Cross Sections

The Newsletter of the University of Tennessee Department of Physics & Astronomy

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Have Theory, Will Travel

Elbio Dagotto and Adriana Moreo Bring a Top-Flight Program to UT

Should the department ever need to build a condensed matter theory group on, say, Jupiter, Elbio Dagotto and Adriana Moreo would be ideal candidates to spearhead the project. Not only are they accomplished scientists (Dr. Dagotto is listed among the 250 Most Cited Physicists and both are fellows of the American Physical Society), but recently they've proven their talent at everything from planning and building work space to securing supplies, choosing furniture, and building computer networks.

Drs. Dagotto and Moreo came to UT this summer from Florida State University. Dr. Dagotto joined the faculty as a Distinguished Professor at UT and is also a Distinguished Scientist at Oak Ridge National Laboratory. Dr. Moreo is a Professor of Physics and a UT/ORNL Joint Faculty member in the Condensed Matter Sciences Division.

"The UT-ORNL search committee came up with a very good offer,"

Dr. Moreo said of the hiring process. "We also saw the potential that both UT and Oak Ridge have at this point. Particularly, they are building the SNS (Spallation Neutron Source) and we are planning to develop there a condensed matter theory group."

"And also they are building the nanocenter," Dr. Dagotto continued, referring to the ORNL Center for Nanophase Materials Sciences (CNMS). "The two buildings will be one next to the other. We will have our work group very close to the intersection of the two buildings. That will be a very nice location for interaction with everyone. So it was the SNS, the nanocenter and also the developments in the area of computation that were very attractive."

Material Witnesses

Computer power is particularly important for Dr. Dagotto's and Dr. Moreo's research. They use numerical techniques to develop condensed matter theory, in particular for strongly-correlated systems.

"The electrons see a lot of each other and so it's not very easy to study their properties using the traditional methods of perturbation theory and analytical techniques," Dr. Moreo explained. "So the approach that we use is to put the model for whatever material we want to understand and crunch numbers in the computer and basically calculate physical quantities that can be compared with experiments." Then they try to make predictions on what experimentalists should be seeing.

"Some of these materials are the manganites," she said, the steel-gray or black minerals found as crystals of manganese ore. One of their charming attributes is the ability to change from insulators to conductors.

"Another set of materials are the high-Tc superconductors," Dr. Moreo continued, "which are superconductors that have the property of superconducting at much higher temperatures than traditional ones . . . halfway between zero and room temperature. But their properties seem to be very different from the traditional materials."

Adriana Moreo

Elbio Dagotto

As they are working with ceramics that contain copper-oxide planes (cuprates), one puzzle these materials present is the behavior of the Cooper

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pairs—the "coupled" electrons in a superconductor—a phenomenon named for the American physicist Leon Cooper who first noticed it.

"Although we know that the electrons are in pairs, the mechanism for which pairing occurs may be different," Dr. Moreo explained.

She and Dr. Dagotto have also noticed that the cuprates seem to have inhomogeneous states and the same seems to be true of the manganites.

"Now that experiments are showing this inhomogeneity in the cuprates, we are trying to study that as well and see what the consequences of those inhomogeneities may be in the superconductors," Dr. Moreo said. "Before, experimentalists tended to assume a homogeneous state and tried to interpret their data based on that. Now that they are aware of the inhomogeneities, they are finding them, not only in the cuprates and the manganites, but also in the ruthenates, such as those (UT-ORNL Distinguished Scientist) Ward Plummer and collaborators are studying."

"In the manganites we have made big contributions to pointing out the existence of the inhomogeneities," she continued. "We actually believe, and have very good simulations showing, that those inhomogeneities seem to be a very important part of why the phenomenon of colossal magnetoresistance occurs."

While its predecessor, gigantic magnetoresistance, has been harnessed to make magnetic read heads for computer disk drives, the potential of colossal magentoresistance is still largely untapped. Work like that of Drs. Moreo and Dagotto could help shed light on the possibilities it may offer for future technologies.

Navigating the Technology Corridor

The university has long enjoyed a thriving relationship with Oak Ridge National Laboratory, a partnership made stronger in 2000 when UT joined with Battelle to manage the laboratory. The Distinguished Scientist and Joint Faculty programs give the physics department the added advantage of attracting top-caliber scientists who are charged with building strong research areas in Oak Ridge and on campus.

"One of the tasks we were given when we were hired was to establish bridges between the two," Dr. Dagotto said. "Many of our duties will be related to recruiting professors at all levels—from distinguished to assistant. We are always in the process of recruiting post-docs and candidates for Wigner Fellowships at Oak Ridge. We send e-mails to hundreds of colleagues every year asking for candidates for everything—graduate students, post-docs, faculty. We are in a constant hunting mode."

