

Summer 2010  
<http://www.phys.lsu.edu>

**CHAIR'S WELCOME . . . *Michael Cherry***

Again, despite Louisiana's and the University's budget concerns, Physics & Astronomy continues to move forward. External research funding has grown to \$13M per year, 15 new postdocs and Research Associates have been hired since September last year, 26 new graduate students entered in summer and fall 2010, and the number of undergraduate majors has risen to 98. We have added four new faculty: Param Singh and Kristina Giesel are joining the theoretical gravity group as Assistant Professors, Martin Tzanov is joining the experimental neutrino program as an Assistant Professor, and Yimin Xiong is taking a position as Research Assistant Professor in the experimental condensed matter - material science group. At the same time, we have searches currently on for new faculty in experimental gravity and medical physics. Bill Metcalf is retiring, Amy Campbell has left for another position in Georgia, Erno Sajo has departed for a position at the University of Massachusetts/Lowell, and Erik Schnetter will be departing for the Perimeter Institute in Canada. We wish them all good luck and will look forward to continuing to interact with them.

Since Fall 2009, 38 students received degrees from the department -- 16 with Bachelor's degrees, 12 with Master's, and 11 PhDs. Their names are listed elsewhere in this Newsletter. Congratulations and good luck to all the graduates!

The Physics Intensive Orientation for Students (PhIOS), a one-week "Boot Camp" for incoming Physics, Astronomy, and Medical Physics majors designed to prepare students for their college coursework and

enhance their study skills, operated for a second year in August 2009, with 14 new students participating.

The Masters in Natural Science summer program for local science teachers experimented with hands-on inquiry-based teaching methods with some interesting success. The faculty will be discussing applying some of the lessons learned this summer to our introductory courses. The first six physical science teachers graduated from the program this year with MNS degrees.

For the first year, we operated a formal Research Experiences for Undergraduates program during the summer, supervised by Kip Matthews with nine visiting students. A second program operated by Juana Moreno under the auspices of CCT hosted an additional 16 students.

Students and faculty have received a number of awards and recognition. A brief list since the last newsletter includes:

- Graduating seniors Jessica Brinson and Arrielle Opatowsky received NSF Graduate Research Fellowships. Jessica will be attending graduate school at the University of Hawaii, and Arielle at Wisconsin.

Additional news can be found on the department's web site. Please take a look:  
<http://www.phys.lsu.edu>

**NEWSLETTER STAFF**

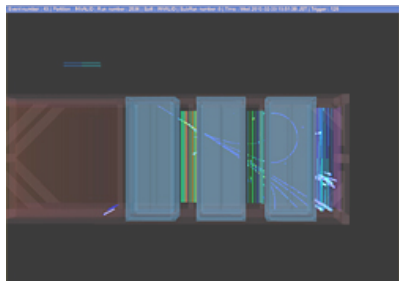
**EDITORS**  
GEOFFREY CLAYTON  
MICHAEL CHERRY, CHAIR

**DESIGNER**  
SHEMEKA EZEFF



## RESEARCH HIGHLIGHTS

A recent article in *Nature Physics* documents the transfer of frequency comb production from the optical region to the vacuum ultraviolet region for the first time. In collaboration with experimental colleagues at JILA in Boulder, the ultrafast AMO theory group at LSU (**Mette Gaarde, James Hostetter, Ken Schafer, and Jennifer Tate**) demonstrates how the technique of high harmonic generation can preserve the temporal coherence necessary to generate a frequency comb structure in the 7th harmonic (153 nm) of an intense infrared laser pulse. This work unites high precision spectroscopy, a specialty of the JILA group, with strong field physics, which has been extensively studied at LSU.



