

**CHAIRMAN'S WELCOME . . . *Michael Cherry***

There have been a large number of comings and goings in the Department since the last newsletter.

Roger McNeil left LSU in May to take up the position of Dean of the College of Natural Sciences at the University of California at Stanislaus. This will be an exciting opportunity to help shape a new program as the first permanent dean of the new College of Natural Sciences at Stanislaus. After over 20 years at LSU doing research with the High Energy Physics group and most recently serving four years as department chair, Roger will be missed. We wish him luck in California.

Roy Goodrich retired August 31 after 42 years at LSU. Roy will continue as a Program Director in the Condensed Matter Physics office in the Division of Materials Research at NSF in Washington for another year.

Several new faces have joined the faculty: Jeff Blackmon is an experimental nuclear physicist from Oak Ridge National Laboratory, and Daniel Sheehy is a theoretical condensed matter physicist from Ames Laboratory at Iowa State University.

Ward Plummer will be joining the faculty as a Professor with a 50% appointment at LSU and a 50% appointment at the University of Tennessee. He currently holds a joint appointment at the University of Tennessee and Oak Ridge National Laboratory, where he serves as Distinguished Professor of Physics at the University of Tennessee, Distinguished Scientist at ORNL, and Director of the Tennessee Advanced Materials Laboratory. Professor Plummer is a Fellow of the American Physical Society and the American Vacuum Society, and a member of the National Academy of Sciences. He will be a key contributor to the University's new Materials Initiative and Multidisciplinary Hiring Initiative in Materials Science. (More about the developing Materials Initiative can be found at <http://appl003.lsu.edu/unv002.nsf/0/23dce213265ad829862572dd00743212?OpenDocument>.)

Staff: Duane Cambre has left the machine shop to rejoin his old company, Gould's Pumps in Denham

Springs. Brandon Amos has replaced him starting September 1. Brandon comes to LSU from John Crane Co.

Postdocs: Brandon Hartfiel has joined the experimental neutrino group, and Travis Garrett has joined the theoretical relativity group. Cristina Torres has joined the experimental gravity wave group. Fabrice Matichard begins as a postdoc with the experimental gravity wave group in October, and will be stationed at MIT.

Cigdem Capan, Ravi Koppurapu, Anton Vorontsov, Pavel Lougovski, Lucia Florescu, and Marian Florescu have moved to postdoc positions at the University of California at Davis, Penn State, University of Wisconsin (Madison), University of Oregon, Penn State, and Princeton respectively. Matt Anderson is now a Visiting Professor in the Mathematics Department at Brigham Young University. Björn Zimmermann has departed for a position as an Instructor at Tulane. Blair Smith has taken a position at the Measurement Standards Laboratory of New Zealand. Dmitry Uskov has accepted a Research Associate position at Tulane, and Kishore Kapale will be an Assistant Professor at Western Illinois University.

**NEWSLETTER STAFF****Editors**

**Michael Cherry, Chair**  
**Phil Sprunger**

**Designer**

**Karen Richard**



## $^{18}\text{O}$ and White Dwarf Star Mergers

*Geoffrey Clayton and Sarah Phillips*

At the 209<sup>th</sup> meeting of the American Astronomical Society in Seattle, Washington, astronomers announced findings of unusually high levels of the oxygen isotope  $^{18}\text{O}$  in two extremely rare types of stars. This breakthrough has led astronomers to believe that the origin of these odd stars could be the merging of white dwarf stars, the burnt-out remnants of normal stars like our Sun.

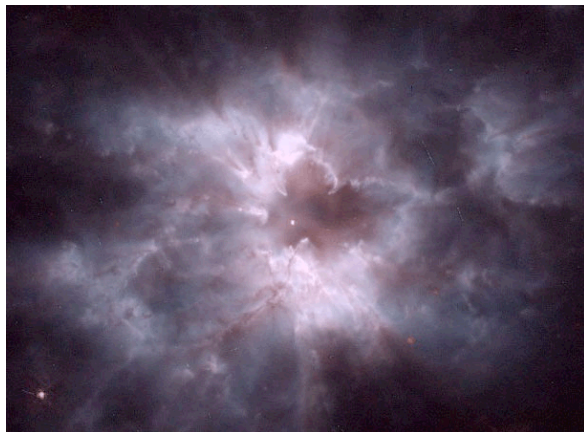
The two uncommon types of stars at the center of the announcement are R Coronae Borealis (RCB) stars and hydrogen-deficient carbon (HdC) stars. An RCB star is a rare type of irregular variable star which has long periods of maximum brightness followed by a sudden, unpredictable reduction in brightness of several magnitudes, and a slower, sometimes erratic return to the original brightness. An HdC star is a type of hydrogen-deficient supergiant star with a composition rich in carbon that resembles the R Coronae Borealis stars but does not display significant variability. To date, there are only about 50 RCB and HdC stars known to be in existence.