Along that line, Dr. Moreo is starting a seminar series in January with the two-pronged goal of bringing UT and ORNL people together and also inviting speakers to the area to see scientific opportunities. The talks will be scheduled on Fridays and held at Oak Ridge as sort of a bookend to the Monday afternoon colloquia sponsored by the physics department.

"Ideally, Monday is the day when everybody comes to UT . . . and Friday is the day when everyone comes to Oak Ridge," she said.

The pair interacts with several UT-ORNL colleagues, including Dr. Ted Barnes, Dr. Pengcheng Dai, Dr. David Mandrus, Dr. Herman Mook, Dr. Ward Plummer, Dr. John Quinn, Dr. David Singh, and Dr. Hanno Weithering, to name a few.

"We are also in the process of hiring other people," Dr. Dagotto said.

A key component of their current work is to build a dynamic community at Oak Ridge that will move in tandem with their UT counterparts and also present an exciting picture to the wider scientific community.

"The key is to get fluid communication between the SNS and UT and the SNS and the rest of the world," Dr. Moreo said. "We feel that the SNS doesn't have to be seen by the external world as just a user facility. They have to see it's a place where things happen. The principal investigators have to feel the need of coming in person and spending some time. And so it's very important that the physicists, both theoreticians and experimentalists, are around."

"We are very much involved in the movement of the entire condensed matter division to the SNS hill," Dr. Dagotto said, to the point of advising architects on where the CNMS offices should line up with the SNS facilities to create a more inclusive and cooperative environment.

The work is important because, as Dr. Moreo said, "the SNS has the potential of transforming the Knoxville-Oak Ridge area into a world-class center."

Campus Life

While the research and collaborative elements of their appointments are forefront, both Dr. Dagotto and Dr. Moreo are also members of the department's teaching faculty.

"We both were professors at FSU," Dr. Moreo said. "We are used to combining teaching with research responsibilities."

"If you do it right, it's pretty time-consuming," Dr. Dagotto added. "There are many people who very casually say, 'Oh, I don't have any problems. I love teaching,' but they are not necessarily the best teachers. If you want to do a very good job, it's very time consuming."

Both will be teaching graduate students.

"In my case, I'll be teaching Electrodynamics, which is one of the most dreaded courses for graduate students," Dr. Moreo said good-naturedly. "And in my case," Dr. Dagotto continued, "it's Condensed Matter II. It's superconductivity, magnetics—topics more or less related to what I work on. I will also add a lot of nanophysics in the class."

Dr. Moreo is also working on the graduate affairs committee, a task she grew accustomed to at FSU.

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A Letter from Soren Sorensen, Department Head

What Makes a Great Physics Department?

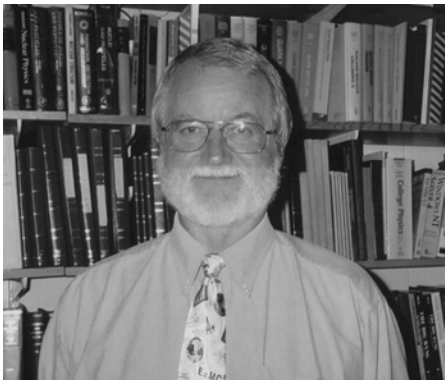
People! It is that simple! Attracting the right people and helping them develop is the only way to build a great physics program. And I am not just talking about the professors. Sure, they are important and attracting the best and brightest junior and senior faculty continues to be an issue we devote a lot of attention to. It is also mandatory that the department runs as a well-lubricated machine by having professional and competent staff members. However, a physics department is a complicated machine (even if it is well lubricated!) and at the center of it are the students. Getting bright, motivated, curious, and dedicated physics students to attend the University of Tennessee and giving them an exciting and well-balanced education is just as important. It is also one of the greatest satisfactions of our professional life; to feel you have made a positive impact in a student's life.

Unfortunately the picture gets murkier when we start to discuss how to get all these great people to our department and how we help them succeed. When it comes to students, we are doing a lot to reach out to Tennessee high schools to make them aware of what great opportunities their students have here at UT instead of attending an over-priced out-of-state school. We are constantly working on updating our curriculum and improving the skills of our teachers. But in the end, there is no way around it—in order to keep and improve a great program the department needs funds. "Money makes the world go around," as they say. It might sound cynical, but it is unfortunately true. We have over the years been very successful in implementing cost neutral improvements and we will continue to look for them, but in the end we need money to pay for improved facilities, better salaries and fellowships, better equipment, etc.

As a state university, UT still gets a large part of its funding from the state of Tennessee. But the total share provided by the state has been steadily declining for a couple of decades and is now around 43 percent according to the latest numbers from the university. For other state universities the situation is even more extreme. I have been told that at the University of Washington in Seattle the state funding is now down to nine percent, so instead of talking about a state university they are talking about a state-located university! This trend in decreasing state funding has caused tuitions and fees at state universities to increase dramatically over the last decade. That is of course a very unfortunate development, since state universities ought to be financially available for all students in the state, not just the financially fortunate.

