and in 1984 it became the state's first Center of Excellence and the home to the Distinguished Scientist program. Huray became its first director.

The long road from the dining room table to a Center of Excellence also brought with it yet another opportunity.

"That's what got me to the White House," Huray said.

Mr. Huray Goes to Washington (and Columbia)

During the process of setting up agreements with potential bidders for the ORNL contract, Huray met a representative from Rockwell Scientific who went on to work for President Ronald Reagan.

"He called me about a year and half later and said, 'We need somebody from a university here in the White House,'" Huray said.

Because he had experience with supercomputing at ORNL, Huray was assigned to the Federal Coordinating Council on Science Engineering and Technology committee on Computer Research Applications. About six months in, he said, the committee was assembled when he volunteered that he thought the networks were going to be at least as important as the supercomputers. The committee chair at the time was Jim Decker from the Department of Energy.

"I didn't know that he wanted out of that job," Huray said. "(Jim) said, 'That is a great idea. I think you ought to be chairman of this committee. All in favor raise their hand.' And I was chairman."

The committee originally wanted to streamline the existing federal agency networks, which didn't typically "talk" to one another. They planned to name the project the Interagency Network, but ultimately the name was shortened to "the Internet."

Corralling the disparate interests of committee members representing so many different agencies (NASA, the National Science Foundation, the Central Intelligence Agency, etc.) wasn't easy, but Huray said the key was showing everyone what was in it for them.

"I think people unify when they recognize that everyone has something to gain," he said. "Colleagues may gain something if they agree to help others also gain some of their goals . . . some wanted better hardware, some wanted to address software Grand

**"I SEE AN OPPORTUNITY
AND I SAY 'LET'S DO THAT.'
MOST THINGS SEEM TO
TURN OUT BETTER THAN
I ORIGINALLY EXPECT."**

Challenges, some wanted to develop the manpower base, and some wanted to build an interagency network (the Internet). By agreeing to include something for everyone, we all got what we wanted. It was a similar thing for the Science Alliance and the Distinguished Scientist program. Physicists had to support chemists, biologists, computer scientists, and engineers, but everyone came away as a winner."

In 1988, after spending three years as a senior policy analyst for the White House, another opportunity came Huray's way. He was invited to become the senior vice-president for research at the University of South Carolina. After a few years in administration, including a stint as vice-provost and interim department chairman, he went back to teaching and is currently a professor of electrical engineering at USC.

"I just loved being with the students," he said. "It was great to get back to the classroom."

He also published two textbooks in 2009: *Maxwell's Equations* and *The Foundations of Signal Integrity*. The latter subject has been an important part of his professorial work in recent years. He has teamed with Intel to develop a program to help engineers keep up with the ever-increasing demand for very fast, reliable electronic circuits. Huray has extended his teaching to the Web for the past 10 years, with students from Beijing to Boston. He also imparts some of the more intangible knowledge he's gained over the course of his own career.

"I tell my students that most opportunities happen because you know people," he said. "It is important to combine personal relationships that include children and spouses so that friendships will last a lifetime. Physicists are good at this; they learn to recognize connections, no matter what opportunity presents itself."

When he was working on network computing in the 1980s, he said he wouldn't have guessed the Internet would have 4 billion users in only 20 years, or that it would take less than a second to get 400,000 responses. What interests him is the potential of a project, not the obstacles.

"I see an opportunity and I say 'Let's do that,'" he said. And "most things seem to turn out better than I originally expect."

OVER THE PAST THREE YEARS I have been fortunate to be involved in the Double Chooz Experiment as a part of the High Energy Particle group here in the physics department. Double Chooz is a multi-national collaboration with members from eight countries representing

nuclear reactors, particle accelerators and natural radioactivity. These neutrinos can oscillate between the flavors, and theta-13 remains one of the unmeasured neutrino oscillation parameters. Reactor neutrino experiments are aimed at measuring this parameter based on the disappearance of electron anti-neutrino produced in the reactors. Earlier reactor experiments, including the first Chooz experiment,

PMT Group has been the onsite testing of each PMT just before and after installation to ensure they are all running properly for detector operation. I developed and built a stand-alone testing system that was used in both Germany and France. This effort was successful in identifying problematic PMTs that would have lowered the coverage of the detector target. During recent dry runs of the full detector data acquisition system there were no failing inner detector PMTs.

