

## Contact List

**Kitt Peak Visitor Center**—318-8726  
Nick Petrosino, Supervisor  
npetrosino@noao.edu  
318-8732

**NOAO Public Outreach**  
Rich Fedele, Manager  
rfedele@noao.edu  
318-8163  
Robert Wilson,  
Sr. Program Coordinator  
rwilson@noao.edu  
318-8440

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](http://www.noao.edu)



## Next Docent Meeting Monday, May 15

The next docent meeting will be held on Monday, May 15. 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.

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

Kitt Peak Docent Program

# DOCENT NEWS

Number 103

May 2006



## SOLAR TELESCOPES, IN PLACE AND OPERATIONAL

All three Coronado refractors are installed in the Razdow dome and are available for public viewing. Public outreach has not received the remaining equipment necessary to complete the project but that should be arriving in the near future. In the meantime, volunteers are needed to staff the small observatory and give visitors a glimpse of the Sun in two wavelengths.

Of the three refractors, two are H-a and one is Calcium-K. The 90-mm H-a and 70-mm Ca-K are the two that the visitors will use for viewing initially. Ultimately the Calcium refractor will be fitted with a camera, as will the other H-a, and feed images to a web site. The 90-mm will remain available for public viewing.

All three telescopes are mounted on a Meade fork arm assembly controlled by Meade's Auto Star system. Operation of the

mount is simple, and volunteers will learn the procedure in one training session. Currently the dome is manually operated as well, and that is equally simple.

Ideally there would be two docents available daily to swap duty at the dome, one taking the morning shift and the other taking the afternoon. Such an arrangement would allow the little observatory to remain open all day for visitors who could come through as part of the solar tour or wander up on their own.

Eventually the dome will be automated so the attending docent would have little to do other than open up, assist visitors, and shut down. But it is hoped that the number of visitors whose curiosity about the Sun draws them to the observatory will provide sufficient activity and intellectual stimulation. Interested docents contact Robert Wilson.

## Ca-K, H-a, AND THE CHROMOSPHERE

The chromosphere is a non-homogeneous layer of the Sun's atmosphere that extends from just above the photosphere to distances ranging from 2,000 to 10,000 kilometers, depending on solar activity in a given region, where it meets the corona. The chromosphere is visible only under certain conditions.

One of those conditions occurs during a total solar eclipse, when a thin reddish ring is visible around the Sun at totality. The reddish color, from which the chromosphere gets its name, results from the light of ionized hydrogen at 656.3 nanometers in the red portion of the visible spectrum, also called Hydrogen-alpha.

The other means of viewing the chromosphere is with special filters. These are what the Coronado telescopes employ. One of the telescopes passes only the hydrogen-alpha emission line. The other telescopes passes

the light of singly-ionized calcium at 393.4 nanometers at the violet end of the visible spectrum. This emission is also known as the Calcium K-line.

Because the Ca K-line is almost in the ultraviolet, chromospheric detail can be very difficult for people to see, depending on the blue sensitivity of their eyes. But it is worth having them take a look simply to demonstrate the concepts of filters and wavelengths.

Visible at these wavelengths are prominences, filaments, plage (bright areas of magnetic activity around sunspots) and the chromospheric network of supergranule cells.

For additional information about the chromosphere, visit solar Physics at [science.nasa.gov](http://science.nasa.gov). Nearest Star: The Surprising Science of Our Sun, by Golub and Pasachoff is another excellent resource.

### Points of Interest:

- The docent meeting is scheduled for Monday, May 15, featuring dinner and a speaker.
- May 1 to 7: Astronomy Week
- May 4: Jupiter at opposition
- May 5: Eta Aquarids Meteor Shower peak
- May 5: Astronomy Day
- May 10, 12, 13, 14, 15, 16, 17, and 27: Comet Schwassmann-Wachmann 3 near-Earth flyby at distances from 0.049 AU to 0.083 AU
- May 14: Griffith Observatory opens
- May 16: Asteroid 2006 GY2 near-Earth flyby at 0.017 AU
- May 26 to 28: 38th Annual Riverside Telescope Makers Conference near Bib Bear City, CA.

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

## HUBBLE PROVIDES SPECTACULAR DETAIL OF A COMET'S BREAKUP

NASA's Hubble Space Telescope is providing astronomers with extraordinary views of comet 73P/Schwassmann-Wachmann 3, which is falling apart right before our eyes. Recent Hubble images have uncovered many more fragments than have been reported by ground-based observers. These observations provide an unprecedented opportunity to study the demise of a comet nucleus.

Amateur and professional astronomers around the world have been tracking for years the spectacular disintegration of 73P/Schwassmann-Wachmann 3. As it plunges toward a June 6th swing around the Sun, the comet will pass Earth on May 12th, at a distance of 7.3 million miles, or 30 times the distance between Earth and the Moon.