Dr. Geoffrey C. Clayton, Professor of Physics and Astronomy at LSU, joined with T. R. Geballe of the Gemini Observatory in Hawaii and other colleagues at Keele University in the UK, Los Alamos National Laboratory in New Mexico, and the Mount Stromlo Observatory in Australia to author "Very Large Excesses of  $^{18}\text{O}$  in Hydrogen-Deficient Carbon and R Coronae Borealis Stars: Evidence for White Dwarf Mergers". After presenting their findings at the national American Astronomical Society meeting, the team's complete work has been published in the June 20, 2007 edition of *The Astrophysical Journal*. Dr. Clayton and Dr. Geballe have also published an article detailing their team's recent work in the June 2007 issue of the GeminiFocus newsletter. Additional information is available at The Gemini Observatory website <http://www.gemini.edu>.

One thing that makes RCB and HdC stars so unusual and special is that while the vast majority of objects in the Milky Way galaxy are made mostly of hydrogen, these particular stars contain very little. What these stars do contain is a relatively

large quantity of the isotope  $^{18}\text{O}$ . The dominant oxygen isotope in the Milky Way galaxy, found in interstellar clouds and distant stars, as well as on the Earth and in the Sun, is  $^{16}\text{O}$ . Typically, the ratio of  $^{16}\text{O}$  to  $^{18}\text{O}$  is close to 500. However, in RCB and HdC stars, the concentration of  $^{18}\text{O}$  and  $^{16}\text{O}$  is roughly the same. No other stars are known to contain as much  $^{18}\text{O}$  as RCB and HdC stars.

The discovery of almost equal amounts of  $^{16}\text{O}$  and  $^{18}\text{O}$  in RCB and HdC stars is a key clue in understanding the evolution of these two rare types of stars. There are two main models, both starting with white dwarf stars – old, relatively low-mass stars that have exhausted all their thermonuclear fuel and contracted to a size roughly the size of the earth. In the first model, as the star is on the verge of becoming a white dwarf, it undergoes a final nuclear flash phase in which a sudden burst of thermonuclear burning ignites near the star's surface. The star swells to the size of a supergiant and its outer atmosphere cools off. During this final rapid flash phase, which may last only a few years, these stars can resemble RCB stars in surface appearance and internal qualities.



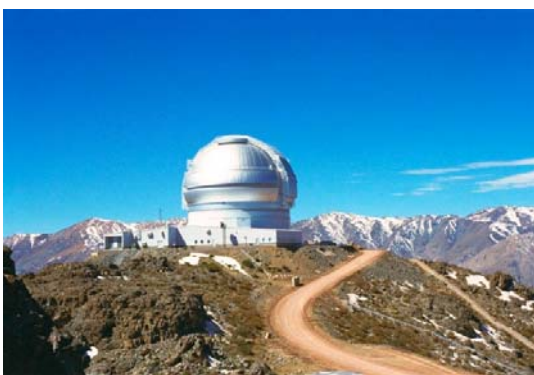
In about another 5 billion years, our Sun will exhaust its supply of hydrogen fuel. As the nuclear engine at the Sun's core turns off, it will expand, throw off its outer layers, and begin to die. The remnant core of the star will contract to an initially hot but slowly cooling ember about the size of the earth -- a white dwarf star. The bright spot at the center of the figure is a white dwarf surrounded by a nebula of the gas ejected as the star died. Figure courtesy of NASA's Astronomy Picture of the Day archive (<http://antwrp.gsfc.nasa.gov/apod/ap000730.html>).