*LSU Researchers Detect First Neutrino Events at Facilities in Japan: T2K experiment off to good start.* - **Thomas Kutter** and his colleagues on the Tokai to Kamioka Long Baseline Neutrino Oscillation Experiment (T2K) have detected the first neutrino events generated by their newly built neutrino beam at the J-PARC accelerator laboratory in Tokai, Japan. The initial neutrino events were detected in a “near” detector (INGRID) whose purpose is to determine the neutrino beam’s direction and profile before it travels to the “far” detector at the Super-Kamiokande neutrino laboratory 183 miles away near Toyama. Super-Kamiokande, a

50,000 ton tank of ultra-pure water located over half a mile underground, will be used together with the near detectors to perform the most sensitive search for oscillations between all three types of neutrinos at the same time. **PHOTO:** The picture shows a cosmic ray event entering from the top left, showering in the tracker with a photon and charged particles depositing energy downstream in the electromagnetic calorimeter.

*Quantum Sensor Developed by LSU Researcher Breaks New Limits.* Researchers at LSU have invented an optical sensor that surpasses a quantum limit to sensitivity previously believed to be unbeatable. The breakthrough has a broad array of applications, from gravity wave observatories seeking to observe distant and bizarre astrophysical phenomena, to optical gyroscopes used in commercial navigation. “We uncovered this ground breaking new sensor concept in an analysis of optical sensors that exploit some of the stranger predictions of quantum mechanics in their workings,” said **Jonathan P. Dowling**, Hearne Research Chair in Theoretical Physics at LSU and lead researcher on the project. The LSU team, led by Dowling, has now demonstrated conclusively that this limit can be broken in a work that appeared recently in *Physical Review Letters*. This work exploits quantum properties of light to design one of the most sensitive optical interferometers ever devised. “This project began as a research project for one of our physics and astronomy undergraduate students, **Gretchen Raterman**,” said Dowling. “The work quickly took on a life of its own with different contributions from Ms. Raterman and other members of our LSU team. The end result – the beating of this thought-to-be-unbeatable limit – came as quite a surprise and it illustrates how basic scientific research at LSU can lead to potentially practical advances in technology in unexpected ways.”

The paper is published in *Physical Review Letters* **104**, 103602 (2010).

## RESEARCH HIGHLIGHTS cont.

On the basis of an extensive study of recurrent novae, **Brad Schaefer** predicted that *U Scorpii*, which last erupted in 1999, would undergo another major outburst at 2009.3 plus or minus one year. On Jan. 28, 2010 the predicted eruption was observed, right on schedule, and a world-wide observing campaign since then has followed the rise and fall of the nova event in detail. The result is the most thoroughly studied nova outburst in history. Schaefer's original prediction paper was published in *Astrophysical Journal Letters* **621**, L53 (2005). Brad's grad student **Ashley Pagnotta** is doing her thesis on the U Sco outburst.

As described in a recent Gemini Observatory newsletter, *luminous infrared galaxies (LIRGs) at high redshift contain great amounts of dust*, but a complete account of the origin of the dust so early in the history of the universe remains lacking. **Jen Andrews, Geoff Clayton, James Clem, Joey Chatelain, Joe Gallagher** et al. have found evidence for early dust formation in supernovae, but the quantity means that supernovae are not likely the primary source of dust in LIRGs, even allowing for dust formation in circumstellar interactions as well as in the ejecta. Their results are published in the *Astrophysical Journal* **715**, 541 (2010).

**William Metcalf** and his collaborators on the MiniBoone neutrino oscillation experiment have previously presented results showing that their neutrino data are inconsistent with a two-neutrino oscillation interpretation of the earlier results from the LSND experiment. At the recent Neutrino 2010 meeting in Greece, they have now reported that their antineutrino data are consistent with an LSND-like excess above 450 MeV.

**Gary Case, Mike Cherry, James Rodi**, and the Gamma ray Burst Monitor collaboration analyzing earth occultation data from the hard x-ray instrument on the Fermi gamma ray telescope mission have reported a *sudden decrease in the hard x-ray (50-300 keV) emission* from the black hole candidate Cygnus X-1 at the same time as an increase in the flux in the 8-25 keV band. The observed behavior appears to be the start of a hard-to-soft-state transition also observed at lower energies by the MAXI and RXTE missions and at higher energies by AGILE.

Information on all of our department's research activities can be found on our web page @

<http://www.phys.lsu.edu>

## OUTREACH AND DIVERSITY PROGRAMS:

*NANODAYS* held at the Highland Road Park Observatory as part of a nationwide program to encourage public interest in science attracted over 100 people to an event highlighting nanotechnology.

