

V I E W

PISGAH ASTRONOMICAL RESEARCH INSTITUTE

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Summer time is student time at PARI

PARI is expecting its busiest summer yet, with scores of students enrolled in a variety of programs. Here are the highlights:

Space Science Lab (SSL): Supported by a grant from the Burroughs-Wellcome Fund Student Science Enrichment Program, 30 high school students from Henderson, Jackson and Transylvania counties will spend a week on campus conducting visible and radio studies of the Sun.

Duke Talent Identification Program (TIP): 24 high school students from across the country will spend two weeks on campus studying astronomy, physics and astrobiology.

Space Science Camp: A new program this year affords local young people the opportunity to spend a day using PARI's telescopes and earth science instruments.

ROBOTS: 210 sixth graders throughout North Carolina will remotely operate "Smiley," our 4.6m radio telescope, to measure the rotation of the Milky Way Galaxy. They will also use the 0.4m West optical telescope robotically, learning how to take astronomical images.

Interns: Up to ten undergraduate students will conduct research at PARI. Several will live on campus and work with PARI mentors, while others will travel with their professors from UNC-Asheville.

If you have an interest in helping with any of these programs, contact PARI to discuss a volunteer teacher-aide position.



The inaugural graduating class of 27 SSL students included this group who received their certificates of achievement during a recent ceremony at PARI. The high school students built their own radio telescopes and spent a year studying the sun.



Samantha Knight and Melanie Miller, both juniors at Brevard High School, won the American Meteorological Society Award for Outstanding Achievement at the North Carolina Science Fair in Raleigh. The students are shown in front of their exhibit, "Weather vs. Sun Activity," a project that resulted from their participation in the Space Science Lab last summer.

PARI Calendar

June 2, June 9	ROBOTS Workshops in Charlotte, Chapel Hill
June 14-28	Duke TIP Summer Field Study in Astronomy, Physics, and Astrobiology
June 15	Evening at PARI
July 6	Space Science Day Camp
July 16-21	Space Science Lab
July 20	Evening at PARI
July 27	ROBOTS Symposium at PARI
July 30-Aug 4	Space Science Lab
August 17	Evening at PARI

NC OPT-ED explores opportunities at PARI



Shown here with President Don Cline, a group of faculty and students from several NC OPT-ED universities spent a recent weekend at PARI exploring learning opportunities. Earlier this year PARI was named a collaborative partner in NC OPT-ED, an NSF-funded alliance of statewide institutions committed to diversifying the science, technology, engineering and mathematics (STEM) workforce.

A special PARI visitor



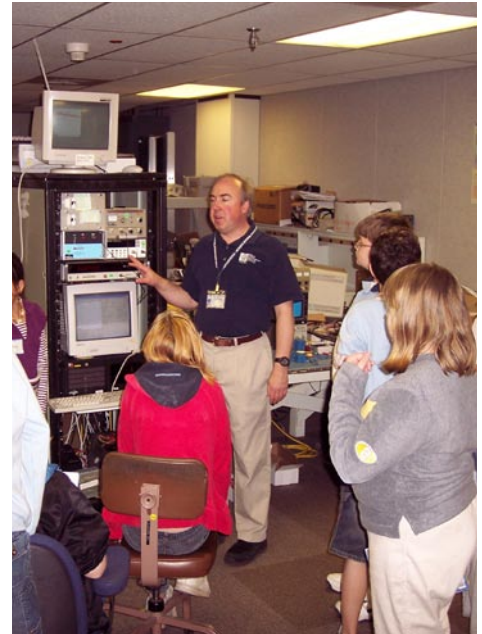
*In the PARI library, J. Dan Avant and his son John review volumes of the *Astronomical Journal* from the years of their birth, 1912 and 1945. At age 95, Dan is an Ohio resident and the oldest Friends of PARI member. John has managed PARI's communications programs since 2003. The *Astronomical Journals* were donated to PARI from Harvard University and date back to 1849.*

Space Day 2007

Despite the rain and cool weather more than 250 people attended PARI's annual Space Day open house. New this year was a bus tour that enabled visitors to see parts of the campus that are not normally open to the public. Visitors also were treated to one of our new StarLab planetarium programs, Skies of the Cherokee, a collaborative effort between PARI and the Cherokee Elementary School on the Qualla Boundary.