Within our own department we also rely more on outside resources than internal state funds. Last year our total revenues were a little more than $10 million, with $6.6 million coming from external research grants and $3.5 million from state appropriations. Of the $6.6 million in research funds, our principal investigators actually paid more than $0.7 million back to the university in the form of overhead. So the taxpayers of Tennessee are actually getting a $10 million physics department for only $2.8 million annually in net expense.

The area where we really need to continue the positive trend is in donations (or "development," as most universities prefer to call it). In 2004 we have been blessed with an unprecedented level of help from our alumni by having received 60 individual donations for a total close to $275,000. We are very, very grateful for this level of interest and support from so many of our alumni. This brings our total endowment up to nearly $400,000. The annual revenue of this endowment is $20,000 and all of it goes to scholarships and awards for our students. This is making a tremendous difference in our recruiting efforts, especially at the undergraduate level, where we now have a record-setting 72 undergraduate majors and 30 more students who have declared a physics interest and therefore might become physics majors once they have accumulated more credit hours.



Soren Sorensen

Setting Priorities

It is our sincere hope that we will be able to continue enjoying this great support from our devoted alumni. Recently the new Interim Dean of the College of Arts and Sciences, Hap McSween, asked us to outline our priorities for potential gifts to the department in preparation for a major development campaign the university is organizing. The overriding criteria for including the four potential gifts on the list below has been that they represent financial needs where we are unlikely to receive any help from either state or research funds, but instead have to rely on donations in order to make them happen.

Our highest priority, and unfortunately also the most expensive, is an ***endowed professorship in Cosmology and Astrophysics***. This field is one of the most exciting areas of contemporary science, and a very large proportion of students want to study in this field. However, it is a field where we have

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Alumnus Profile: Dr. Rufus Ritchie

Had Rufus Ritchie let criticism get to him, surface physics would have suffered mightily. Fortunately, he shrugged off the nay Sayers and wrote a paper introducing the world to the surface plasmon, a phenomenon that as recently as this past September has been referenced in articles proposing such advanced technologies as optical computers. In November he visited the Knoxville campus and recounted his work and where it has taken him.

"I was working with Bob Birkhoff, who was a great guy and a tremendous experimenter," Dr. Ritchie said. "I was helping him analyze some of the experimental data and looking at the energy losses—plasmon losses—and developing that sort of thing about surfaces."

He was interested in the way energy losses were distributed when a swift electron passes through a thin metal foil and worked out the theoretical spectrum to describe how the metal responded.

He and Dr. Birkhoff had submitted separate abstracts to a conference at the University of Maryland, but Dr. Ritchie could not attend because of a conflicting trip. Dr. Birkhoff offered to present his paper, which met with some fierce criticism from Dr. Dennis Gabor (later a Nobel laureate), who said he had studied the problem and concluded that there was no such animal as the surface plasmon. Upon learning of this response, Dr. Ritchie questioned what he should do. Colleague David Pines (now professor emeritus at the University of Illinois) encouraged him to submit the paper anyway.

In 1957, *Physical Review* published "Plasma Losses by Fast Electrons in Thin Films" by R. H. Ritchie. Three years later, Cedric Powell at the National Bureau of Standards (now NIST), ran a series of experiments confirming surface plasmon losses by electrons in reflection geometry

"The experiments showed that surface plasmons existed," Dr. Ritchie said.

In a surface plasmon, electrons move collectively in response to the electric field of a penetrating charged particle. The potential applications of this knowledge are still being realized in computing, communications, laser technology, environmental monitoring, and medical diagnosis and treatment.

Light on a Chip

The September 7 issue of *Innovations Report Online* reported that using this natural phenomenon could lead to "light on a chip" technology and make optical computers and sub-wavelength-sized optical components real possibilities. Researchers from the UK and Spain have found that by drilling tiny holes or grooves into perfectly conducting surfaces, light can be channeled through holes smaller than the wavelength of light. The holes focus a beam of light, creating a tiny lens just a few microns wide. Designers could harness the effect to channel light at the sub-wavelength scale, overcoming one of the major constraints faced in designing optical computers.

"It's nice to see all those applications," Dr. Ritchie said. "The industrial physicists have been talking about surface plasmonics and things that they're doing in that field."