Shortly after joining the experiment my travel began with trips to Germany, Japan, and France for meetings. During these meetings I gained my first experiences in an international collaboration. It was interesting to see people of differing cultures and customs work together for a common goal. As my role in the PMT group grew and became more defined I began working closely with colleagues from Germany and Japan. Over the summer of 2008 I took the testing system

to Tuebingen, Germany, for characterization tests. Spending nearly three months there allowed me to deeply experience the culture of Southern Germany. The

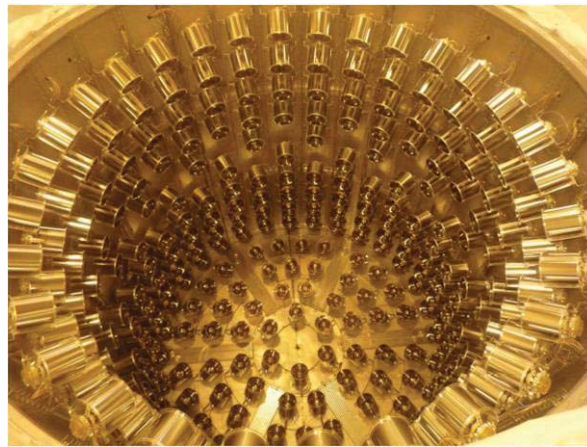
BBQ and Double-Chooz

By Brandon White, Ph.D. Candidate

four continents. The UTK High Energy Particle Physics Group is a part of the Photomultiplier Tube (PMT) Working Group. Advised by Drs. Yuri Efremenko and Yuri Kamyshkov, we have served an important role in the selection and implementation of the PMT System for the experiment. After joining the experiment in 2007 I had no idea the journey I was in for. For meetings and detector construction I have traveled to five countries, spending extended time in Germany and France. Working closely with collaboration members from each country, I have gained a rich perspective on global physics research.

Double Chooz is one of the next-generation neutrino experiments tasked with the measurement of the neutrino mixing parameter theta-13. Three flavors of neutrinos (electron, muon, and tau) emanate from many sources including the sun, cosmic rays in the atmosphere,

were only able to set upper limits for theta-13. One of the major uncertainty contributions to these experiments was the electron anti-neutrino flux from the



Above: A view of the Double-Chooz detector in Northern France; right: Brandon White at the construction site.



reactors. The concept for Double Chooz is to have two identical detectors, making this uncertainty negligible. Improvements have also been made to the detector design. A critical element is to have maximal PMT coverage of the neutrino target areas. One step of this goal is to have the PMT system operating at full capacity with no failures. The experiment's 468 PMTs were first characterized by tests performed in Japan and Germany. They were then assembled and shipped to the experimental site in northern France for detector construction. My contribution within the Double Chooz

following months I made several more trips to Germany, France, and Spain in preparation for detector construction. Beginning February 2009 I made numerous trips to France during separate detector construction



“WORKING CLOSELY WITH COLLABORATION MEMBERS FROM EACH COUNTRY, I HAVE GAINED A RICH PERSPECTIVE ON GLOBAL PHYSICS RESEARCH.”

What You Don't Learn in Class

The GRE, the Employment Scene, and Building a Professional Network

A CAREER IN PHYSICS might get underway with an introductory course freshman year, but during the journey an undergraduate major is bound to encounter questions that no syllabus or lab experiment can answer. Do you have to go to graduate school? When should you take the GRE? Should you take it more than once? How do you apply for fellowships and assistantships, and when? Do you have to pursue an academic career if you get a degree in physics?

For 65 young women, including UTK physics majors, many of those queries were answered when they attended the First Annual Southeast Conference for Undergraduate Women in Physics (SCUWP). The meeting was held January 15-17 at Duke University. The goal was to provide undergraduate women with an opportunity to experience a professional conference, arm them with information about graduate school and career options in physics, and offer them access to other women in physics of all ages with whom they can share experiences, advice, and ideas.