Brevard Middle School Career Day at PARI



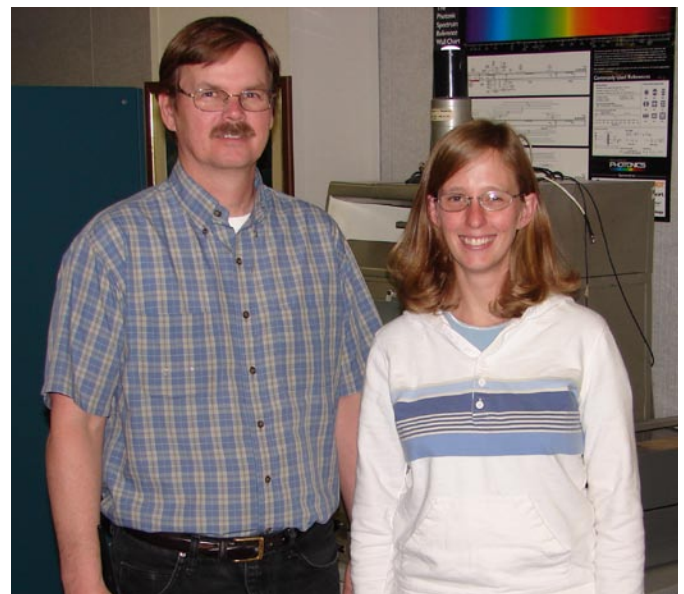
This spring PARI hosted one of the largest groups to ever visit the campus when 270 students from Brevard Middle School attended Career Day. The students toured the campus and spent the day learning about careers in science and technology. The event proved to be so popular we're now in discussions about making it an annual event.

PARI promotes Lamar Owen to CIO



Lamar Owen, left, shown here with Dr. David Clavier, vice president of administration and development, has been promoted to chief information officer (CIO) at PARI. Lamar came to PARI as a volunteer in 1999, was hired as a network consultant in 2001 and became fulltime director of information technology in 2003. As CIO, Lamar is responsible for all the computer systems and data networks at PARI, as well as our new OC3 Internet connection, one of the largest in Western North Carolina.

PARI hires K-12 education specialist



PARI has strengthened its K-12 education initiatives with the hiring of Beth Snoke Harris, science educator. Shown here with Dr. Michael Castelaz, director of astronomical studies and education, Beth comes to PARI from the Science House at N.C. State University where she was instrumental in developing educational resources and materials for K-12 teachers to promote the use of technology in the classroom.

Homeschool Day

PARI's Spring Homeschool Day attracted 69 students and just as many parents, who spent the day in a number of science and technology-oriented activities, including making podcasts, learning electronics, creating sky stories and making their own constellations. The event was one of a series of special programs PARI has conducted for children being schooled at home, and included grade-appropriate (K-2, 3-5, 6-8 and 9-12) modules for four areas of study. There were a number of comments that this was the best Homeschool Day yet, and in the written evaluations one parent said "Thank you for allowing us to come here to bring such a wonderful element of teaching for our children. We are very fortunate to have you here."



STEREO

astronomer's corner

Dr. Bob Hayward, Astronomer/Educator

On April 23, 2007, NASA released the first stereoscopic images of the Sun. We are all familiar with stereoscopic vision – we use it every day. We estimate distances by looking at objects from slightly different angles with two detectors, called eyes. For a long time astronomers have used this principle to estimate distances to nearby stars. We take a picture of a star on one night and then again approximately six months later. Since the Earth has moved around to the other side of its orbit, we are looking at the star from a slightly different angle. Astronomers call the angle measured the star's parallax. The closer a star is to us, the larger its parallax will be...and vice versa. So by measuring a star's parallax we can determine its distance.

On October 25, 2006, NASA launched on a single rocket two almost identical satellites. Through a series of orbital maneuvers using the gravity of the Moon, these satellites, dubbed STEREO for Solar TERrestrial RELations Observatory, are now orbiting the Sun one slightly ahead of the Earth and the other slightly behind the Earth. The one ahead of the Earth is in an orbit slightly smaller than the Earth's. Thus, it orbits the Sun a little more quickly than the Earth and is gradually pulling away from us. Its twin is in an orbit slightly outside the Earth's. So it is slowly dropping behind the Earth. The end result of this is that the satellites are drifting apart at about 45° per year.