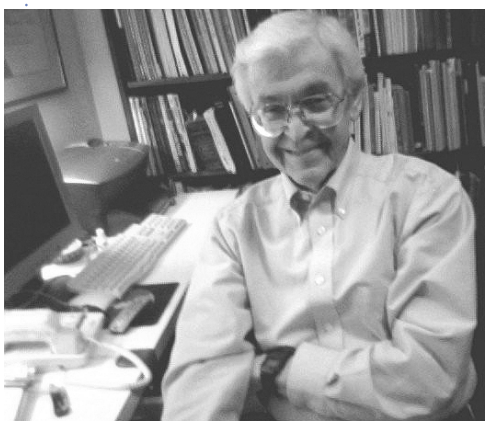
Dr. Ritchie was born in Blue Diamond, Kentucky, in 1924 and grew up in a coal mining camp.

"I went to UK for undergraduate and master's degrees and then I came here for a Ph.D," he said. His bachelor's degree is in electrical engineering, and his master's and doctoral degrees are in physics. He finished his Ph.D., working with Dr. Dick Present, in 1959.

"I took classes with Bill Bugg, Sheldon Datz, Sam Hurst—a lot of good guys," he said.

He was also working full-time in the ORNL Health Sciences Division, which would be his career home.

"I stayed my whole working life there, except for a few nice sabbaticals," Dr. Ritchie said. "I came in the fall of '49 and retired in '94. A nice advantage of the lab was that I was able to spend a year in Denmark when my kids were small and then a year at the Cavendish Laboratory in Cambridge. It was great to have the privilege of working with outstanding people internationally."



Rufus Ritchie

Dr. Ritchie was also a Ford Foundation Professor in the physics department, teaching graduate students on a part-time basis from 1965 until he retired from ORNL.

But retirement can't keep this ORNL Senior Corporate Fellow away from the national lab for too long.

"I still go out once a week and work with Tom Ferrell and Thomas Thundat and their students," he said. "It's still an interesting place."

He has other pursuits as well, including a couple with his long-time friend and colleague Dr. Sam Hurst.

"I'm working a little bit with a small group that does advanced touch sensor design. I spend some time doing mathematical analysis for the group, and it's a lot of fun," he said. Dr. Hurst, an adjunct professor of physics at UT, first developed the "touch sensor" In 1971 and started the group. He and Dr. Ritchie have also started a forum on religion and science.

Dr. Ritchie also spends time with his family; which has grown to include his son and daughter, seven grandchildren, and three great grandchildren with another one scheduled to appear soon. He and his wife Dorothy celebrated their 60th wedding anniversary December 2.

He has garnered his share of commendations during his distinguished career, including the Jesse W. Beams Award for Excellence in Research, an honorary doctoral degree from the Universidad del Pais Vasco in Spain, and a senior fellowship from the Japanese Society for the Promotion of Science, among others. But he said the highlight for him was the camaraderie and sense of purpose he enjoyed at the national laboratory and the university.

"For me it was a real privilege to work at ORNL, and the UT connection was very important too. I have a lot of good feelings about UT and the people here."

In Memoriam

Physics Loses an Educational Innovator

The department is saddened to announce the death of **Dr. Wayne Kincaid**, 51, a post-doctoral research associate.

Dr. Kincaid earned his Ph.D. in theoretical nuclear physics at UT in 1992. He specialized in the development of Web-based educational material for all levels of education and worked with Physics Professor Mike Guidry and his wife, Jo Ann, to build webTeacher, an Internet training tool designed specifically for teachers. He was also the Webmaster for Tech Corps, which recruits volunteers from the technology community to aid schools with the introduction of new technologies.

Dr. Kincaid was also a developer for a broad range of advanced educational technologies for major college textbook publishers in physics, astronomy, biology, microbiology, and genetics.

Everything Old is New Again

Rooms 304 and 306 of the Nielsen Physics Building got a facelift this summer, as their time for renewal came up on UT's calendar for building renovation. Gone are the old desks and ancient carpet. The rooms are now equipped with faster and more efficient computing power for lectures and a much more modern and inclusive seating plan. The department was proud to show off the newly spruced-up digs while hosting the Society of Physics Students Zone 8 Meeting on November 12.

UT physics major Gail Zasowski uses the new equipment in Room 304

The new presentation system uses an integrated control unit with a touch panel connected to a switcher. This allows a user to switch the projectors and audio system between the internal computer, DVD/VCR, and laptop. Speakers can select all projectors from the main screen and also lower the screens with a touch. The SmartBoard Sympodium interactive display lets lecturers draw or write on top of virtually anything the computer displays. A wireless microphone system will also be installed soon, and each student workstation will have AC power outlets as well as a network port.