## $^{18}\text{O}$ and White Dwarf Star Mergers (Contd. from Page 2)

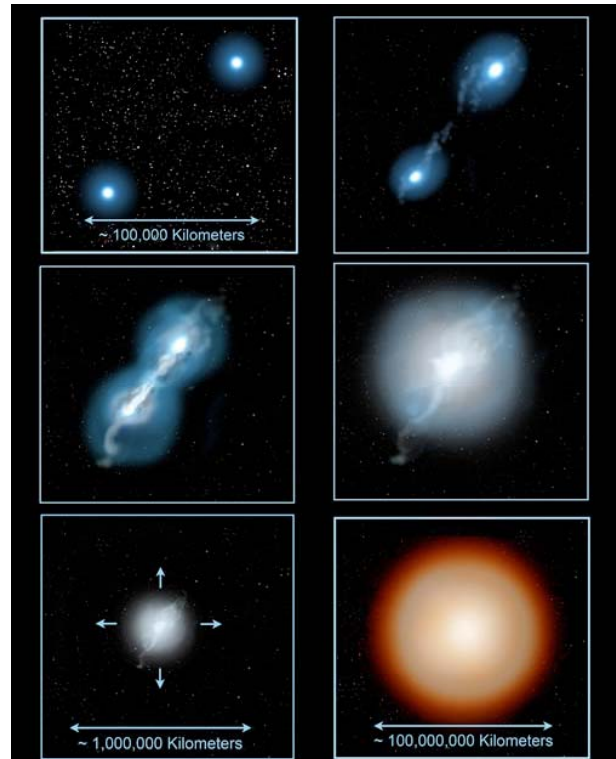
The second model involves the merger of a pair of white dwarf stars. As the stars' atmospheres are disrupted, the gas created in the reaction becomes hot enough for nuclear reactions to take place. The freshly merged star expands and becomes a supergiant star roughly a thousand times larger than the pair of stars that formed it. The team of astronomers agreed that conditions surrounding the merger of the two stars would need to be ideal in order to create the quantities of  $^{18}\text{O}$  seen in RCB and HdC stars.

Although both models are attractive, the very short duration of the final thermonuclear flash makes it difficult for the flash model to account for even the small number of RCB and HdC stars. The consensus of the team is that the origin of these unusual stars is the result of the merger of a pair of white dwarf stars.

For more information, The Gemini Observatory website press release can be found at <http://www.gemini.edu/index.php?option=content&task=view&id=220>. The Gemini press release recorded more hits (more than 50,000) in the first three months after its release than any previous Gemini press release. For more information, please contact Professor Geoffrey Clayton at [gclayton@fenway.phys.lsu.edu](mailto:gclayton@fenway.phys.lsu.edu) or 225-578-8275.



Gemini South telescope at an altitude of 8895' atop Cerro Pachon in the Chilean Andes. Additional images can be found at <http://www.gemini.edu>. Image courtesy of Gemini Observatory/Association of Universities for Research in Astronomy.



A large fraction of the stars in our Milky Way galaxy come in pairs. When a normal star like the Sun burns up its supply of hydrogen and dies, it evolves to a white dwarf. As a result, pairs of white dwarfs orbiting each other in binary systems are relatively common. After time, though, a close pair of white dwarfs may come near enough together to merge. During the merger, the gas surrounding the stars heats up enough so that thermonuclear reactions can again take place. The new merged star expands to become a supergiant many times the size of the Sun and the white dwarfs that formed it. If the temperatures and initial conditions are just right, large ratios of  $^{18}\text{O}$  to  $^{16}\text{O}$  can appear. Images courtesy of Gemini Observatory/Association of Universities for Research in Astronomy.

## FACULTY AWARDS &amp; NEWS



Jorge Pullin, Horace Hearne Research Chair of Theoretical Physics, has been appointed to the committee that selects the winner of the Basilis Zanthopoulos prize. The prestigious international prize is awarded every three years to

a physicist under the age of 40 for contributions in gravitational physics. Pullin was also named a Fellow of the American Association for the Advancement of Science (AAAS) and has been elected a corresponding member of the Mexican Academy of Sciences (Academia Mexicana de Ciencias), a non-profit organization comprising over 1,800 distinguished Mexican scientists.



Jerry Draayer, Roy Paul Daniels Professor of Physics & Astronomy, has been named the LSU Distinguished Research Master of Engineering, Science and Technology. In research, Dr. Draayer announced a new collaboration between SURA and

IBM to advance the nation's Unix-based computing grid. Initial deployments of IBM high performance computing systems acquired by LSU and Georgia State University are currently in process with an additional system planned for Texas A&M University. A total of 27 universities and colleges in 15 states will be partnered with IBM and SURA.



