The Space Porter

Fall 2010

Space Op**PORT**unities for **E**ducators and **R**esearchers

Lead Institution:

Louisiana State University

Affiliates:

Dillard University
Grambling State University
Highland Rd Park Observatory
Jacobs Technology at Michoud Assembly Facility
Louisiana Art & Science Museum
LA Board of Elementary and Secondary Education
Louisiana Board of Regents
LA Business &Technology Center
Louisiana Tech University
LSU Agricultural Center
Loyola University
LSU—Shreveport
McNeese State University
Nicholls State University
NW State University of Louisiana
Sci-Port: LA's Science Center
SE Louisiana University
Southern University
Southern University in New Orleans
Tulane University
U of Louisiana at Lafayette
University of Louisiana at Monroe
University of New Orleans
Xavier University of LA

Welcome from the Director

I am pleased to announced the re-launch of *The Space Porter* after a too long hiatus. Our purpose in producing *The Space Porter* is to keep individuals and institutions within the Space Grant community apprised of the innovative research, teaching, outreach, and student development happening among LaSPACE affiliates. Our goal at LaSPACE is to promote scientific research, workforce development, and public outreach that will enhance economic growth and development in Louisiana, as well as contribute to the research and technology Mission Directorates of NASA. We never lose sight of the fact our members make this happen. Featured in this issue are several of these contributions from across the state, including high-performance polymers at Grambling, and low-mass star formation at Nicholls State

I am happy to report that the Louisiana Space consortium and the LA Board of Regents are in the top 10 in the list of "2010 Top Supporters of the HBCUs" as detailed in *US Black Engineer & Information Technology*. Scroll through this newsletter to read about exciting developments at HBCUs in Louisiana.

Further, our five-year proposal has been approved by NASA and we are in the process of getting the new grant in place.

We're looking forward to our Council meeting at Dillard University in New Orleans in September. See page 3 for a bio of our gracious host, Dr. Abdalla Darwish.

"LaBRAT" @ LSU

A low-cost, low-weight alternative to gamma-ray imaging for satellite applications

LABORATORY PROTOTYPE

The Lanthanum Bromide-based Rotating Aperture Telescope (LaBRAT) is a laboratory prototype Rotational Modulator, developed at Louisiana State University. The concept used for imaging photons at x-ray and gamma-ray energies is cheaper, less complex, and lighter weigh than the current generation of satellite-based experiments.

UNDERSTANDING OUR UNIVERSE

Observation in the gamma-ray spectrum is crucial to our understanding of the universe. With it, we can view tell-tale signs of black-holes, x-ray solar flares, and even the collapse of distant stars. Our planet's atmosphere absorbs these photons, so high-altitude experiments are a necessity.

PhD THESIS, PHYSICS

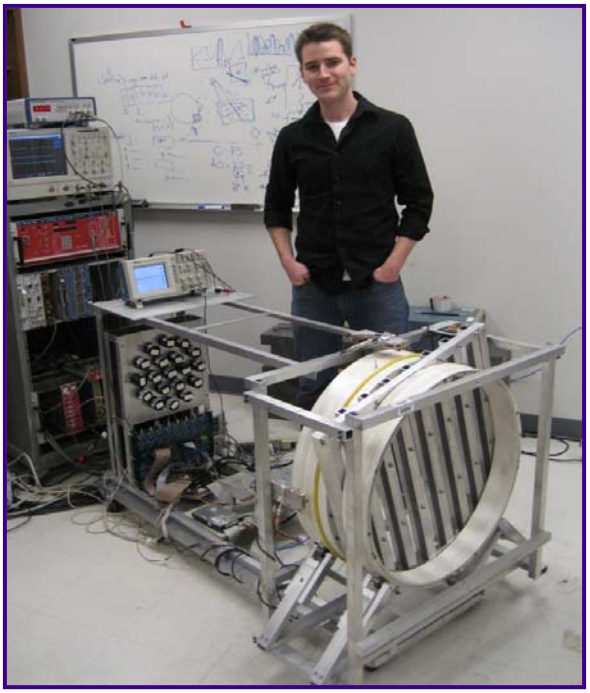
From concept to imaging results by a prototype, and a possible day-long flight as a high-altitude balloon payload, LaBRAT has been the motivation and center of research for a PhD thesis in physics. The design constraints and imaging requirements of the instrument have presented exciting challenges and led to novel techniques, which may even extend to unrelated applications

UNDERGRADUATE MENTORING

LaSPACE funding provides education to more than just those directly supported. In the case of LaBRAT, mechanical design, electronics design, detector preparation, simulations, and laboratory testing all provide ample opportunity for undergraduate student involvement.

"The greatest benefit of the LaSPACE fellowship is the ability to devote myself full-time to focus on thesis research. At times when I would otherwise be worrying about my next source of funding, I'm publishing papers, presenting talks, and concentrating on the science at hand. I owe an enormous debt of gratitude to LaSPACE, and I'm happy to know other graduate students are given this same opportunity."