Christine Natrass is a post-doctoral research associate in UTK's Relativistic Heavy Ion Group and served on the meeting's organizing committee. She became acquainted with this conference while working toward a doctoral degree at Yale University, which she earned in December.

"This is part of a series of conferences that was actually started by a graduate student at the University of California at San Diego," Natrass explained.

Seed groups then picked up on the idea and started new meetings across the country, eventually winding their way to New Haven, where she got involved.

"The goal was to get geographic coverage so that everyone in the U.S. would be near (a meeting) so they could keep travel expenses down," she said. At Yale, "they were looking for a grad student to help out on the organizing committee and so I got recruited to do that."

phases. Between February of 2009 and June 2010 I have spent nearly seven months in Europe working on various phases of the detector. It has been amazing to watch the engineering plans become a reality as the detector has been assembled. The progression from drawings and presentations to a detector has been one of the joys of spending time at the experiment site. During construction I have worked with personnel from Brazil, England, France, Germany, Japan, Spain and the US. Time spent outside of the lab has also been enjoyable. After work we would often spend the evenings together for dinner, with groups from different countries taking turns cooking for everyone. From this I have learned that the Germans love BBQ sandwiches. During free time over the weekends I had the opportunity to visit several cities throughout northern Europe. In addition to Paris, Amsterdam, Brussels, and Luxembourg, I saw countless small French and German villages and castles.

When she accepted the post-doc position at UTK, the conference work sort of travelled with her.

"There was a concerted effort to start one in the Southeast," she said. "I actually asked to be part of the committee because this is something that I find important and enjoy doing."

The triangle universities (Duke, North Carolina Central University, North Carolina State, and the University of North Carolina at Chapel Hill) took the lead in organizing this first meeting, with the Department of Energy and the National Science Foundation coming on board as sponsors. The agenda incorporated research talks, panel discussions on careers and graduate school, lab tours, and student presentations.

Michelle Buchanan, for example, is Associate Laboratory Director at Oak Ridge National Laboratory and gave a talk titled "From College to Career: Things You Don't Learn in the Classroom." She was also on a career panel comprising a patent attorney, a professor from NC State, and a Science and Technology Fellow from the American Association for the Advancement of Science, among others.



Lisa Agle and Meagan White (back row) attended the inaugural Southeast Conference for Undergraduate Women in Physics.

Continued on page 8

The construction of the Double Chooz far detector is nearly completed and neutrino data taking should begin by the end of this summer, when my work will transition into analysis. It will be an exciting time to begin evaluating data and turning it into physics results. After a few months of running with the far detector only, the experiment should greatly improve the current limits on the value of θ_{13} . These results will be important to future neutrino experiments that will search for CP violations.

These past few years have been filled with valuable learning experiences both culturally and in the field of neutrino research. Being a part of an international collaboration I have forged both professional and personal relationships that will benefit me greatly as my career progresses beyond graduate school. It has been an experience that I will build on and not soon forget.

Discovering Options

For Meagan White, a UTK physics major and conference attendee, that information had a definite impact on her expectations. She said she went into the meeting thinking of her future as strictly academic.

"Now, I'm seriously considering a career at one of the NASA centers," she said.

Her field of interest is observational astrophysics and she said she enjoyed meeting other students at the poster session who are in related fields and talking to them about undergraduate research experiences. She added that graduate school is likely in her future and it was rewarding to get confirmation from the graduate panel discussion that it's a good idea to take the Graduate Record Exam (GRE) more than once.

"It was nice to hear that from people on the 'other side' who've been through the process," she said.

White was one of four students from Tennessee who attended the meeting (she and Lisa Agle represented UTK, joined by two other students from East Tennessee State University). All four carpooled with Natrass.

"The whole car ride back, the students were asking me about grad school and career options," she said. "They were more quiet on the way there, and afterwards, it was 'What about this?'"