Joseph Giaime, Associate Professor, was named Director of the Laser Interferometer Gravitational Wave Observatory (LIGO) facility in Livingston Parish. He was also elected to represent the LIGO Scientific

Collaboration on the LIGO Board of Directors.



Jonathan Dowling, Horace Hearne Research Chair of Theoretical Physics, was elected a Fellow of the Optical Society of America.



Bradley Schaefer has just won a share of the 2007 Gruber Cosmology Prize as a participant in the discovery that the expansion of the Universe is accelerating, not decelerating as expected. By measuring the brightnesses of

a large number of very distant supernovae, two competing teams ~ the Supernova Cosmology Project and the High-z Supernova Search team ~ simultaneously determined that the expansion of our Universe is accelerating, a surprising result since confirmed by several independent methods. The conclusion is that approximately 70% of the mass/energy of our Universe is due to a previously unknown 'force' now called 'Dark Energy'. The \$500,000 prize money will be shared amongst the co-authors of the original papers, with the award ceremony being held on September 7, 2007 at Trinity College in Cambridge.



John DiTusa and a group of international colleagues have discovered an unusual magnetic material that has major implications in Quantum Physics. Their findings were published online July 26<sup>th</sup> by *Science* in an article entitled

"Mesoscopic Phase Coherence in a Quantum Spin Fluid".



The proceedings of the Astronomical Society of the Pacific conference series entitled "The Future Photometric, Spectrophotometric and Polarimetric Standardization" that took place in Blankenberge, Belgium was dedicated to Arlo Landolt

in recognition of his life work of setting standards in photometry.

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## STUDENT AWARDS & NEWS

### Becky Ann Lefebvre

Recipient of Upper Division Honors, was awarded the 2005-2006 SPS Leadership Award (\$2,000) from the American Institute of Physics Society of Physics Students, and is one of two winners of the Keen-Morris Prize.

### Brendan Matthew Watson

One of two winners of the Keen-Morris Prize

### Nickolas Michalogia Vanmeter

Received the Barry M. Goldwater Fellowship

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## LSU Math Students Finish 21<sup>st</sup> in "World's Toughest Math Competition"

- - *LSU NEWS, April 30, 2007, 3:54 PM*

A team of LSU students recently competed in the William Lowell Putnam Mathematical Competition, often cited as one of the world's toughest math competitions for undergraduate college students. The LSU team finished 21<sup>st</sup> out of 402 teams from 508 colleges and universities.

The LSU team consisted of Jude Melancon of Zachary, **Nickolas Vanmeter of Metairie and the Physics and Astronomy Department**, and Daniel Whitman of Lafayette. The team was prepared by Jacek Cygan, LSU Associate Professor of Mathematics, and Suat Namli, a mathematics graduate student at LSU. The team competed against 3,640 of the brightest undergraduate students in the United States and Canada.

The William Lowell Putnam Mathematical Competition, established in 1938, has been described by Time magazine as possibly the hardest math test in the world. The 12-problem exam takes six hours to administer. Although it is only taken by the best undergraduate math students, the median score was one point out of a possible 120 points.

The top three teams in this year's competition were Princeton University, Harvard University and the Massachusetts Institute of Technology, or MIT. Cash prizes for the top teams in recent years ranged from \$5,000 to \$25,000.

More information about the exam is available from the Mathematical Association of America at [www.maa.org/awards/putnam.html](http://www.maa.org/awards/putnam.html). For more information about LSU's team, contact Lawrence Smolinsky, Chair of the LSU Department of Mathematics, at 225-578-1618 or [smolinsk@math.lsu.edu](mailto:smolinsk@math.lsu.edu).

by *Ernie Ballard, LSU Media Relations*

### ***Join us in welcoming two new faculty members this Fall -***

**Jeff Blackmon**, an experimental nuclear physicist, comes to LSU as an Associate Professor from the Physics Division of Oak Ridge National Laboratory. Professor Blackmon's research is in nuclear astrophysics, especially focusing on nuclear properties that are important in understanding supernova explosions and the origins of elements. He received his Ph.D. at the University of North Carolina.

**Daniel Sheehy**, an Assistant Professor from the Ames Laboratory at Iowa State University, is a theoretical condensed matter physicist. His research has involved problems in high temperature superconductivity, atomic physics connected to condensed matter, superfluidity in cold atom settings, heavy fermion superconductors, and Kondo lattices. He received his Ph.D. at the University of Illinois.