*LSU and Mary Bird Perkins Cancer Center jointly hosted the Spring Meeting of the Southwest Chapter of the American Association of Physicists in Medicine, or SWAAPM, at LSU's Lod Cook Conference Center on March 5-6, 2010.*

**Dana Browne, Ray Chastain, Mike Cherry, Juana Moreno,** and Adjunct Assistant Professor Cyrill Slezak have joined with the Math Department, Chemistry, College of Science, and the Gordon A. Cain Center for Scientific, Technological, Engineering and Mathematical Literacy to offer a *Masters in Natural Science program for Louisiana science teachers*. Twenty teachers are currently enrolled in the program to provide advanced content and pedagogy training, enhance the quality of local science education, and provide increased access to advanced high school courses. The program has recently received National Science Foundation funding to continue for another five years.

*Huiheng Medical, Inc., a Chinese company, plans to build a plant in Baton Rouge to manufacture radiation treatment devices.* The company's Whole Body Gamma Knife is already used to treat cancer patients across the world. One of the reasons cited by the company for choosing Baton Rouge was *LSU's Medical Physics program*. The company hopes to capitalize on the LSU medical physics program, which trains students in the use of these types of cancer treatment systems.

*The LSU Board of Supervisors approved a collaborative Ph.D. program in materials science between LSU, UNO and Southern.*

**Thank you to Entergy Corp.** for a \$100,000 gift to the Department to support the new Health Physics and Nuclear Power Industry Workforce Development Initiative being developed jointly by the Departments of Physics and Astronomy, and Mechanical Engineering. With support from Entergy and the Nuclear Regulatory Commission, the program is designed to establish a new curriculum, support new faculty, and train students to fill a growing need for trained scientists and engineers in the nuclear power industry. Erno Sajo was the Principal Investigator of the NRC grants and director of the new program.

*LSU Professor Invited to Attend Science and Technology Meeting* - LSU Professor, Hearne Chair of Theoretical Physics and Interim Co-Director for the Center for Computation and Technology **Jorge Pullin** has been invited to attend a joint commission meeting on science and technology cooperation between the United States and Argentina in Buenos Aires, Argentina, in September. The meeting is organized by the United States Science & Technology Cooperation and the Ministry of Science and Technology in Argentina and will be attended by representatives of many U.S. agencies that fund science and technology projects, as well as their counterparts in Argentina. Pullin was asked to attend the meeting because of his previous experience in cooperation with Argentina and his expertise in the area.

## OUTREACH AND DIVERSITY PROGRAMS cont.:

*REU Program* - Our proposal to NSF (**Kenneth Matthews** PI) to host a Research Experiences for Undergraduates (REU) program was approved. We have funds to host an REU program for three summers starting in 2010. The 9-week program introduces students to the nature of research-oriented careers in physics & astronomy, and fosters development of research-related skills and knowledge. Participants are matched with faculty mentors based on student interests. Weekly seminars, field trips and workshops provide students with additional skills development, professional development topics such as ethics and patents/intellectual property, and an introduction to common research resources. Many events occur in conjunction with concurrent LSU summer undergraduate science programs in space science, computational science, and biomedical sciences. Nine visiting students participated in the inaugural summer 2010 program.

### *Baton Rouge Cancer Facility Gets Major Research Grant*

The U.S. Army Medical has awarded Mary Bird Perkins (MBP) Cancer Center a \$2.2 million contract for groundbreaking new research.

The science will focus on how radiation therapy can better target individual tumor cells. Research will be conducted through the MBP partnership with LSU. Principal investigator, Kenneth Hogstrom, Ph.D., MBP, commented, "We are researching a new paradigm in which cancer will be treated on a cell by cell basis – targeting cancer cells while avoiding normal cells mixed within the target volume." It is hoped that such therapies will allow a greater dose to the cancer with minimal damage to normal tissue, which will increase cures for many cancers.