Professor and head Soren Sorensen talks with students at the SPS Zone meeting in the newly-renovated classroom

The lecture room prior to this summer's renovation

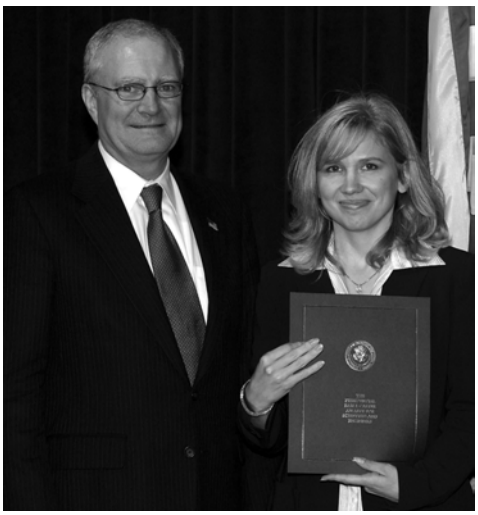
Presidential Awards for Two Tennessee Physicists

Two outstanding young scientists with ties to UT physics have won the prestigious Presidential Early Career Award for Scientists and Engineers.

Saskia Mioduszewski and Jian Shen were among 57 researchers receiving the highest honor the U.S. government bestows on scientists and engineers at the outset of their careers. Dr. John Marburger, Director of the Office of Science and Technology Policy, presented the awards in a ceremony at the White House on September 9.

Dr. Mioduszewski and Dr. Shen were also honored with two of the four Department of Energy Office of Science Early Career Scientist and Engineer Awards presented at DOE Headquarters earlier in the day.

Dr. Mioduszewski earned her Ph.D. in physics at UT in 1999. As a graduate student working with Dr. Kenneth Read and Dr. Soren Sorensen, she joined the PHENIX (Pioneering High Energy Nuclear Interaction eXperiment) research team at Brookhaven National Lab's Relativistic Heavy Ion Collider. PHENIX investigates high-energy collisions of heavy ions and protons. She did her thesis work on the Alternating Gradient Synchrotron.



Saskia Mioduszewski with John H. Marburger, III, Director of the Office of Science and Technology Policy

Jian Shen with Dr. Marburger

"I don't feel much differently than when I was a graduate student doing research," Dr. Mioduszewski said, adding that she would like to stay put for awhile.

honors and accolades

"In the immediate future, I'd like to stay with RHIC," she said. "There's a lot of data, and we have a lot of work to do."

Dr. Mioduszewski was honored for her study of the properties of the unusual matter formed in extremely high-energy nuclear collisions produced at RHIC.

"It's a nice honor," she said of the PECASE award. "A lot of it is luck—working at the right place at the right time. I've very fortunate to be working at RHIC at this time."

Dr. Shen is a member of Oak Ridge National Laboratory's Condensed Matter Sciences Division. He is a close collaborator of Dr. Ward Plummer, a UT-ORNL Distinguished Scientist in physics. Dr. Shen is an adjunct professor of physics at the university and includes UT physics graduate students in his research program.

"John Pierce was my first student," he said. "I have two other students; Maria Torija-Juana and Dane Gillaspie, and I'm actually looking for new students." (An interesting note on the power of mentoring: John Pierce won the prestigious Nottingham Prize in 2003, and Maria Torija won the AVS Falicov Award in 2004).

In fact, Dr. Shen gave most of the credit for the honor to his hired help.

"The major contributions were from the students and postdocs," he said laughing. "I was just a guy sitting in the office."

That's rather unlikely, considering Dr. Shen was honored for his pioneering approach to the study of magnetism in nanostructured materials synthesis.

"My current research is on the so-called magnetic and transport properties of nanostructures," he explained. He added that he hopes the PECASE award might help him secure additional funding from the Department of Energy.

The Presidential Early Career Award for Scientists and Engineers was established in 1996 to honor the most promising beginning researchers in the nation within their fields. Each honoree receives a citation, a plaque, and a commitment for continued funding of their work from their agency for five years.

Be on the lookout for the spring issue of *Cross Sections* for the low-down on the famous physics spring picnic, honors day awards, alumni news and more. Visit the physics Web site at http://www.phys.utk.edu to keep up with what's going on in the department.

Dagotto and Moreo
Continued from Page 2

"Recruitment is a problem all across the country," she said, "so we'll have to be aggressive to get good students."

Not that their educational duties stop there. Dr. Moreo has already visited Webb School to teach her son's class about geometry. In the past she has judged elementary school science fairs and given first graders an introduction to gravity and magnetism.

"I think that's a good thing, so that kids get the impression that science is fun as opposed to something difficult or maybe boring," she said. "I think it's important to maintain contact with young children."

From Tallahassee to Knoxville

It's never easy to pick up and move to a new job in a new city. But if you really want to complicate things, add to the list of transfer items three National Science Foundation grants, an entire research program, and a gaggle of graduate students and post-docs.

"Senior professors are very difficult to move," Dr. Dagotto said, because they are usually established not only at an institution, but also within their respective communities and neighborhoods.