## LSU-Mary Bird Perkins Research Helps Fight Breast Cancer: New Screening Technology Poised To Improve Early Detection

- - [www.marybird.org](http://www.marybird.org)

“Medical physics is a fundamental science concerned with improving peoples’ lives,” said Dr. Polad Shikhaliev, who joined the LSU faculty in January, 2007 as an Assistant Professor in its joint Medical Physics Program with Mary Bird Perkins Cancer Center. “Medical physics has a direct impact on people’s health, helping cure breast cancer. As a medical physicist, I conduct research with detector technology to find cancer earlier,” he explained.

Shikhaliev’s current research is focused on developing a new breast CT system that will allow detecting breast cancer at its very early stages. Breast CT, as proposed by Shikhaliev, should be able to detect breast lesions as small as 2-3mm, compared to 10mm, which is often the case in current mammography x-rays. He also expects his research to acquire the CT scan with less radiation dose to the breast than current low-risk mammography techniques and with no pain or discomfort. What distinguishes his research from all others is that his CT system will use a new type of x-ray detector, a photon counting detector, with the additional capability of measuring the energy of the individual x-ray photons. This developing technology forms the basis for the unique aspect of his entire project, which will improve differentiation of a tumor being benign or malignant. The proposed breast CT system has the potential to become a routine breast screening tool to supplement x-ray mammography.

“Dr. Shikhaliev is an outstanding addition to the medical physics program, allowing it to expand its imaging physics research in the area of cancer diagnosis, particularly in breast screening,” said Dr. Kenneth Hogstrom, chief of physics at Mary Bird Perkins and director of the medical physics program at LSU. “We conducted a national search and Dr. Shikhaliev was selected in large part because his particular area of interest parallels that of Mary Bird Perkins’ C.A.R.E. Network – early detection via cancer screenings. In addition, he is one of the leading medical imaging researchers in the world today.”



*The research of LSU Medical Physics Assistant Professor Dr. Polad Shikhaliev, in joint partnership with MBP, gives Renea Austin-Duffin (r), executive director, MBP's C.A.R.E. Network, hope for a major impact on community cancer care within the decade.*

Originally from Azerbaijan, Shikhaliev received his PhD in Nuclear Engineering from Ioffe Physico-Technical Institute in St. Petersburg, Russia. He left his homeland to pursue the further development of his research. He arrived in the United States in 2001 at the University of California, Irvine, where he continued his study of medical physics as an assistant researcher, concentrating on x-ray and CT imaging technologies. Upon arrival at LSU, Shikhaliev is continuing the same research. “Dr. Shikhaliev has set up an x-ray imaging laboratory at LSU where he and our medical physics students will research his ideas and work to develop a future generation mammography CT device,” said Hogstrom.

Renea Austin-Duffin, executive director of Mary Bird Perkins' C.A.R.E. Network, could not be more pleased that research being done in Baton Rouge might affect

## LSU-MBP Research Helps Fight Breast Cancer: New Screening Technology Poised To Improve Early Detection

*(Contd. from page 6)*

the health care of women screened by the C.A.R.E. Network and well beyond. "The National Cancer Institute has estimated that over 200,000 women will be diagnosed with breast cancer in the United States this year, making it the most commonly diagnosed cancer in women. Of those women, over 40,000 will die from it," she said. "The potential for earlier detection has important applications for reducing breast cancer mortality, a serious problem in Louisiana." She explained that the incidence rate of breast cancer is not higher in Louisiana, but the mortality rates are much higher. "One of the reasons is that a lot of women shy away from mammograms because they think they hurt. The possibility of pain free technology may attract more women to screenings, which in turn should reduce mortality because problems would be detected and treated earlier, therefore increasing survival rates."

Women's Hospital in Baton Rouge is also interested in Dr. Shikhaliev's imaging research in early breast cancer detection.

Shikhaliev expects it to take at least five years before his research is approved for clinical trials.

*"We are excited about Dr. Shikhaliev's work and it's potential," said Teri G. Fontenot, president and CEO, Woman's Hospital. "Our partnership with Mary Bird Perkins and the C.A.R.E. Network has saved lives through earlier detection, but in breast cancer, there is no such thing as 'too early.' We look forward to the day that no woman dies from this disease, and this research opens a new door to that possibility."*

### A LOOK BACK: LSU Gravitational Radiation Detection Experiment, 1976-1979 © Robert Gardner, 2007

Under the direction of Bill Hamilton, the LSU Gravitational Radiation Detection experiment employed dozens of undergraduate and graduate students, post-docs and faculty members over the years. Robert Gardner worked on the experiment as an undergraduate from March 1976 to May 1979 and occasionally took photos of the people and detector. Bill retired in 2002, but remains active in the department.