This study would not be possible without the LSU CAMD (Center for Advanced Microstructures and Devices) synchrotron, which provides the monoenergetic x-ray source used to irradiate cells. Through the award, MBP will collaborate with scientists at the LSU synchrotron and the Department of Physics and Astronomy.

"This collaborative effort, led by Kip Matthews, Ph.D., subcontractor principal investigator at LSU, will allow us to build a new state-of-the-art biomedical beamline at CAMD that facilitates the present research as well as enabling future cancer-targeting research by LSU and other scientists," said interim CAMD Director, Rich Kurtz, Ph.D. If successful, this targeted therapy could be translated into Mary Bird Perkins using future technology called electron-laser accelerators.

"Mary Bird Perkins is very excited about entering and contributing to basic science that will help answer questions that could serve as building blocks for future advances in the radiation treatment of cancer," said Todd Stevens, president and CEO, MBP.

MBP has multiple radiation devices that effectively and efficiently target tumor volumes for each specific patient, and it has multiple applied research programs aimed at improving these therapies. This grant, however, funds MBP's first major effort in basic research by studying a new paradigm for radiation therapy.

## FACULTY RECOGNITION

•**Jeffery Blackmon** has been elected to chair the Users' Executive Committee of the National Superconducting Cyclotron Laboratory and will represent the NSCL on the National User Facility Organization for 2010.



•**Richard Kurtz** has been named a Fellow of the AVS for his "experimental and theoretical work in interpreting intensities in photoelectron angular distributions."

•**Robert Hynes** was awarded a Non-Tenured Faculty Research Award at the College of Science's recent Choppin Honors Convocation.



•**Jonathan Dowling**, Hearne Research Chair in Theoretical Physics, has been elected as a Fellow of the American Association for the Advancement of Science

(AAAS) for his distinguished contributions to the field of quantum optics; particularly the quantum theory of photonic crystals and the development of quantum computing, metrology and imaging.



•**Jorge Pullin** has been nominated as a candidate for President of the International Society on General Relativity and Gravitation. He has been

appointed to the Advisory Panel of the journal Classical and Quantum Gravity of the Institute of Physics (UK).

•**Mette Gaarde** has been appointed to a 3-year term as a member of the Editorial Board for Physical Review A.



•**John Wefel** is a member of the Astronomy and Astrophysics Advisory Committee (AAAC) that advises the NSF, NASA, and DOE on issues involving the three agencies within the fields of astronomy and astrophysics.



•**Joseph Giaime** has been elected a Fellow of the American Physical Society (APS).

•**Gabriela Gonzales** has been named a Fellow of the International Society on General Relativity and Gravitation for "her outstanding contributions to the gravitational wave science and leadership in the LIGO Scientific Collaboration.



•**H. Edward Seidel** has been appointed as Asst. Director of the Mathematics & Physical Sci. (MPS) Directorate at the Natl. Sci. Foundation & has been serving as Acting Asst. Director of MPS since Aug. 2009. He has been Head of the NSF Office of Cyberinfrastructure since Sept. 2008. He serves as Floating Point Systems Professor in the Dept. of Physics and Astronomy & Computer Science; & was previously founding Director of the LSU Center for Computation & Technology.

## FACULTY HONORS & AWARDS

**John Wefel** and **Greg Guzik's** paper describing their measurement of an anomalous flux of high energy electrons was one of the 50 most cited papers of last year on the SPIRES high energy physics web site.

Congratulations! to the following faculty who were honored at the *University Distinguished Faculty Awards Reception*:

- Bradley Schaefer, LSU Distinguished Faculty Award
- Geoffrey Clayton, LSU Alumni Association Faculty Excellence Award
- Phillip Sprunger, Tiger Athletic Foundation Undergraduate Teaching Award

*Nine Physics & Astronomy faculty members have been named to the List of LSU's 2009 Rainmakers*, the 100 most productive researchers and scholars at the University: Michael L. Cherry, Jonathan P. Dowling, Jerry P. Draayer, Gabriela Gonzalez, Mark Jarrell, E. Ward Plummer, Bradley E. Schaefer, Kenneth J. Schafer, and John P. Wefel. These faculty members are among others who are nationally and internationally recognized for innovative research and creative scholarship, compete for external funding at the highest levels and attract and mentor exceptional graduate students.