The stereoscopic views of our central star will help scientists understand it much better than in the past. They will enable solar physicists to detect and study the flow of energy and matter from the Sun especially the so-called Coronal Mass Ejections (CME's). These massive ejections of electrically charged particles play havoc with space "weather" in the vicinity of the Earth and can even disrupt our satellites and power grids. So understanding CME's is a critical area of scientific study.

Solar activity, generally gauged by the number of sunspots on the surface, follows a cycle of approximately eleven years. Recent observations of sunspots seem to indicate that we entered solar minimum in 2006. In the next few years, solar activity will be increasing and observations by STEREO will be especially crucial.

But STEREO is not the only mission studying our Sun. We are all aware of the more spectacular missions to the planets such as the Mars Exploration Rovers Spirit and Opportunity on the red planet and the Cassini and Huygens missions that have sent valuable data including pictures back from Saturn and its moons. But lesser known are ongoing studies of the Sun. The Solar and Heliospheric Observatory (SOHO), a joint US-European mission, has been observing the Sun since its launch in December 1995. SOHO is studying the interior of the Sun by watching the surface for tiny ripples, called g (for gravity) modes, caused by subtle variations in the very core of our central star. A fascinating offshoot of SOHO's study of the Sun is its discovery of over a thousand (1258 at this writing) small comets that it has photographed in the vicinity of the solar surface, some of which are diving to their obliterations in the Sun. Another spacecraft called Ulysses is in polar orbit around the Sun studying that star from angles impossible from the Earth or Earth orbit. The Active Cavity Radiometer Irradiance Monitor Satellite (AcrimSat) launched in 1999 continues to monitor solar radiation reaching the Earth with an eye to understanding how this might contribute to global warming. So the two STEREO satellites are just the latest additions to our fleet of solar spacecraft. For more information on this exciting mission visit NASA's mission site at http://www.nasa.gov/mission_pages/stereo/main/index.html.

PARI needs your help!

PARI is a public, not-for-profit foundation. Financially, we are dependent upon contributions and grants for our educational and research programs, and for the many operating expenses associated with maintaining the campus and our facilities.

If you have recently contributed, we thank you for your support. If not, please help support PARI and our mission with a contribution. PARI is a 501 c(3) organization and all donations are tax deductible to the full amount allowed by law.

A financial contribution automatically makes you a member of Friends of PARI. Membership levels and benefits include:

Student Member	\$10.	Member level for full time students. E-mail copy of the PARI Newsletter.
Associate Member	\$50.	Receive Quarterly Issues of the PARI Newsletter.
Member	\$100.	All of the above plus a PARI key chain with light.
Family Member	\$200.	For a family of 4, all of the above plus a PARI coffee mug. Use of the PARI Astronomy Library.
Supporter	\$500.	All of the above plus a PARI hat and a PARI lapel pin.
Mentor	\$1,000.	All of the above plus an invitation to one of the quarterly night astronomy sessions at PARI.
Advisor	\$2,000.	All of the above plus use of the Internet controlled remote optical imaging Space Observatory.
Benefactor	\$5,000.	All of the above plus "Guest Astronomer Program." Spend a day working with the astronomy staff, learning how to operate a radio telescope.

All donors at the level of \$5,000 and above will receive recognition on a plaque at PARI.

Please provide the requested information below and mail it with your contribution to:

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Name: _____

Address: _____

City State Zip _____

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The Pisgah Astronomical Research Institute (PARI) is a not-for-profit public foundation established in 1998. Located in the Pisgah Forest 30 miles southwest of Asheville, NC, the PARI campus is a dark sky location for astronomy and was selected in 1962 by NASA as the site for one of the first U.S. satellite tracking facilities. Today, the 200 acre campus houses radio and optical telescopes, earth science instruments, 30 buildings, a fulltime staff and all the infrastructure necessary to support STEM (science, technology, engineering and math) education and research. PARI offers educational programs at all levels, from K-12 through post-graduate research. The institute is affiliated with the 16-campus University of North Carolina system through PARSEC, a UNC Center hosted at PARI, and is a member of the NC Grassroots Museum Collaborative. For more information about PARI and its programs, visit www.pari.edu.

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