Her background as a teaching assistant and tutor, combined with her recent graduate school experience, make Natrass a perfect listening ear for undergraduates.

"I think it's easier for me to relate to the insecurities that people have at an early point in their career," she said. "Students are more likely to tell me when they don't know something. They're more likely to be afraid of looking stupid in front of faculty. And there are a lot of realities about being a student and a post-doc that faculty members have forgotten. They remember, 'Oh, it was great, and I had a blast; not, 'I was working 80 hours a week and nothing ever worked,'" she said smiling. "It's a different perspective."

Supporting women in physics is a passion for Natrass, who has written about and given talks on the subject.

"The truth is that there are things that

are going to happen that women have to deal with that men simply don't," she said.

Friends and colleagues have shared stories of women being excluded from study groups, for example, which hurts their academic performance and leads to the perception that they might be weaker students.

There's no training for these kinds of things, Natrass said, so "there's got to be some realistic discussions with young women that you are going to have to face these obstacles."

One issue she knows about firsthand is the "two-body problem," when a husband and wife are both scientists and are looking for work in the same city. Her husband, also a nuclear physicist, works for the University of California at Riverside and is stationed at Brookhaven National Laboratory. He hopes to find career options in the Knoxville-Oak Ridge area, which was in part what drew Natrass here.

"About 60 percent of female physicists are married to male physicists and about 80 percent are married to male scientists. So almost every woman in physics has a two-body problem," she said. "This is something that a lot of women want to ask you about."

Natrass relayed the account of a student at the conference who lives near a national laboratory and thought she couldn't go to graduate school because her husband was employed locally and they wouldn't be able to re-locate.

"I was able to say, 'You know what? They're probably looking really hard for graduate students who can be posted at that national lab, so why don't you talk to someone?'" Sometimes there are practical solutions that you can point out to people," she explained.

Another common question dealt with paying for graduate education.

"There were a fair number of concerns about money," said Natrass, who was part of the graduate school panel. "This is something a lot of undergraduates

"THERE ARE ACTUALLY QUITE A FEW STUDENTS AROUND WHO REALLY DON'T KNOW HOW THE MECHANICS OF GETTING IN TO GRADUATE SCHOOL WORK. IF THEY DON'T KNOW, OF COURSE, THEY'RE NOT APPLYING."

don't realize: if you go to graduate school in physics, you get a stipend. There are actually quite a few students around who really don't know how the mechanics of getting in to graduate school work. If they don't know, of course, they're not applying."

In fact, the registration for this year's conference was free; alleviating some financial worries for students who wanted to attend.

"The goal is that none of the undergraduates will have to pay anything," Natrass said. "We try to get departments to pay for their students. I think the ones we need to reach most are the ones for whom money is a problem."

Undergraduates are also often in the dark about what career options exist for physics graduates. Natrass suggested that a career panel, like the one at the conference, could be hosted locally with relatively little expense.

"This is something both male and female students benefit from," Natrass said. "How do you get where you want to go?"

For now, another Southeastern Conference for Undergraduate Women in Physics is in the works to help answer that question. And Natrass already has some help lined up for the organizing committee.

"Both Meagan and Lisa volunteered, and I remember that," she said, laughing.

More information on the conference, including resources, is online at <http://www.physics.ncsu.edu/scuwp/>



Physics Flashback



The Physics Department Photo: 1976

Row 1: Solon Georghiou, Wylene Guinn, Barbara Pack, Deborah Adams, David King, Miecyslov Forys, Bob Lovell, Tom Callcott, Steve Shieh, Kermit Duckett, David Pegg | **Row 2:** Charlie King, Ed Hart, Bob Childers, Jim White, Dick Present, Paul Huray, Jim Thompson, Ed Harris, Bob Turtle, Pat Shirley | **Row 3:** Ray Mink, Glen Cunningham, Gene Guth, Bob Birkhoff, Linda Painter, Bill Blass, Gerald McElyea, Lee Riedinger, Rufus Ritchie, Bob Lide | **Row 4:** Gene McGuire, Norman Gailar, Harry Jacobson, Mark Garrabrant, Steve Daunt | **Row 5:** Felix Obenshain, Chia Shih, Loucas Christophorou, Ollie Thomson, Carrol Bingham, Tom Fugate, Jodie Millward | **Row 6:** Clyde Cupp, Bill Bugg, Paul Stelson, Ivan Sellin, Ted Welton, George Condo, Bob Kerley, Earl Shelton | **Absent:** Laszlo Adler, Mack Breazeale, Jack Craven, Ed Deeds, Owen Eldridge, Myron Fair, Joe Fowler, Ken Fox, Mike Guidry, Hal Schweinler, Bob Thoe