Brent Budden
LaSPACE Graduate Fellow, 2006 – 2010
Louisiana State University
Dept. of Physics & Astronomy



LaSPACE Faculty Spotlight: Abdalla Darwish

Dr. Darwish will be our host for the 2010 LaSPACE Council meeting in September. His research interests include laser spectroscopy, EPR, and thin film fabrication by Pulse Laser Deposition (PLD) technique. He has multiple teaching interests, including applying innovative pedagogies such as simulation programs, critical thinking and inquiry, virtual and video experiments, and on-time-teaching pedagogy. In addition to over 81 publications, he has secured over $7.8 M for educational and research programs for STEM majors and the research infrastructure in the Physics department. Dr. Darwish served as chair of Dillard's Physics department since 2000, and he has most recently accepted the position of Dean of the Division of Natural Sciences, Math, and Engineering at Dillard.

When I joined Dillard in 1998, I recognized the need to increase the number of STEM graduates. Private funding has allowed me to establish the Systemic Research Mentoring Program in the Division of Natural Sciences, and to secure many BOR and Federal awards from NSF, NASA, AFOSR, and the US Navy. I direct the Louisiana Alliance for Minority Participation, the Graduate Alliance for Education in Louisiana, and the Transforming Earth Science Education programs at DU.

Abdalla Darwish, **LaSPACE Coordinator**
Dillard University, Dept. of Physics

LaSPACE Mixes with Chemistry @ Xavier

Cherise Steib (r) weighs reactants for synthesizing lithium ruthenate (Li_2RuO_3)

The Xavier Space Grant Research Scholars program funds six undergraduate research projects in NASA-related areas. To participate in the program, undergraduate students must be majors in either chemistry or physics, have a minimum 2.5 GPA, and exhibit an interest in research.

Each student is mentored by a faculty member, who trains students in the laboratory techniques appropriate for their research projects. Students are engaged in the research projects and develop expertise and independence. In addition, these projects not only introduce underrepresented minority students to NASA-related research areas, but are helping Xavier's faculty mentors to become more competitive for NASA funding.

Focus on LURA

We are pleased to report that the LaSPACE Undergraduate Research Assistantship (LURA) Program is thriving in universities across the state. The LURA program supplements and enhances the undergraduate curriculum by providing the student with mentored research experience relevant to space sciences. A LURA project is a joint effort between a faculty researcher (who serves as mentor and project Principal Investigator) and one or two undergraduate research assistants.

Visit <www.laspace.lsu.edu> for more information on the LURA program.

High-Performance Polymers @ Grambling

At Grambling, Dr. Danny Hubbard and Jerrell Gibson are working on High Performance polymers and fiber reinforced polymer composites which have been found to provide improvements in materials used in the aerospace industry. Such materials have improved strength and durability when compared to materials that were used before the turn of the century. Another advantage of these materials was the reduction in weight when compared to metal containing systems. Our research study involved the chemical preparation of novel polymers, *i.e.,* polyamides, made from 2,2'-Bis(p-aminophenoxy)biphenyl and aromatic diester/diacid compounds. Thermal studies were conducted using techniques in differential scanning calorimetry and thermal gravimetric analysis. The data from such measurements was used to evaluate structure-property relationships, and to access their potential use in high temperature applications as components of graphite composts and fiber-reinforced ceramics.

Jerrell Gibson (LURA scholar)

Education Fellowship Program Continuing to Thrive @ Michoud Assembly Facility

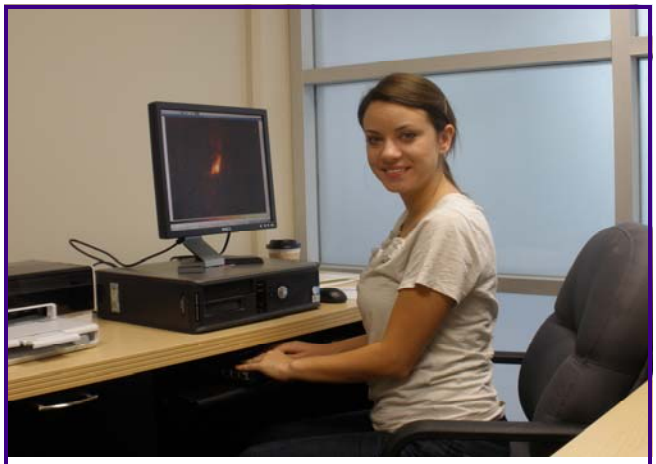
The third year of the NASA/LaSPACE Michoud Education Fellows (MEF) program recently completed the second week of the two-week summer professional development institute at NASA's Michoud Assembly Facility in New Orleans. The purpose of the MEF program is to provide Louisiana teachers the opportunity to explore how science content, inquiry skills, mathematics, and communication skills are used by scientists, engineers, and skilled workers at Michoud.