Visit Robert's web site and see more pictures and information:  
<https://rgardner.backpackit.com/pub/1105893/>



A "younger" Bill Hamilton with coffee cup in hand standing in the Gravity Lab, November, 1976.



Loading the 11,000 pound aluminum bar, December, 1976

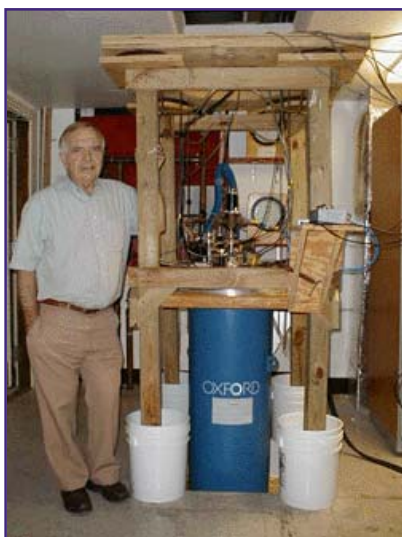
## RETIREMENTS



On August 31, 2007, Roy G. Goodrich retired from the Department of Physics and Astronomy at LSU. Roy joined the department in 1965, after obtaining his Ph.D. in

condensed matter physics from the University of California, Riverside. Roy served his department, college, and university with remarkable energy, distinction, and honor. He was a key architect in the establishment of a strong and prolific condensed matter group in the Department of Physics and Astronomy. Throughout his entire career at LSU, Roy kept research at the forefront of his professional life and published more than 80 papers in refereed scientific journals and directed 14 Ph.D. theses. His work is internationally known, as evidenced by the fact that he was elected as a Fellow of the American Physical Society in the mid 1990's. Recently Roy Goodrich was named the Ball Professor of Physics in Physics and Astronomy. Roy will continue his work at the National Science Foundation in Washington, D.C. where he and wife Gretchen now live. As both a friend and colleague, Roy's long presence within Nicholson Hall will be greatly missed.

-- Phil Adams



On September 30<sup>th</sup> 2007 Ronald Depew will be retiring from the department after 5 years of service to the department as the cryogenics technician. Ronnie joined the department in July of 2002, just before the renovation of Nicholson

was to begin. He helped out extensively by learning the operation of our ancient helium liquefier during the short period of time before the cryoshop had to be shut down for the renovation. His assistance in preparing the equipment for storage, in keeping the flow of liquid nitrogen going, and helium delivered during the construction was invaluable. Perhaps Ronnie's biggest contribution to the research at LSU was his work in setting up the new cryoshop after the completion of the construction in Nicholson. He has spent many hours in the shop trying to make the 30 year old liquefier produce liquid helium again. Although the project of bringing the liquefier back to life has been a long journey, it has been one that I have enjoyed due only to Ronnie's friendly demeanor and willingness to try my crazy ideas. We will miss you Ronnie. Enjoy your retirement!

-- John DiTusa

### INCOMING GRADUATE STUDENTS

- **Batte, Catherine - Medical Physics**  
*BS, Centenary College*
- **Byerly, Zachary - Astronomy**  
*BS, Louisiana State University*
- **Caudill, Sarah - Relativity**  
*BS, Stetson University*
- **Fritz, Shannon - Medical Physics**  
*BS, Texas Lutheran University*
- **Jiang, Kebei - Optics**  
*BS, South China University*
- **Matthews, Bobby - Medical Physics**  
*BS, Univ. of Arkansas, Little Rock*
- **Pagnotta, Ashley - Astronomy**  
*BS, Texas A&M University*
- **Patterson, Matthew -**  
*BS, Rice University*
- **Petrek, Peter - Medical Physics**  
*BS, Augustana College*
- **Talbert, Catherine - Medical Physics**  
*BS, Austin College*