### Student Honors and Awards

Undergraduate physics majors **Casey Pangan** and **Christopher Dupuis**, working with Jeff Blackmon, received travel awards from the American Physical Society to present posters on their work at the Joint Meeting of the APS Division of Nuclear Physics and the Physical Society of Japan in Hawaii last October. M.M. White, Jeff Blackmon, Laura Lindhardt, Casey Pangan and collaborators presented posters on "Electronics and Data Acquisition for miniLENS" and "Performance of a 2m prototype neutron detector for VANDLE", and Chris Dupuis, Blackmon, Lindhardt, Milan Matos, and collaborators presented a poster on "Development of a large acceptance, tracking gas ionization chamber".

Undergraduate physics major **Daniel Lum** received Honorable Mention in the prestigious Goldwater Scholar competitions.

Undergraduate physics majors **Jessica Brinson** and **Arrielle Opotowsky** have been awarded NSF graduate fellowships.

## Professor Robert O'Connell has taught physics since 1964

### Sarah Eddington, Staff Writer, LSU Reveille

The University has endured many changes during the past 45 years — four tigers have earned the moniker “Mike,” and eight chancellors, including the University’s first, have lead the school. But during this nearly half century, Robert O’Connell has remained a constant fixture. O’Connell, the University’s longest-serving tenured professor, first came to the University in January 1964 and has been teaching theoretical physics ever since. “Physics is my thing,” O’Connell said. “I always knew I wanted a career in physics.” Irish-born O’Connell received his bachelor’s degree at the National University of Ireland in 1953.

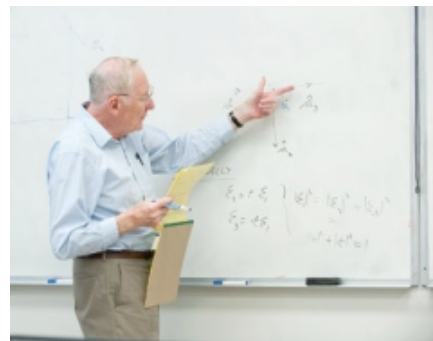
After completing college and working as a telecommunications engineer for four years, O’Connell said he decided to come to the U.S. for opportunities in scientific fields. “It was at a time when the U.S. was really getting into science in a big way,” O’Connell said. “That’s the main reason I came.” After getting his Ph.D. at the University of Notre Dame in 1962, O’Connell returned to Ireland to marry his fiancée, Josephine, who was living there at the time. O’Connell worked at the Dublin Institute for Advanced Studies for a year, but said conditions in Ireland weren’t favorable for theoretical physics. He then started looking for positions in the southern U.S., and he received an offer from LSU in January of 1964. O’Connell said he came at a fortunate time for science because the University had just received the National Science Foundation’s Centers of Excellence grant. “This was at a time when a lot of money was being put into science,” he said.

O’Connell said he was never interested in administration. After serving a term as faculty senate president in 1986, he said he decided he didn’t want to pursue administration as a career. “It wasn’t for me,” he said. “I just like what I’m doing and my aim at the time was to work hard and creatively with my research. As a result, I was awarded a Boyd professorship in 1986.” A Boyd professorship is the highest academic title in the LSU System and is based primarily on research, O’Connell said.

O’Connell said keeping updated on global research is important to him. He said he often visits international universities. “Every summer I generally go back to the Dublin Institute for Advanced Studies,” he said. “It’s important to interact with the international community.” Michael Cherry, chair of the physics and astronomy department, said the department is pleased to have a faculty member like O’Connell, who is well-known around the world. “He is a tremendously valuable and productive member of our faculty,” Cherry said. “He is unique in that he teaches some of our advanced courses where he is the expert on the subject.”

