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Next Docent Meeting
Monday, April 16

The next docent meeting will be held on Monday, April 16. The meeting will convene at 6:00 in the main conference room and will feature dinner and a speaker. Docents should visit the docent forum calendar to schedule their hours. Docents who do not have web access may contact Nick Petrosino. See the URL for the docent calendar at lower left.

Kitt Peak Docent Program

950 N Cherry Ave
Tucson, AZ 85719

Docent Forum: http://groups.yahoo.com/group/docentforum/
Docent Calendar: http://groups.yahoo.com/group/docentforum/
Volunteering at Kitt Peak:http://www.noao.edu/outreach/kpoutreach.html

www.noao.edu

KITT PEAK DOCENT

«First Name» «Last Name»
«Mailing Address»
«City» «State» «Zip Code»

Kitt Peak Docent Program

DOCENT NEWS

Number 114
April 2007

KITT PEAK DOCENT

Points of Interest:

- The docent meeting is scheduled for Monday, April 16 and features dinner and a speaker.
- April 8: Easter Sunday
- April 12: Work Space Party: Yuri's Night 2007
- April 12: Lecture: Hot Topic, Cool Science—The Greenhouse Effect and the Orbiting Carbon Observatory, Pasadena, CA
- April 13: Asteroid 1994 GL near-Earth flyby at 0.020 AU
- April 16: Leonardo DaVinci's 555th birthday (1452)
- April 16 to 22: Astronomy Week
- April 21: Astronomy Day
- April 22: Lyrids Meteor Shower peak

For additional information about these points of interest, visit http://www2.jpl.nasa.gov/calendar/.

ASTRONOMY DAY CELEBRATION, APRIL 21ST

Astronomy Day began in 1973 when Doug Berger, an amateur astronomer and president of the Astronomical Association of Northern California, decided to take astronomy to the streets as a way to inform people about the hobby and the science and entice them to visit an observatory. The idea caught on.

Today Astronomy Day is celebrated annually on the Saturday closest to the first-quarter moon. Events are planned across America and in a number of other countries. It is also the capstone event for Astronomy Week, which runs from the preceding Monday until the following Sunday.

This year the Kitt Peak Visitor Center will host a day-long celebration on Saturday, April 21st. Three presentations will be given by professional and amateur astronomers: Dr. Ron Probst at 10:00 speaking about NEWFIRM, Dr. Nalin Samarasinha at noon speaking about comet research, and James McGaha at 2:00 speaking about the contribution amateurs make to the science of astronomy.

In between presentations, there will be hands-on events for families, solar observing at the Coronado and any other telescopes that are set up on the patio, and of course the tours. The presentations are scheduled so they will not interfere with the tours except the first one. The solar tour will have to begin outside while the 10:00 presentation is in progress. The two remaining presentations will begin thirty minutes after the start of the 11:30 and 1:30 tours.

This event is free so the visitor center will not know how many people to expect. Docent participation is encouraged, and the activities will be discussed at the meeting on April 16.

NEW EVENT FOR ASTRONOMERS-TO-BE

April 21st marks the inaugural Junior Astronomer program at Kitt Peak. The program was designed to offer an NOP-like event to those too young to attend the real nightly program.

The visitor center has found through experience that accepting children younger than eight years old in the Nightly Observing Program can be problematic. They get bored, tired, and cranky long before the event concludes. The result is that one or both parents, who have paid for the program, spend most of it in the visitor center trying to console the child. If they choose to tough it out in the program, the child may disrupt the event for the other paying customers. Either way someone is not having a good time.

With the Junior Astronomer program, children ages five to nine can visit Kitt Peak and observe the Sun and Moon. When they are not observing, the junior astronomers and their parents will engage in activities aimed at increasing the children's understanding of the two most obvious objects in the sky.

The program runs in the late afternoon so little ones can return home at a reasonable hour and get plenty of much needed sleep after all that science.

Docents may inform guests with children about the program. Anyone wishing to make reservations may call the visitor center. The program costs $12.00 for adults and $10.00 for children and lasts two hours. The April event goes from 5:00 to 7:00. The junior astronomers will be leaving before the facilities are needed for the NOP.

GEMINI'S LASER VISION REVEALS STRIKING NEW DETAILS IN ORION NEBULA

An image released today by the Gemini Observatory brings into focus a new and remarkably detailed view of supersonic "bullets" of gas and the wakes created as they pierce through clouds of molecular hydrogen in the Orion Nebula. The image was made possible with new laser guide star adaptive optics technology that corrects in real time for image distortions caused by Earth's atmosphere.

The Orion Nebula is a star-forming region located relatively near to us, about 1,500 light-years away. It's a young stellar nursery and shows many unusual features related to the effect of massive stars on the dense birth environment of gas and dust.

The Orion bullets were first seen in a visible-light image in 1983. By 1992, images taken at infrared wavelengths led astronomers to conclude that these clumps of gas were ejected from deep within the nebula following an unknown violent event connected with the recent formation of a cluster of massive stars there. The bullets are speeding outward from the cloud at up to 400 kilometers (250 miles) per second. This is more than a thousand times faster than the speed of sound. The name "bullet" is somewhat misleading since these objects are truly gigantic. The typical size of one of the bullet tips is about ten times the size of Pluto's orbit around the Sun. The wakes shown in the image about are about a fifth of a light-year long.

Clouds of iron atoms at the tip of each bullet glow brightly (blue in the Gemini image) as they are shock-heated by friction to around 5000C (9,000F). Molecular hydrogen, which makes up the bulk of both the bullets and the surrounding gas cloud, is destroyed at the tips by the violent collisions between the high-speed bullets and the surrounding cloud. On the trailing edges of the bullets, however, the hydrogen molecules are not destroyed, but instead are heated to about 2000C (4000F). As the bullets plow through the clouds they leave behind distinctive tubular wakes (colored orange in the Gemini image). These wakes shine like bullet tracers due to the heated molecular hydrogen gas.