He and Dr. Moreo, who are married, moved at the beginning of the summer while their students were still at FSU. They took a space on the third floor of South College and spent weeks finding furniture, buying computers, and trying to pin down where walls and doors and lights should go. Dr. Dagotto's office, in fact, did not even exist. Now there are desks and PCs and bookcases, but it took some doing.

"Everything you see," Dr. Dagotto said, sweeping his arm out across the space, "we had to order."

"The students were able to continue working during the summer at FSU while we were trying to put all the stuff together here. They came at the beginning of the fall semester," said Dr. Moreo. "And then," she said, "came all the grant transfers."

"We have three NSF grants," Dr. Dagotto explained. "They had to be moved from FSU back to NSF," before being transferred to UT. "One of the grants came untouched," he said. "And the other two—we are still waiting."

Collectively, the pair brings close to $1 million in NSF money with them.

They also had the usual hassles of moving: selling their house in Florida, buying a new one in Knoxville, and finding schools and childcare for their two children, Gabriel and Carina, ages eight and three.

"We were lucky that we already knew a lot of people here," Dr. Moreo said. "It's not as if we came to a place where we didn't know anybody. In fact, we had many friends already."

Dr. Dagotto agreed. "One of the reasons we came here is that we had a tremendous amount of collaborators and friends," he said.

Given that they work together, live together, and have a family together, one wonders if they ever tire of one another's company.

"We met each other back when we were undergraduates in Argentina," Dr. Moreo said, smiling (both earned their undergraduate and doctoral degrees at the Instituto Balseiro in Bariloche, which is the leading institution for physics in all of South America). "But we do things separately as well, although we work in the same general area."

News from the Society of Physics Students

The department's ever-industrious Society of Physics Students caught entrepreneurial fever Labor Day weekend, selling liquid nitrogen ice cream to raise money for their chapter. They made $160, clearing about $60 after expenses (SPS students use only the finest ingredients available).

In other news, the UT chapter was named the national "Chapter of the Month" for October 2004. They have also revamped thier Web site, so pay them a visit at http://www.phys.utk.edu/sps/.

SPS members exhibit their considerable skill at making frozen treats from liquid nitrogen

UT Physics Meets the Great Wall of China

If James Wicker didn't carefully scan his incoming e-mail, he might have unknowingly deleted a big part of his future.

Fortunately, this doctoral candidate in physics took notice when he saw a message from the National Science Foundation advertising the East Asia and Pacific Summer Institutes (EAPSI). The program sends American graduate students in science and engineering to Australia, China, Japan, Korea and Taiwan for an eight-week stint. The exchange builds international technical collaborations and gives students a personal introduction not only to the scientific infrastructure of another country, but also to its culture and language.

James applied for the 2003 program and was accepted to visit Mainland China; unfortunately, unforeseen circumstances prevented his trip.

"I couldn't go last summer because of SARS," he said.

Waiting a year actually turned out to be a blessing. The 2004 venture ushered in the inaugural EAPSI exchange with China, and he was among the 25 students chosen for the trip.

"This was one of the most interesting groups of people I've ever met," James said. "They were just amazing."

At the age of 28 he said he thought he "might be the oldest person there." He was mistaken. One fellow student was a doctor who had spent 20 years in the Navy. Most were in their 30s or older. Many students had multiple degrees and all were broadly educated. The program attracted applicants from physics, chemistry, statistics, engineering and medicine. They arrived on June 20 and spent their first week in Beijing for orientation sessions, learning about Chinese culture and history. They also hit some high spots no visitor should miss in China, including the Great Wall. (A tip from James: "It's a workout to climb the Great Wall.") He visited 13 Ming tombs, Tiananmen Square, the Museum of Chinese History and the Forbidden City. Then it was time to get down to business.

Because host countries in the NSF program are not paid for taking on American students, the students make the exchange worthwhile for them by offering their professional expertise. James worked at the Beijing Astronomical Observatory, where he applied data mining algorithms to astronomy data from the star and stellar evolution group. He more than earned his keep; the observatory offered him a job when the eight weeks were over.

NSF furnished each student a $3,000 stipend plus airfare. "The Chinese government also supported us," James explained, by picking up hotel and living expenses. "Actually, we lived really well."

The program also encourages EAPSI students to visit research labs other than the ones to which they're assigned. James visited Xinglong Observatory, the largest of China's five observatories. Xinglong's newest telescope (the LAMOST, ready to go in 2007) will generate lots of new astronomical data. Using algorithms, "I could separate their data to within 95 percent accuracy," he said.

Although devoted to the research aspect of the program, he did manage to squeeze in some sightseeing, finding time to visit the Summer Palace in Beijing, for example.

"I really worked pretty hard," he said. "I wish I'd had more time for exploring."