After working at LSU for nearly half a century, O’Connell said he has seen a lot of campus growth. “Clearly the University has made fantastic progress in terms of its national recognition,” he said. “In the early days, there were a lot of very good people working at LSU who were really responsible for moving LSU forward.” O’Connell said while the theoretical work at LSU has “grown by leaps and bounds” from his arrival at LSU, he said he has also seen changes outside his department. “The campus still has the same attractions, but, as a condition of progress, it is losing a lot of green spaces,” he said. “They have put up more buildings, but I suppose one cannot complain about that.” O’Connell said he thinks the University is handling the current budget cuts well. “Obviously, its happening all over the country, so we aren’t unique in that,” he said. “I think the chancellor, administration and faculty senate president are handling things very well.”

O’Connell said part of what has kept him at the University are the research opportunities. “At a big University like LSU, the big concentration is on research,” he said. “I focus on quantum theory nowadays and general relativity.” O’Connell said it’s hard to explain the details of his research to the common person. “My wife keeps asking me that question all the time, and I’m afraid I’m inclined to not answer,” he said. “However, she’s still with me.” O’Connell said he enjoys teaching higher-level courses and it’s important to have relationships with his students, particularly the ones working with him.





## CAMD offers unique research opportunities

By Ryan Buxton, Staff Writer, Daily Reveille

December 1, 2009

Trillions of electrons are injected into a ring 150 feet in circumference, accelerating to an energy of 1.3 trillion volts and emitting radiation strong enough to produce a CT Scan with 1,000 times more resolution than a hospital's. This hub of scientific research can be found at only eight locations throughout the nation, and one of them is LSU. The University's synchrotron, a type of particle accelerator, can be found at the Center for Advanced Microstructures and Devices, or CAMD. Located off campus on Jefferson Highway, CAMD puts the University on par with other schools with synchrotrons, like Stanford and Cornell universities. "Without CAMD, [LSU] is like a 'me too' university," said Challa Kumar, head of the nanotechnology group at CAMD. "Everyone has a physics department, a materials department and a biology department. But who has a synchrotron? CAMD gives a niche to Louisiana and LSU."

Construction on CAMD began in 1989, and the first data was collected from it in 1992, said Richard Kurtz, interim director of CAMD. The original investment was \$25 million, but new equipment for the facility has built the total investment to \$175 million, Kurtz said. The synchrotron works by accelerating electrons in a vacuum using large magnets to produce radiation, similar to radio waves.

"When you send electrons up and down a radio antenna, that emits radio waves," Kurtz said. "When electrons turn the corner [in the synchrotron], that's acceleration. Because they are going so fast, instead of radio waves, you are emitting light." The light comes from all parts of the spectrum and can be used for research in a number of disciplines including biology, physics and chemistry. One-third of all patents held by the University come from CAMD users, Kurtz said.

The research conducted at CAMD seems physics professor. One example is work in nanotechnology that led to the new types of hard drives for computers. "In 12 years, we've revolutionized the hard drive industry," Sprunger said. "Everybody thinks basic science is three or four decades away from being used, but that's not the case anymore." Some of that practical research comes in biology. Biologists can focus the synchrotron's X-ray light and examine specific molecules to determine their structure, which has a number of valuable applications, said Marcia Newcomer, head of the biological science department.

One such project deals with antibiotics that kill bacteria. After an antibiotic is used for a while, bacteria develop a resistance, rendering the medicine ineffective. But by examining molecular structures at CAMD, biologists can more easily alter the antibiotic to make it useful again. "You can come up with and design novel antibiotics using the information you get from CAMD," Newcomer said. "It's a silver bullet kind of thing — make a bullet to kill the molecule, and when you kill it, the bacteria can no longer survive." Part of Kumar's work at CAMD deals with cancer treatment, with a specific focus on metastatic cells, which are hard to detect and treat.

Ninety percent of primary tumors are treatable," Kumar said. "The problem is with metastatic tumors — those that move away from primary tumors and get lodged into different parts of the body." Current contrast agents are not efficient enough to detect cells smaller than a micrometer, but the new agents being developed by Kumar could detect those tiny cells. "We cannot take synchrotron radiation to a hospital, so it's not a direct tool in that sense," Kumar said. "It's an indirect tool because without it, it will be difficult to develop these contrast agents."

