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Science Center Completed

The Science Center renovation has been completed and the Department of Physics and Astronomy has moved into its new home. The $20M project included a 30,000 s.f. expansion along with a complete renovation of the existing structure; the facility now contains 96,000 s.f. of modern classrooms, laboratories, and research space. It is home to the departments of Physics and Astronomy, Chemistry and Biochemistry, Life and Earth Sciences, Equine Sciences, and Nursing. A formal dedication ceremony will take place at 4:30 p.m. on Friday, October 9, 2009.

Neutrino Research at Otterbein Receives NSF Grant

The National Science Foundation (NSF) has announced that Otterbein College will receive a major research grant, through the Research at Undergraduate Institutions program, to study neutrino physics at the Fermilab NuMI beam-line, near Chicago. A total award of $113,000 will be issued over the next three years to allow Dr. Nathaniel Tagg and student researchers to participate in two large international experiments, MINOS and MINERvA.

Neutrinos are very light, nearly-undetectable particles created in nuclear reactions or by the decay of other energetic particles. Although neutrinos play little role in our day-to-day lives, they are so plentiful that the total mass of neutrinos in the universe is roughly equal to the mass of all stars and planets. Neutrinos are thought to play a significant role in the development of the early universe, and have interesting properties not shared by other particles.

MINOS is a long-baseline neutrino detection experiment designed to examine one of these strange properties, namely that neutrinos change type (or “flavor”) as they travel through space. MINOS uses two detectors to count neutrinos in the NuMI beam, one at Fermilab and the other in the deep-underground Soudan mine in northern Minnesota. By examining types of neutrinos at the start and end of this journey, MINOS is making major discoveries about the properties of the neutrino.

MINERvA is a new neutrino scattering experiment designed to examine the exact character of the rare interaction between neutrinos and matter, by using a fine-grained detector in the NuMI beam at Fermilab. The data collected by this experiment will be used to improve results from MINOS and many other neutrino experiments worldwide.

Work at Otterbein will focus on detector calibration and monitoring, development of software for event visualization and reconstruction, and data analysis for the MINOS and MINERvA experiments. Otterbein students with interests in physics and/or computing are encouraged to contact Dr. Tagg for details about participation in this research.
Otterbein Student Wins Prestigious Goldwater Scholarship

Otterbein College junior Justin Young of Wooster, Ohio, has been awarded a 2009 Barry M. Goldwater Scholarship. A double major in Physics and Mathematics, Young is in the honors program at Otterbein College.

The Barry M. Goldwater Scholarship and Excellence in Education Foundation awarded 278 scholarships for the 2009-2010 academic year to undergraduate sophomores and junior from the United States.

The Goldwater Scholars were selected on the basis of academic merit from a field of 1,097 mathematics, science, and engineering students who were nominated by the faculties of colleges and universities nationwide. Young has been conducting research with Dr. Brian Sell, assistant professor of physics, on the magnetic multilayer materials that are prototypical magnetic tunnel junctions. By employing computer modeling and synchrotron X-ray photoelectron spectroscopy, Young is attempting to elucidate details of the electronic structure of these compounds.

The Scholarship Program honoring Senator Barry M. Goldwater was designed to foster and encourage outstanding students to pursue careers in the fields of mathematics, the natural sciences, and engineering. The Goldwater Scholarship is the premier undergraduate award of its type in these fields. In its 21-year history, the Foundation has awarded 5,801 scholarships worth approximately $56 million.

Cardinal Science Scholars Program

Beginning in Fall 2010, this program provides a unique opportunity for students pursuing degrees in Physics, Biochemistry, or Chemistry. This enriched educational experience offers scholarships of up to $6,000 per year and includes enhanced academic, social, and career programming, including a weekend summer immersion experience prior to the start of classes, involvement in a year-long mentoring triad with an upperclassman and alum, social activities with students and faculty, visits to regional graduate programs and industries, and talks by leading scientists. The $482,992 grant from the National Science Foundation for strengthening Science, Technology, Engineering and Mathematics (STEM) was solicited by Joan Esson of the Chemistry and Biochemistry Department and Brian Sell of the Physics Department.

Science Lecture Series News

The 2008 Science Lecture Series was a resounding success, featuring Sir Anthony Leggett, the John D. and Catherine T. MacArthur Professor and Center for Advanced Study Professor of Physics at the University of Illinois in Urbana-Champaign. Professor Leggett is a world authority in the theory of low-temperature physics, and his work on the superfluid state of liquid helium-3 was recognized by the 2003 Nobel Prize in Physics. He also has a long-standing interest in the foundations of quantum mechanics.

Prof. Leggett gave two lectures during his visit: "Does the Everyday World Really Obey Quantum Mechanics?" and "Bell’s Theorem, Entanglement, Quantum Teleportation and All That."