But even everyday life in China can be an adventure for an American. James lived in the university district, which is called the "silicon valley of China," a bustling part of town encompassing universities, a science park, and various technological enterprises. He quickly found favorite restaurants and shops. One of his common haunts was a five-story bookstore.

"Everything in China is on a bigger scale than we're used to thinking of in the U.S.," he said. Even so, blending in could present a challenge.

James Wicker poses on the Great Wall of China sporting a Tennessee Science Olympiad T-shirt

"I was usually the only non-Chinese on the bus," he said.

James, however, was not entirely out of his element. He had visited Taiwan in 2001 under an earlier NSF program. He had also studied the Mandarin language for three years. In June, before going to Beijing, he spent a week in the port city of Dalian in northeast China. He was a guest of Dr. Li Rong, whom he met in Knoxville when she was a visiting professor at UT during the 2002-2003 academic year. He interviewed at the Dalian University of Technology and was offered a postdoctoral position with the Neuroinformatics Institute there.

"They employ people from a wide variety of backgrounds," he said. "They do cross disciplinary work."

Computer scientists, psychologists, and physicians are among some of the professionals on staff. James accepted the postdoc offer and will work on complex systems modeling. He heads back to China next summer, after finishing his Ph.D. at UT in the spring. Since the observatory in Beijing offered him a job as well, he has been examining the possibility of juggling both positions. In mid-October he submitted an application to NSF for postdoctoral support under a program that would allow him to work for two years with multiple institutions. Although securing funding is tough, he is optimistic that he might be able to work in both Dalian and Beijing.

"That," he said, "would be like winning the lottery."

Other potential employment might be available in a less-obvious area. As Beijing prepares to host the 2008 Olympic Games, James noticed squads of "English Police" patrolling the city, checking written signs for accuracy.

"Maybe I can get a part-time job," he mused.

And while the country may have a reputation for being closed and secretive, he noticed energy and enthusiasm for the future.

"China is trying very hard to become a modern country. There's lots of building and construction going on. The living conditions were vastly improved from even 10 years ago."

His zeal for the program so impressed the NSF organizers that in October they invited him to Washington to share his experience with the US-China Joint Commission on Scientific and Technological Cooperation. Dr. John Marburger, Director of the White House Office of Science and Technology Policy, and His Excellency Mr. Xu Guanhua, Minister of the Chinese Ministry of Science and Technology, chaired the meeting. James gave a presentation to an audience representing government agencies running the gamut from the State Department to the National Institutes of Health. He was one of only two students asked to give a presentation.

Dr. William Chang issued the invitation. He is currently serving as senior program manager at the NSF Office of International Science and Engineering and was struck by James' conscientiousness.

"He is a person who takes initiative. That impressed me," Dr. Chang said of James. "He is willing to organize, take charge, and get things done."

Dr. Chang explained that many people in China draw their conclusions about American youth based on movies. James and the other students involved in the EAPSI exchange left many authoritative figures in China with an extremely positive and more realistic picture.

"They got an entirely different impression," he said.

"I want to thank (the University of Tennessee) for sending such a nice individual to our program," he added.

Since his return in August, James has been a cheerleader for the EAPSI program, giving presentations all over the UT campus to encourage more students to apply.

"I had an amazing time in China," he said. "It was a really fascinating experience."

For more information on National Science Foundation programs for graduate students and postdocs (including the EAPSI program), hop on the Web at http://www.nsf.gov/home/menus/grads.htm.

Sorensen's Letter
Continued from Page 3

little chance of receiving a Distinguished Scientist position in contrast to, for example, condensed matter physics, where ORNL is a great partner for developing distinguished professorships.

Our second priority is ***junior level endowed chairs***, which is a "cost-effective" way of creating attractive positions for new junior faculty members or as a reward for exceptionally high performing junior professors in our faculty. We envision positions at the associate professor level that are augmented by endowments (~$100k-300k) to provide salary enhancements and discretionary research funding for a time-limited period of five years.

The third priority is a ***Planetarium and Astronomy Outreach Center***. The UT Department of Physics and Astronomy has a long and distinguished record of astronomy outreach, where we use the telescopes on the roof of the Nielsen building. For ~$500k we can convert the high bay room on the first floor of Nielsen into a combined astronomy laboratory and planetarium, which would allow us to substantially extend our outreach efforts to the public in general and, in particular, to K-12 schools.

And finally, we continue to need substantial ***scholarship funds*** in order to attract the best and brightest students to UT, or, in many cases, to convince minority or first generation students to study physics. The HOPE Lottery scholarships have made UT much more attractive to many students, but for the competitive and savvy students we most often have in our department we need to be offer more than the $3000 annually in HOPE scholarships. As I stated above, we feel that the increased endowment we have for student scholarships has contributed significantly to the increased enrollment in physics and we hope to continue that trend.

