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 Opotowsky received NSF Graduate Research Fellowships. Jessica will be

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 (
and

2010 Summer

FACULTY RECOGNITION

- has been elected to chair the Users' Executive Committee of the National Superconducting Cyclotron Laboratory and will represent the NSCL on

FACULTY HONORS & AWARDS

and '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 studentiu -8.6 cm B00eU J.

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

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

LSU's Focus: Faculty, Students, & Staff

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."

, 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.

has been awarded a Mentor Award for Lifetime Achievement -5 (a) -m0 0 T Q q 0T

SPRING 2010 GRADUATES

Ph.D.
Rupal Amin

DONATION FORM

Thank you for your support!

Private support has always been important in providing the margin of excellence for our students and faculty. In today's challenging economic times, LSU relies even more on our alumni and friends to make a vital investment in the future. Donations for the benefit of the Department of Physics and Astronomy will be used to enhance our teaching program and facilitate scientific discoveries that shape the future.

If you would like to make a tax-deductible gift for the benefit of the LSU Department of Physics and Astronomy, please complete this form and return it with your check to the address below. Your contribution check should be written payable to:

"LSU Foundation – Department of Physics and Astronomy".

If you prefer to use a credit card for your donation, you may either fill in the details below, or you may submit your gift online by visiting www.lsufoundation.org. Under the Giving Opportunities heading, select Contribute Online.

Contributions can be mailed to:

Michael Cherry, Chair, Department of Physics and Astronomy
Louisiana State University
202 Nicholson Hall - Tower Drive
Baton Rouge, LA 70803-4001.

Print your name _____

Address _____

_____

Signature/Date _____

Enclosed is my gift of $25 $50 $100 $250 $500 $1,000 Other _____

Credit card type_____