## CAMD offers unique research opportunities cont...

This type of research is plentiful at CAMD. There are 60 principal investigators from the University from 19 different departments, Kurtz said. About 180 University students also use the facility, as well as 61 more principal investigators from other universities. Users apply for beam time, which is typically booked four to six months in advance. The high demand and limited amount of beam time can cause problems, Kurtz said. "In some areas of research, the beam lines are oversubscribed, so we get twice as many requests as we can honor in terms of assigned beam time," he said. With so many researchers working at CAMD, the facility is a magnet for grant money. CAMD researchers have brought in \$19.5 million in the last three months alone, Kurtz said.

The facility also gives the University an important advantage in recruiting graduate students, said Chancellor Michael Martin. "Great research programs are run as much by great grad students as by great faculty," Martin said. "[CAMD] is a grad student magnet that others cannot easily match."

CAMD provides a more personal environment for grad students because there are fewer users than at other synchrotrons, Martin said. The smaller scale

of CAMD also makes research more cost efficient. Even though it has its own synchrotron, the Argonne National Laboratory installed a beam line at CAMD for a much lower cost. "It cost them about \$100,000 in initial investment, whereas at their own synchrotron, it would cost about \$10 million," Kurtz said. Researchers at CAMD are always keeping an eye on costs, said Vic Suller, accelerator director at CAMD. The facility shut down in August to replace a metal vessel that insulates liquid helium to keep magnets superconducting.

"Helium is about the same cost as a good bottle of wine, for the same amount," Kurtz said. The helium, which costs \$2,500 to refill, now only needs to be replaced every 150 days, Suller said. It had to be changed three times a week before the new vessel.

University administration and faculty agree CAMD is vital to LSU's profile as a research university. "CAMD is ... one of the few, if not the only, leadership-class research facilities that we have on campus," said Brooks Keel, vice chancellor for research and economic development. "It provides a very visible opportunity for LSU to take a leadership role in research."



Richard Kurtz, interim director of CAMD, gives a tour.

## **LSU-led Research Team Receives INCITE Award**

### **Source: LSU'S Center for Computation & Technology**

February 04, 2010

BATON ROUGE, La., -- A research team led by **Mark Jarrell**, LSU Department of Physics & Astronomy and LSU's Center for Computation & Technology, was among the recipients for the 2010 Innovative and Novel Computational Impact on Theory and Experiment, or INCITE, program awards.

The U.S. Department of Energy's Office of Science supports these awards to promote advanced scientific research conducted on machines at the nation's leadership computing facilities, Oak Ridge and Argonne national laboratories. The supercomputers at these laboratories are the largest and fastest in the United States dedicated primarily to academic research. Through the INCITE program awards, research teams can propose projects in science or engineering that require advanced computational technology, and can receive user time on these powerful computing systems.

Jarrell's research project, "Next Generation Multi-Scale Quantum Simulation Software for Strongly Correlated Materials," is a collaborative effort that includes scientists from LSU, University of California-Davis, Oak Ridge National Laboratory, and Ohio Supercomputer Center. This project received 17,000,000 user hours on the Cray XT supercomputer at Oak Ridge National Laboratory in Tennessee. This research focuses on materials science, in which scientists focus on the basic material properties of strongly correlated electronic materials, such as magnets, magnetic-resistant objects and high-temperature superconductors. These materials are ideal for creating new devices and technologies, since scientists can completely change their properties by simply tuning some parameters through applying pressure or magnetic field. Because the unexpected and changing properties of these compounds are too complex to study with conventional approaches, scientists must use high-performance computers to run simulations that can model these materials, which gives them insight to predict their properties. Computer simulations are an efficient way to study material properties, and it is faster and cheaper to test ideas with computer simulations than to address them by hand in the laboratory.

Jarrell and other members of this research team will use the hours they receive through the INCITE award to advance materials science research on a more powerful machine. "This method, and the opportunity to use the Cray Jaguar XT5 machine, gives us a chance to study model systems with the precision that was previously impossible," Jarrell said. "We hope our research will provide a more comprehensive understanding of the makeup and basic properties of these materials."

For more information on the INCITE program, visit <http://www.er.doe.gov/ascr/incite/index.html>.