Bill Bugg and Charlie King
(October 1976)

ANY PHOTOS, ANECDOTES, STORIES, OR
FACTS ABOUT THE DEPARTMENT YOU'D LIKE TO SHARE?

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Authorized to Travel

Judy Hutchins Retires from Physics and Takes to the Road

SHE HAS BEEN KNOWN, FOR YEARS, AS ONE OF THE NICEST PEOPLE—if not THE nicest person—in the physics department. She ordered the textbooks and took all kinds of phone calls; gave directions and validated parking. And she handled loads of paperwork for physicists travelling at home and abroad. Now Judy Hutchins will have time to do a bit of travelling herself, as she officially retired on January 31.

Judy grew up in Briceville, Tennessee, a little coal-mining community in Anderson County. After spending several years as a stay-at-home mom, she came to work full-time at UTK. Her first job on campus, which she began 22 years ago, was a temporary position in Aconda Court doing data entry work. She was then hired by the zoology department as a secretary. In 1991, she came to physics, where she quickly became one of the department's friendliest faces.

Judy said she was happy to come into such a good department, first with Bill Bugg as head, then Lee Riedinger, and then Soren Sorensen.

"We have good longevity here," she said. "All in all, you can't beat physics. I've been very, very happy here."

Early on, travel quickly became her number one priority. She said it took a long time to process travel reimbursements because everything had to be typed and calculated. She had to call First Tennessee Bank to get the conversion rates for international travel, making sure she had correct rates for specific dates. One account she remembers

in particular involved a young faculty member named Soren Sorensen, who travelled extensively the first summer Judy was on staff.

"He would come in with these little receipts; a million of them, it seemed," she said. "That's how I got to know Soren real well."

While Judy was well-known for handling all things travel, there were other responsibilities as well: database entries, keeping up the number of students enrolled in courses, making sure mail went into the right boxes, textbook orders, and entering the names of teaching faculty members into Blackboard so that they could submit grades.

With those responsibilities behind her, she now has more time for family and hobbies. Judy and her husband Glen have four sons and 10 grandchildren, and grandmother duties will definitely be part of her retirement. She said she also looks forward to travelling, appropriately enough. She and Glen are planning a long visit out West, as well as trips to Alaska and Hawaii. She has already visited Italy, Germany, France, Belgium, the Netherlands, Israel, Egypt, Jordan, and Greece.

Judy was quick to answer the question about what she liked most about working in physics.

"I enjoy the people. I just dearly love the people I work with. It's like family."



Judy Hutchins and her husband, Glen, at the January reception honoring her retirement. She joined the department in 1991.

3, 2, 1 . . . Liftoff

Paul Lewis, who directs the department's astronomy outreach program, leads young scientists through the summer Rockets! course as part of the University's Kids U program. Students study principles of flight, history, and rocket design. "Graduation" is a rocket-launch on the green in front of Ayres Hall. The first class was June 2-4. The second is scheduled for July 28-30.

For more information, visit: <http://www.outreach.utk.edu/ppd/kidsu/rockets.html>





SCALE-UP Room is Open for Business

In our Fall 2009/Winter 2010 issue of *Cross Sections*, we reported that the department had some exciting teaching developments in the works. The new SCALE-UP (Student-Centered Active Learning Environment for Undergraduate Programs) facilities in Room 207 are now up and running. The tools and layout promote a highly collaborative, hands-on, computer-rich, interactive learning environment for large-enrollment courses. Dr. Stuart Elston uses this room to teach Studio Physics, a course that integrates laboratory and discussion with peer teaching. Dr. Marianne Breinig is also using the room to teach students enrolled in physics courses through the Governor's School for the Sciences.