## The Pierre Auger Observatory: Measuring the Highest Energy Cosmic Rays

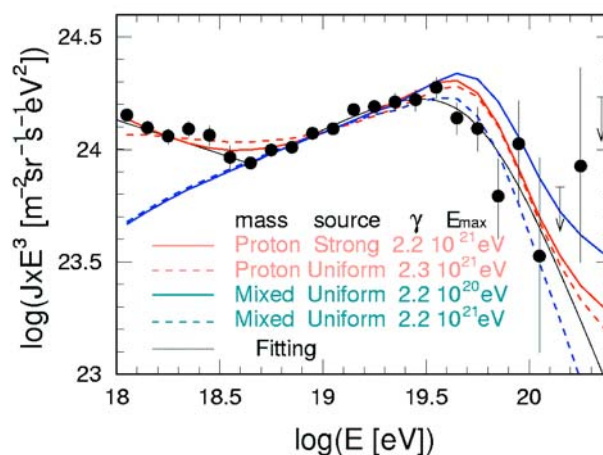
- - Sarah Phillips

Located in western Argentina, the Pierre Auger Cosmic Ray Observatory is a facility built to measure the highest energy cosmic rays, individual particles reaching energies above  $10^{20}$  electron volts (eV). Auger consists of a combination of four fluorescence telescopes observing particle showers generated in the upper atmosphere and 1,600 surface detectors spaced approximately a mile apart over an area larger than the state of Rhode Island. The Observatory, the largest cosmic ray air shower experiment ever built, has been under construction for almost 10 years.

In July 2007, the initial Auger results were presented at the 30th International Cosmic Ray Conference in Mexico. The data indicated a clear cutoff in the spectrum near  $10^{20}$  eV, a result known as the "GZK cutoff" and expected due to interactions of high energy cosmic ray protons with the cosmic microwave background. No correlations or clustering of event arrival times or directions is seen, as would be expected if the particles were produced in relatively nearby sources. The composition appears to be a mixture of protons and heavier nuclei with few gamma rays, strongly implying that the acceleration is due to shock waves in extragalactic sources rather than decays of theorized but undetected massive particles. Although the search for sources continues, the main issue is the longstanding question of how these enormously high energies are produced and in what sources.

The Auger Collaboration consists of over 200 scientists from more than 20 countries. The group participating from LSU is led by Prof. James Matthews and includes Prof. Roger McNeil, postdocs Alexei Dorofeev and Javier Gonzalez, graduate student Megan McEwen, and undergraduate students Rachel Mannino and Brittan Farmer. Prof. Matthews has been a part of the project since it was first conceived in 1992. He serves on the Collaboration Board and the Spokesperson's Advisory Committee, and is head of the Publications Committee.

More information about Auger can be found by visiting Nature.com at <http://www.nature.com/news/2007/070702/full/448008b.html>, Science Magazine at <http://www.sciencemag.org/cgi/content/full/317/5835/178>, or the Auger web site at <http://www.auger.org/>. Prof. Matthews can be contacted at [matthews@phys.lsu.edu](mailto:matthews@phys.lsu.edu) or 225-578-8598.



Auger energy spectrum multiplied by  $E^3$ , together with the predictions of two astrophysical models (blue and red lines). The model input assumptions (mass composition at the sources, source distribution, spectral index, and exponential cutoff energy per nucleon at the acceleration site) are indicated in the figure. From T. Yamamoto et al., 30<sup>th</sup> Intl. Cosmic Ray Conf., Merida, Mexico (2007); [http://www.auger.org/technical\\_info/icrc\\_2007.html](http://www.auger.org/technical_info/icrc_2007.html)