## LSU's Focus: Faculty, Students, & Staff

**Victor Taveras**, Postdoctoral Researcher in Physics and Astronomy and CCT, is the winner of the Bergmann-Wheeler prize of the International Society of General Relativity and Gravitation. Victor's citation reads "For contributions to loop quantum cosmology and the development of a novel extension of loop quantum gravity."

**Beverly Rodriguez**, Assistant to the Chair, received a 2009 LSU Foundation Outstanding Staff Service Award on November 24, 2009. Ms. Rodriguez has served LSU for 24 years with 20 years being the Assistant to the Chair. She has served 5 chairmen, 53 faculty, 23 staff members, and is a master at helping students. She has a daughter, Bonnie Miller, and a grandson, Michael Miller, who is an LSU Undergraduate student.

**Adjunct Professor Diola Bagayoko** has been awarded a Mentor Award for Lifetime Achievement by the American Academy for the Advancement of Science (AAAS) "for his extraordinary effort to significantly increase the number of African-American Ph.D.'s in physics and chemistry." Professor Bagayoko is a professor at Southern University and Associate Director of the Louisiana Space Consortium (LaSPACE).

The Louisiana Space Consortium, directed by **John Wefel**, has been named among the 2010 Top Supporters of Historically Black Colleges and Universities (HBCUs) and minority-serving institutions in the survey conducted annually of engineering school deans of ABET-accredited HBCU and minority institutions.

## CONGRATULATIONS!

The following students were honored at the recent College of Science Honors Convocation:



**Keen-Morris Award -**

Mary Dean, James Hostetter, Chris Peeler

**Distinguished Research and Public Service Award -**

Zach Cummings

**Hussey Award for Outstanding Research -**

Richard Strope

**Outstanding Senior, College of Science -**

James Hostetter

From left to right: College of Science Dean Kevin Carmen, James Hostetter, Christopher Peeler, Mary Dean, Richard Strope, and Department of Physics & Astronomy Chairman Michael Cherry.

**WELCOME NEW MEMBERS TO OUR DEPARTMENT!**

**• FACULTY •**

Dr. Kristina Giesel – Assistant Professor (Gravitational Theory)  
Dr. Parampreet Singh – Assistant Professor (Gravitational Theory)  
Dr. Martin Tzanov – Assistant Professor (Experimental Neutrino)

**• POSTDOCTORAL RESEARCHERS AND RESEARCH ASSOCIATES •**

Jessica Brinson	Sandeep Pathak
William Coleman	Kelly Patton
Nagesh Kulkarni	Viviana Scherini
Fei Lin	Michael Sutherland
Miguel Megevand	Ka-Ming Tam
Brian Moazen	Kazuo Watanabe
Jun Miyamoto	Ying Yang
Carlos Palenzuela	

**CONGRATULATIONS GRADUATES!**

**FALL 2009 GRADUATES**

Ph.D.

Aravind Chiruveli  
William Fitzgerald Coleman  
Argenis Daniel DaSilva  
Miguel F. Megevand

M.S.

Olivier C. Blasi  
John Gordon Eley

B.S.

Jessica Danielle Brinson  
Arrielle Christine Opotowsky  
Zariat Afrin

### SPRING 2010 GRADUATES

#### Ph.D.

Rupal Amin  
Wesley Even  
William Plick

#### M.S.

Sarah Caudill  
Ashley Pagnotta  
Joshua Thibadeauxx

#### MS in MPHP

Olivier Blasi  
John Eley  
Peter Petrek  
Todd Racine  
Chad Robertson

#### B.S.

Cody Arceneaux  
Matthew Champagne  
Mary Dean  
Christopher Granier  
John-Paul Grenier  
Randall Hopson  
James Hostetter  
Ashton LeBourgeois  
Casey Pangan  
Christopher Peeler  
Richard Strobe  
Ryan Wargo

### SUMMER 2010 GRADUATES

#### Ph. D.

Yang Gao  
Jay Call  
Jacob Slutsky  
Limin Xiao

#### M.S.

Andrew Collazzi

#### B.S.

Ryan Minvielle

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