Family News



Dr. Robert Compton



Dr. Takeshi Egami



Dr. Kate Jones



Dr. Witek Nazarewicz

Faculty

Dr. Robert Compton has been elected a Fellow of the American Association for the Advancement of Science (AAAS). Dr. Compton, who holds a joint appointment with the chemistry department, was recognized for distinguished contributions to the understanding of negative ions and nonlinear laser spectroscopy.

Dr. Takeshi Egami has received the 2010 Hanawalt Award from the International Union of Crystallography. The J.D. Hanawalt Award is presented every three years for important, contribution to the field of X-ray powder diffraction. Simon Billinge of Columbia University is a co-recipient of the award. Egami and Billinge co-wrote *Underneath the Bragg Peaks: Structural Analysis of Complex Materials*.

Dr. Kate Jones is lead author on a *Nature* paper outlining the magical properties of tin. In “The magic nature of ^{132}Sn explored through the single particle states of ^{133}Sn ,” published in the May 27 issue, she and her colleagues showed how Tin-132 is most likely the best existing example of a doubly-magic nucleus, providing a new standard to infer the properties of less-easily-measured nuclei, particularly those responsible for the synthesis of the heaviest elements. [A more detailed write-up is online at http://www.phys.utk.edu/news/2010/news_05262010_nature.html.]

Dr. Witek Nazarewicz has been invited to join the Committee on the Assessment and Outlook for Nuclear Physics, which operates under the auspices of the Board on Physics and Astronomy of the National Research Council’s Division on Engineering and Physics Sciences (part of the National Academies). The committee will conduct a study to identify new directions and new perspectives for nuclear physics and formulate guidelines for pursuing this field to advance the sciences efforts in the United States and abroad. Dr. Nazarewicz was also quoted in the April 16 issue of *Science* regarding the discovery of Element 117.

Service Awards

Administrative Services Assistant **Joyce Satterfield** and Electronics Shop Supervisor **Gene McGuire** were among those recognized at the university’s May 18 luncheon to honor employees with 24 or more years of service to UTK. Joyce has been with the university for 25 years; Gene for 40. Other notable service anniversaries are Senior Administrative Services Assistant **Pam Carter** (25 years) and **Dr. Stephen Daunt** (35 years).

Alumni

Dr. J.E. “Bill” Hancock (B.S., Engineering Physics, 1952) sent the department Mardi Gras greetings from Louisiana with his annual gift of King Cakes, for which the staff, faculty, and especially the students, were most appreciative.

Leticia Pibida (Ph.D., 1997) is a Physicist in the Ionizing Radiation Division at the National Institute of Standards and Technology.

Rachel White (B.S., 2006) teaches physics at Clinton High School in Anderson County and her students were featured in the *Knoxville News Sentinel* in May for their trebuchet project.



The Society of Physics Students enjoyed a get-together at the Copper Cellar Restaurant in February.

Students

Physics was once again well-represented at the Chancellor's Honors Banquet, held each spring to recognize students, faculty, staff and friends of the University of Tennessee for their extraordinary achievements. This year's physics honorees were:

EXTRAORDINARY ACADEMIC ACHIEVEMENT

Adrian A. Sanchez
Meagan K. White

EXTRAORDINARY PROFESSIONAL PROMISE

Rachael E. Ainsworth
Hua Chen
Alexander J. McCaskey
Jordan D. McDonnell
Laurene Tetard
Brandon R. White

TOP COLLEGIATE SCHOLAR

Adrian A. Sanchez

Congratulations to **Irakli Garishvili** (Ph.D., December 2009), who won an honorable mention in the Relativistic Heavy Ion Collider (RHIC) annual doctoral thesis award competition. His dissertation, titled, "Open heavy flavor measurement at forward angles for Cu+Cu collisions at center of mass NN collision energy 200 GeV" was described as "an analysis tour-de-force" that "contains several firsts for PHENIX."