The 2009 lecture series will feature Sean B. Carroll, Professor of Molecular Biology and Genetics and an Investigator with the Howard Hughes Medical Institute at the University of Wisconsin. Dr. Carroll is widely recognized as a leading public voice in evolutionary science in the U.S. today. His research has centered on the genes that control animal body patterns and play major roles in the evolution of animal diversity. He is a member of the National Academy of Sciences and a Fellow of the American Association for the Advancement of Science. He has received the National Science Foundation Presidential Young Investigator Award, the Shaw Scientist Award of the Milwaukee Foundation, and numerous honorary lectureships.

Dr. Carroll will discuss foundational questions of evolutionary biology in his lecture, "Remarkable Creatures: Epic Adventures in the Search for the Origins of Species." The talk is scheduled for 7 p.m. on Tuesday, Oct. 27, in Riley Auditorium in the Battelle Fine Arts Center, 170 W. Park St., Westerville. It is free and open to the public.

For further information see http://www.otterbein.edu/sciencelectureseries or contact Diane Nance (614-823-1846).
The IYA comes to a close. Many events were organized to commemorate the 400th anniversary of two milestones in astronomy. One is the first astronomical observation through a telescope, undertaken by Galileo Galilei and described beautifully in his famous “Starry Messenger” of 1610, originally published in Latin as “Siderius Nuncius”. The second is the publication of Johannes Kepler’s “Astronomia Nova” which contained some “brand-new astronomy”, namely the first installment of Kepler’s three laws describing how (Newton would later explain why) planets move around the sun. The first law states that orbits are ellipses and not circles, as previously thought, the second (equal area) law describes how fast the move: swiftly when close to the sun and slowly when farther away. The third law, relating the sizes of the orbits to the length of the planet’s “year”, was published ten years later. Kepler’s laws are an amazing step forward from the awkward epicycle theory of Ptolemy. His achievement cannot be overestimated: Ptolemy’s wrong theory had ruled for almost 1500 years before Kepler dared to challenge it, and replaced it with a better description of Nature’s patterns that would inspire Newton to venture even further.

Galileo meanwhile had discovered other things that shattered the old notions of the laws of the heavens. He discovered the Medicean planets, now known as the four Galilean moons of Jupiter (see photo), showing that the Earth, up to this point the only planet with a moon, is not so special after all. He went on to discover mountains on the moon (immediately calculating their height correctly from shadows cast), the phases of Venus (falsifying the geocentric model of the solar system), the sunspots (giving the correct modern interpretation of the phenomenon and using it to estimate the Sun’s rotation period), and more. All in all, the work of a true genius.

International Year of Astronomy 2009

Join APS
Joining APS is the perfect way to stay connected with the most recent developments in the physics world. In addition, APS works on behalf of the physics community to improve physics education, inform the public and policy leaders about the importance and excitement of physics, increase the diversity of the field, and reach out to physicists around the world. Join now and become part of these efforts.

Student Research Activities
Otterbein physics student Molly Clairemont spent ten weeks in the Summer doing research funded by Dr. Trittmann’s Research Corporation grant. Just out of freshman physics class, Molly explored special relativity, quantum mechanics and a dash of particle physics. The work culminated in her calculation of the Hamiltonian matrix elements appearing in a discretized version of a two-dimensional quantum field theory related to Quantum Chromodynamics, one of the pillars of the so-called Standard Model of particle physics.

In the summer of 2009, Justin Young was accepted into a competitive National Science Foundation REU (Research Experience for Undergraduates) program at UC Davis. There he worked with Dr. Rena Zieve, other faculty, and graduate students to explore properties of low temperature superconductors. Using liquid nitrogen and helium he examined multiple crystal samples under various pressures hoping to see changes in the superconducting transition temperature. His results will be presented on the Otterbein honors reporting day in spring 2010.

OSAPS
Two meetings of the Ohio-Region Section of the American Physical Society (OSAPS) are scheduled for this academic year. The autumn conference will be at Ohio Wesleyan University in Delaware and takes place October 9 & 10, 2009. The focus will be on “Synchronization of Coupled Nonlinear Oscillators”. It is held concurrent with the meeting of the Southern Ohio section of the American Association of Physics Teachers. The OSAPS Spring conference will be hosted by Kettering University in Flint, Michigan on April 30 & May 1, 2010.

Both conferences are Friday afternoon/Saturday morning events, and free for students. Although there is a set of plenary talks on the main theme of the meetings, many short talks with topics from all areas of physics are scheduled in the parallel sessions. These conferences are a great opportunity for undergrads to go a first professional conference.
Scheduled Events Winter/Spring 2010

Coffee Hour
Wednesdays, 3:30 p.m., Science Bldg. Room 204

Society of Physics Students
Pizza Lunch—October 6, 2009
Other Dates TBA

“Starry Mondays”
Astronomy Lecture Series
Mondays
October 5, 2009, 7:00pm
November 2, 2009, 7:00pm
February 1, 2010, 7:00pm
March 1, 2010, 7:00pm
April 5, 2010, 8:00pm
May 3, 2010, 8:00pm

Night Sky Observing
Prairie Oaks Metro Park
Fridays
September 25, 2009, 8:30pm
February 19, 2010, 7:00pm