Six teachers, four from St. Tammany Parish Schools and two from Zachary Community Schools, spent June 7-11 and July 12-16 touring Michoud and meeting with various workers. Some of the highlights from the two weeks included seeing the Orion capsule, meeting the STS-134 crew, attending a one-day VIP tour at Stennis Space Center in MS, and watching the rollout of ET-122 (nicknamed the "Katrina" tank due to damage suffered during Hurricane Katrina) from building 103 to building 420.

When asked about their thoughts on the MEF program so far, Renee Davis, a teacher at Madisonville Junior High School in St. Tammany Parish, said "This program has been amazing! It has given me an enthusiasm for space that will surely translate into my classroom. I look forward to this year and all of the benefits my students will see as a result of my involvement in the NASA Fellows program."

Low-mass Star Formation @ Nicholls State

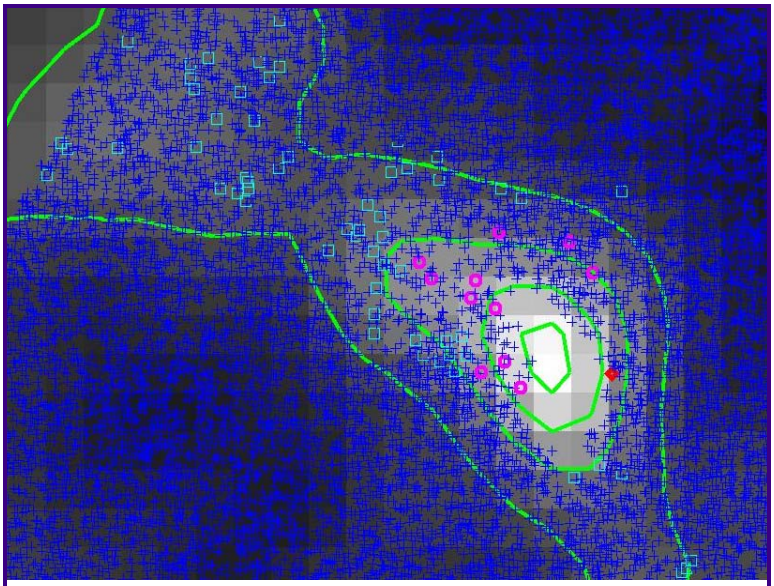
At Nicholls State University, assistant professor of physics, Chad Young, in collaboration with Tyler Bourke at Harvard's Center for Astrophysics, is working to determine the distances to low-mass star-forming cores. These small cores are sites of planet and star formation, and, in recent years, astronomers have spent much time observing and studying the cores. However, most of the conclusions regarding these sites of star formation assume good knowledge of their distance, which, unfortunately, is often very uncertain.



Leah Garber, undergraduate chemistry major at Nicholls

Together with undergraduate chemistry major, Leah Garber, Drs. Young and Bourke are using data from a variety of NASA, ESO, and USNO archives to calculate the distances to these star-forming cores. By combining several sets of observations, they can determine whether a star is either in front of or behind a star-forming core. Then, when they calculate the distances to the stars, they can easily determine the distance to these sites of low-mass star formation.

In this map of the star-forming core B133, the green contours and grayscale represent extinction—there is more gas and dust where the extinction is highest. The blue crosses are at the positions of stars that are in front of or to the side of the star forming core. The cyan, magenta, and red shapes show the positions of stars located behind the core. By calculating the distances to these stars—in front and behind the core—Dr. Young and Ms. Garber are able to estimate the distance to the core.



Extinction map of B133. The markers represent the positions of stars that are either in front of or behind the star-forming core. B133 is about 300 parsecs from the Earth.

LaACES/PACER Launch Relocates After Australia Ballooning Accident

As many in the scientific ballooning community know, the near-fatal balloon accident in Australia last April led NASA to put a moratorium on *all* balloon flights while conducting an extensive investigation. This decision impacted high-altitude student ballooning missions as part of the LaACES and PACER program at LSU and Southern University.

LaACES faculty moved a planned launch from Palestine, TX, further west to the campus of Texas Tech University in Lubbock, TX. At Texas Tech, the students found a warm reception among the faculty and graduate students at the Wind Science and Engineering (WISE) Research Center. Operations for two balloon flights were successfully conducted with six payloads carried to an altitude of almost 100, 000 feet on May 25, and another four payloads carried to 36, 000 feet on May 26.

Further, the end-of-summer launch trip for the 2010 PACER program was hosted by Aerostar International, Inc. located in Sulphur Springs, TX. Aerostar constructs the large volume zero-pressure balloons used to carry heavy science payloads to altitudes of 120,000 feet for extended durations. As a special treat, Aerostar flew several of our student payloads on a 19,000 ft^3 balloon enabling these payloads to stay aloft for several hours. Use of small, zero-pressure balloons could support new kinds of student research programs. We will report on the success of this flight in a subsequent issue!

Excited LaACES students from LSU and Southern hold up certificates of achievement while giving the “L for Louisiana” sign at Texas Tech after the successful launch and recovery of their payloads.