Physics Family News

students

Congratulations to Ph.D. candidate **Chad Middleton and his wife Serpil** on the October 30 arrival of Apollonia Pelin Middleton.

faculty

ORNL-UT Physicists were honored this summer for their work on SniffEx, a compact, low-cost vapor sensor designed to detect and locate a variety of explosives. The sensor was developed by **Thomas Thundat, Lal Pinnaduwage, Tony Gehl, Vassil Boiadjiev and Eric Hawk and David Hedden**, all of whom work at Oak Ridge National Laboratory but have ties to the UT Physics Department as well. In late June they learned SniffEx had won an R&D 100 Award, an honor presented each year by R&D Magazine in recognition of the year's most significant technological innovations.

The November 16 issue of *The New York Times* gave a nod to **Dr. Marianne Breinig's** work on football physics. While the article featured Dr. Tim Gay from the University of Nebraska, he mentioned that he had drawn on Dr. Breinig's work at UT.

The Fourth International Conference on Exotic Nuclei and Atomic Masses was held at Callaway Gardens in Pine Mountain, Georgia, in September. **Dr. Witek Nazarewicz** served as chair of the International Advisory Committee for the conference. The UT Physics Department, the UT Office of Research, and ORNL's Physics Division were among the meeting's sponsors.

The Council of the Institute of Physics has elected **Dr. Nazarewicz** a fellow of the IOP. Membership as a fellow is reserved for elite scientists with notable achievements who have made outstanding contributions to the field of physics. In early December he was selected as chair of the Rare Isotope Accelerator Users Organization, which has more than 730 members from 35 countries.

Research Professor **Serguei Ovichinnikov** and two of his colleagues have won the Konstantinov Prize from the Russian Academy of Sciences. Nobel Prize Winner Zhores Alferov presented the award to G.N. Ogurtsov, Yury Gordeev and Dr. Ovichinnkov for "Dynamical Processes in Atomic and Molecular Physics" on October 29. The prize was awarded for work done in Distinguished Scientist Joseph Macek's theoretical physics group at UT and in Dr. Gordeev's experimental group at the Ioffe Institute in Russia.

Research Professors **Lal Pinnaduwage** and **Serguei Ovichinnikov** have been elected fellows of the American Physical Society. Fellows are elected based on their reputation for making advances in knowledge through original research and publication or significant and innovative contributions in the application of physics to science and technology. Dr. Pinnaduwage's research focuses on novel physical, chemical, and biological detection using micromechanical sensors. He is a senior scientist at ORNL. Dr. Ovichinnikov works with Dr. Macek's theoretical physics group and was selected for his work on the development of the hidden crossing and two-center Sturmian theory of ion-atom collisions, and the hyperspherical hidden crossing theory of electron and positron interactions with atoms.

alumni

Adam Berryhill (B.S., 1997) is a senior engineer with Cryomagnetics, Inc., in Oak Ridge.

Todd Downey (M.S., 1998) is a senior optical engineer with ASML Lithography in Wilton, Connecticut.

Sam Held (M.S., 1999) was featured on the University of Rochester Physics Department Web site (http://www.pas.rochester.edu/) for his help in organizing the U.S. delegation's trip to the 54th Lindau Meeting of Nobel Laureates and Students, held in Lindau, Germany, June 17-July 2, 2004.

Edwin C. Jones (Ph.D., 1992) is a physician and physicist for the State of California's Mono County Healthcare District.

Dr. Joseph Thomas (Tom) Lewis (Ph.D., 1971) is retired from the Boeing Company, where he was a Division Director in Laser and Electro-Optics Systems. Dr. Lewis worked for ~30 years in the development of High Energy Laser Systems and is now living in Sammamish, Washington.

Eric Lingerfelt (M.S., 2002) is an IT Specialist in the UT Department of Physics and Astronomy.

Richard Tran Mills (B.S, 1999) is a research computer scientist with the Center for Computational Sciences at Oak Ridge National Laboratory.

Samuel J. Nalley (M.S, 1967; Ph.D., 1971) is a professor at Chattanooga State Technical Community College.

Izabela Szlufarska (Ph.D., 2002) is an assistant professor in the Department of Materials Science and Engineering at the University of Wisconsin, Madison.

Have news to share? Visit the alumni section of the physics department Web site at http://www.phys.utk.edu/alumni.html.

Thanks to our Donors!

The University of Tennessee Department of Physics and Astronomy would like to thank the generous alumni and friends who have offered financial support to our programs.

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The artwork above is a drawing of the "Untitled" sculpture over the entrance of the Nielsen Physics Building. The sculpture was designed by Professor Philip Nichols of the Department of Art and is intended to convey the feeling of large and small masses, atoms, molecules, motions of charged particles in magnetic fields, and radiation emanating from nuclear disintegrations.

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