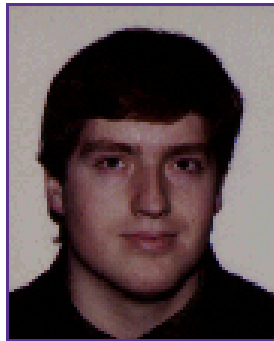


## The Relativistic Turducken Approach to Stuffing a Black Hole

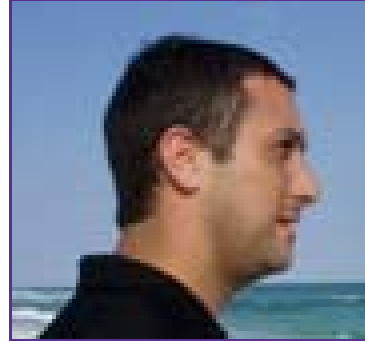
- - Sarah Phillips



**Erik Schnetter**



**Peter Diener**



**Manuel Tiglio**

Louisianans know what you get when you take a dead chicken, shove it into a duck (also preferably dead), insert the "ducken" into a turkey, and slowly cook. The result is the delicious concoction known as a "turducken". And we all know how good a stuffed turducken can taste. Erik Schnetter, Manuel Tiglio, and Peter Diener from LSU's Physics and Astronomy Department and the Center for Computation and Technology, working together with colleagues from the Universidad Michoacana de San Nicolas de Hidalgo in Mexico, North Carolina State University, the University of Southampton in Britain, and the Albert Einstein Institute in Germany, have shown how to stuff a black hole. A black hole is an object whose gravitational field is so intense that nothing, not even light, can escape from the interior. That means that no information can penetrate from the unseen interior to the exterior where we can potentially make observations.

A difficulty with trying to calculate what happens in a black hole is that as one moves close to the center, the strength of the gravitational field grows large ~ and at the very core, gravity becomes infinitely strong. Computers, of course, do not like to deal with quantities that are infinitely large, and so computational physicists doing calculations involving the general relativity of black holes somehow have to deal with this "singularity" or infinity at the center of the black hole.

The idea of a recent paper by Schnetter and his colleagues is that to avoid dealing with the singularity inside black holes when treating them

on a computer, one "stuffs" the black hole with unphysical matter that removes the singularity. Since the interior cannot communicate with the exterior, one is unconcerned with what is happening inside, even if it is not correct physically. The group shows that the behavior on the outside of the black hole is mathematically well-behaved even if the invisible stuffing on the inside is not physically possible. The result is that their "turducken" approach to stuffing a black hole may lead to useful methods of simulating the behavior of real black holes irrespective of many of the unobservable details of how the interior stuffing is arranged. A preprint of the paper can be found on the web at <http://arxiv.org/abs/0707.3101>.

Erik Schnetter is a research staff member in the numerical relativity group of the Coast to Cosmos focus area at CCT and the Hearne Institute for Theoretical Physics. Peter Diener is Assistant Professor of Research and Manuel Tiglio is an Assistant Professor in the Department of Physics and Astronomy, the Hearne Institute, and CCT.

### LSU 16<sup>th</sup> Annual Employee Recognition Program

The following members of our department were honored at a reception on Wednesday, May 2 at Lod Cook Alumni Center for their many years of service to the University:

**25 Years:**

George Gascon  
Joel Tohline  
John Wefel

**30 Years:**

Hortensia Valdes

**35 Years:**

Allen Young

**CONGRATULATIONS! to our graduates . . .****SPRING 2007**

Teresa Ann Ashcraft (B.S.)  
Zachary Duncan Byerly (B.S.)  
Carrie BNeth Cormier (B.S.)  
Zachary Adam Dupre (B.S.)  
Lyndsey Renee Kelly (B.S.)  
Becky Anne Lefebvre (B.S.)  
Justin Thomas Runnels (B.S.)  
Matthew Murray Springer (B.S.)  
John Preston Terracina (B.S.)  
Brendan Matthew Watson (B.S.)  
Zachary Keefe Wentzell (B.S.)

Muxin Han (M.S.)  
Adam Lackie (M.S.)  
Ilsoon Park (M.S.)  
Koren Suzette Smith (M.S.)

Ernst Nils Dorband (Ph.D.)  
Vayujeet Mohan Gokhale (Ph.D.)

**SUMMER 2007**

Robin E. Levine (B.S.)  
  
Allen Beardmore (M.S.)  
Andres Rodriguez (M.S.)  
Ganesh Selvaraj (M.S.)  
Zhanghan Wu (M.S.)  
  
Hrayr Matevosyan (Ph.D.)

**PHYSICS & ASTRONOMY ALUMNI !**

**Please help us update our alumni database -**

**We are very interested in how you are doing and where your career has taken you. Please take a few minutes to respond with news about yourself to be included in our Alumni database.**

**The Department of Physics and Astronomy maintains a database of all our alumni - Ph.D., M.S., and B.S. -**

**The following information is needed and can be submitted by e-mail to *alumni@phys.lsu.edu***

- Full name (*including maiden name*)
- Home address and telephone number
- Current employment information, title, e-mail
- Graduation Information (*semester and year graduated, degree level and major*)
- Career and Personal News

**OR**

**Visit us on the web -**

**<http://www.phys.lsu.edu/dept/alumni/>**

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