Graduate Research Assistant **Olga Ovchinnikova** won second place for the physical sciences in the UTK Sigma Xi Graduate Student Research Paper Competition in March. She was recognized for her work on "Molecular Cartography: Combined Topographical and Chemical Imaging using AFM and Mass Spectrometry."

Undergraduate Physics Major **Oleg Ovchinnikov** was one of three Phi Kappa Phi National Honor Society Award Winners at the university's 14th annual Exhibition of Undergraduate Research and Creative Achievement (EURECA) competition in March. His work was entitled "Unlocking the Mysteries of the FORC" and addressed understanding energy transformations on the nanoscale. In April Oleg was awarded a \$2,000 undergraduate research scholarship from the Microscopy Society of America for his proposal "Towards the Thinking Microscope: Artificial Intelligence Analysis and Identification of 2D+3D STEM/EELS Data." The research will be a collaborative effort with Sergei Kalinin and Stephen Pennycook at Oak Ridge National Laboratory.

Graduate Research Assistant **Jason Schaake** was part of the research team recognized with an Oak Ridge National Laboratory Significant Even Award (SEA) for his work on "Development of a Bright Single-Mode Entangled Photon Source." Fellow team members are Ryan Bennink, Phil Evans (Ph.D., 2007), Warren Grice and Travis Humble.

In Memoriam

The physics department lost great friends and colleagues with the deaths of **Hans Cohn** on April 12, **Harry Jacobson** on June 6, and **Gerald McElyea** on February 24.



Hans Cohn

Dr. Cohn was 82 years old. He was born in Berlin, Germany, moving to the United States in 1947. He earned undergraduate and graduate degrees in physics at Indiana University and joined Oak Ridge National Laboratory in 1953, where he stayed until his retirement in 1994. His research specialty was high-energy particle physics, work he shared with the physics department as an adjunct professor.



Harry Jacobson

Dr. Jacobson, professor emeritus, passed away June 6. He was born July 13, 1931. Alvin Nielsen brought him to the department to work on theoretical aspects of infrared spectroscopy research. He had earned the Ph.D. at Yale, where he was a student of the distinguished theoretician Henry Margenau. He went on to become the Associate Dean for Student Academic Affairs in the College of Arts and Sciences and Director of the College Scholars Program. Dr. Jacobson was known as an outstanding teacher and for many years was a mainstay in the upper division courses for physics majors. He was devoted to his family and was a founding father of the John XXIII University Parish Catholic Center.

Gerald McElyea, who died on February 24, came to UTK in 1967 after serving in the Air Force and worked primarily as a research technician for the Infrared Spectroscopy Group until retiring in 1995.

Thanks to our Donors

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Gifts forwarded to the department from the Office of Development (Gifts dated October 31, 2009, through May 31, 2010)

Giving Opportunities

The physics department has several award and scholarship funds to support our vision of excellence in science education at both the undergraduate and graduate levels:

Undergraduate Scholarships

- The William Bugg General Scholarship Fund
- The G. Samuel and Betty P. Hurst Scholarship Fund
- The Dorothy and Rufus Ritchie Scholarship Fund
- The Robert and Sue Talley Scholarship Fund

Undergraduate Awards

- The Douglas V. Roseberry Memorial Fund
- The Robert Talley Undergraduate Awards

Graduate Awards & Fellowships

- Paul Stelson Fellowship Fund
- Fowler-Marion Physics Fund

Other Departmental Funds

- Physics General Scholarship Fund
- Physics Equipment Fund
- Physics Enrichment Fund
- Robert W. Lide Citations
- Wayne Kincaid Award

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Department Head: Dr. Soren Sorensen

Associate Department Heads: Dr. Marianne Breinig and Dr. James E. Parks

Publications Coordinator: Catherine Longmire

(865) 974-3342 phone (865) 974-7843 fax

physics@utk.edu

www.phys.utk.edu



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DEPARTMENT OF PHYSICS AND ASTRONOMY

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401 Nielsen Physics Building
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