"What I find stunning about the new image is the detail it shows, which was blurred out in any previous studies, revealing the structure of the bullets and their trailing wakes as they run into the surrounding molecular cloud," said Michael Burton of the University of New South Wales who, along with the late David Allen (Anglo-Australian Observatory) were the first to suggest the origin of these spectacular bullets 15 years ago. "This level of precision will allow the evolution of the system to be followed over the next few years, for small changes in the structures are expected from year to year as the bullets continue their outward motion."

The bullets are relatively young, with their ages estimated to be less than a thousand years since ejection. The new Gemini adaptive optics image shows them in near-infrared light in a combination of three images using different filters. The blue features in the Gemini image correspond to the shocked regions where the iron is fluorescing. The orange regions are the glowing hydrogen molecules in the bullet's wakes. In this image, the wakes ("fingers") behind each of the iron-gas bullets are resolved into filaments for the first time ever. These might well be the actual sheaths enclosing the shock waves created as the bullets travel through the cloud.

The exceptional resolution of the new image was made possible by adaptive optics technology in place at Gemini Observatory. With a laser guide star as a reference and a rapidly deformable mirror for real-time correction, astronomers can compensate for most of the atmospheric distortions that blur the near-infrared image of a star whose light reaches the telescope's primary mirror. The system deploys a yellow/orange solid-state sodium laser that produces the artificial guide star by exciting and causing a small column of sodium gas about 90 kilometers (56 miles) up in our atmosphere to glow. The artificial star it creates becomes a reference star for the adaptive optics system and allows it to determine how the atmosphere distorts the incoming near-infrared starlight.

This Gemini image was obtained as part of the commissioning and science verification of the Gemini North laser guide star system. The data used to make this image are available to astronomers world-wide by accessing the Gemini Data Archive: http://www1.cadc-ccda.hia-iha.nrc-cnrc.gc.ca/gsa/

Laser guide star technology is relatively new and has recently been advanced by the Gemini Observatory with the development of a solid-state laser for this purpose, a joint venture with the US National Science Foundation and the US Air Force. The Gemini North solid-state, sum-frequency laser was designed and built under contract by Coherent Technologies (now Lockheed Martin/Coherent Technologies). ALTAIR, the Gemini North adaptive optics system, was designed and built by the Herzberg Institute of Astrophysics in Victoria, Canada.

The Gemini Observatory is an international collaboration with two identical 8-meter telescopes. The Frederick C. Gillett Gemini Telescope is located at Mauna Kea, Hawai'i (Gemini North) and the other telescope at Cerro Pachon central Chile (Gemini South), and hence provide full coverage of both hemispheres of the sky. Both telescopes incorporate new technologies that allow large, relatively thin mirrors under active control to collect and focus both optical and infrared radiation from space.

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April 2007

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1 *Larry L., Ken*	*2* *Gerald, Mike* *Sells School 30*	*3* *Richard* *Sells School 30*	*4* *Sheila* *Pima CC, Sells School 30*	*5* *Jerry* *Sells School 30*	*6* *Doug, Vance (C)*	*7* *Eugene, Mike*
8 *Jerry, Gerald*	*9* *Larry E.*	*10* *Joyce, Mike*	*11* *Sheila*	*12* *Jerry, Mike*	*13* *Gerald, Don*	*14* *Jerry, Ken*
15 *Gerald*	*16* *Aubrey* *Docent Meeting*	*17* *Joyce, Mike*	*18* *Sheila, Richard*	*19* *Jerry*	*20* *Don, Doug*	*21* *Jim, Eugene* *Astronomy Day*
22 *Jerry, Ken*	*23* *Need Docent*	*24* *Joyce, Ken, Laura* *Vista Verde 58*	*25* *Sheila*	*26* *Jerry*	*27 Eugene, Doug, Don, Richard, Vance* *Deer Valley 170*	*28* *Larry L., Jim*
29 *Ken*	*30* *Aubrey*					

SOLAR POWER IN MARANA

About a year ago I learned of Tucson Electric Power's "Sun Share" program that provides subsidies for the installation of solar electric generating systems. I had thought about installing such a system for our home, but there were some major concerns: Where to put the battery bank , the cost, and how to get such a system approved by our Home Owner's Association. I then discovered that the type of system promoted by TEP, a "grid-tie system", does not use storage batteries. The D.C. current generated the photoelectric panels is converted to A.C. current and fed into the home's main breaker panel. Any current not used to power the home is fed into the electric supply grid for credit. And Arizona State Law over-rides HOA objections to the installation of solar energy systems.

I decided that a two-kilowatt capacity system would be most cost effective given our yearly electric-energy usage, signed a contract with TEP, and chose an installation contractor. We were told that getting the necessary building permit should take two or three weeks. But apparently we were the first to request such a permit from the Town of Marana and eight weeks elapsed before the permit was issued. Our contractor spent more time "educating" the folks responsible for issuing the permit than actually installing the system.

Finally the system was installed, inspections performed, and the system went "on-line" in early May 2006. The system has performed flawlessly – even generating significant power on cloudy days. It is conservatively rated at 2kW but it is capable of a peak output of 3kW under ideal conditions. Its midday output normally peaks at about 2.6kW and it generates between 16 and 19 kilowatt-hours on bright sunny days. In nine months of operation, it has generated 4180 kilowatt-hours of energy. At this rate, it will generate about 75% of our total yearly electric energy needs. *Larry East*