The comet is currently comprised of a chain of over three dozen separate fragments, named alphabetically, stretching across several degrees on the sky. (The Sun and Moon each have an apparent diameter of about 1/2 of a degree.) Ground-based observers have noted dramatic brightening events associated with some of the fragments (as shown in the bottom frame) indicating that they are continuing to break-up and that some may disappear altogether.

Hubble caught two of the fragments, B and G, (top frames) shortly after large outbursts in activity. Hubble also photographed fragment C (not shown), which was less active. The resulting images reveal that a hierarchical destruction process is taking place, in which fragments are continuing to break into smaller chunks. Several dozen "mini-fragments" are found trailing behind each main fragment, probably associated with the ejection of house-sized chunks of surface material that can only be detected in these very sensitive and high-resolution Hubble images.

Sequential Hubble images of the B fragment, taken a few days apart, suggest that the chunks are pushed down the tail by outgassing from the icy, sunward-facing surfaces of the chunks, much like space-walking astronauts are propelled by their jetpacks. The smaller chunks have the lowest mass, and so are accelerated away from the parent nucleus faster than the larger chunks. Some of the chunks seem to dissipate completely over the course of several days.

Deep-freeze relics of the early solar system, cometary nuclei are porous and fragile mixes of dust and ices. They can be broken apart by gravitational tidal forces when they pass near large bodies (for example, Comet Shoemaker-Levy 9 was torn to pieces when it skirted near Jupiter in 1992, prior to plunging into Jupiter's atmosphere two years later). They can also fly apart from rapid rotation of the nucleus, break apart because of thermal stresses as they pass near the Sun, or explosively pop apart like corks from champagne bottles due to the outburst of trapped volatile gases.

"Catastrophic breakups may be the ultimate fate of most comets," says planetary astronomer Hal Weaver of the Johns Hopkins University Applied Physics Laboratory, who led the

team that made the recent Hubble observations and who used Hubble previously to study the fragmentations of comets Shoemaker-Levy 9 in 1993-1994, Hyakutake in 1996, and 1999 S4 (LINEAR) in 2000. Analysis of the new Hubble data, and data taken by other observatories as the comet approaches the Earth and Sun, may reveal which of these breakup mechanisms are contributing to the disintegration of 73P/Schwassmann-Wachmann 3.

German astronomers Arnold Schwassmann and Arno Arthur Wachmann discovered this comet during a photographic search for asteroids in 1930, when the comet passed within 5.8 million miles of the Earth (only 24 times the Earth-Moon distance). The comet orbits the Sun every 5.4 years, but it was not seen again until 1979. The comet was missed again in 1985 but has been observed every return since then.

During the fall of 1995, the comet had a huge outburst in activity and shortly afterwards four separate nuclei were identified and labeled "A", "B", "C", and "D", with "C" being the largest and the presumed principal remnant of the original nucleus. Only the C and B fragments were definitively observed during the next return, possibly because of the poor geometry for the 2000-2001 apparition. The much better observing circumstances during this year's return may be partly responsible for the detection of so many new fragments, but it is also likely that the disintegration of the comet is now accelerating. Whether any of the many fragments will survive the trip around the Sun remains to be seen.

<http://hubblesite.org/news/2006/18>  
<http://www.jhuapl.edu/newscenter/pressreleases/2006/060427.asp>  
<http://www.spacetelescope.org>

*Ray Villard*  
 Space Telescope Science Institute  
 Baltimore, Md.  
 Phone: 1-410-338-4514  
[villard@stsci.edu](mailto:villard@stsci.edu)

*Michael Buckley*  
 Johns Hopkins University Applied Physics Lab  
 Laurel, Md.  
 Phone: 1-443-778-7536  
[michael.buckley@jhuapl.edu](mailto:michael.buckley@jhuapl.edu)

*Hal Weaver*  
 Johns Hopkins University Applied Physics Laboratory  
 Laurel, Md.  
 Phone: 1-443-778-8078  
[hal.weaver@jhuapl.edu](mailto:hal.weaver@jhuapl.edu)

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Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1 <i>Bill, Jim S.</i>	2 <i>Larry E., Joyce, Bob Mc.</i>	3 <i>Punch, Sheila</i>	4 <i>Eugene, Jerry, Jon</i>	5 <i>Doug, Jerry L., Vance</i>	6 <i>Vance, Kelly</i>
7 <i>Jerry, Larry L.</i>	8 <i>Ken, Aubrey, Jon</i>	9 <i>Gerald, Bob Mc.</i>	10 <i>Punch, Sheila T.O. Head Start</i>	11 <i>Gerald, Jerry</i>	12 <i>Doug, Rich G., Vance</i>	13 <i>Jim O., Eugene, Gerald</i>
14 <i>Need Docent</i>	15 <i>Gerald Docent Meeting</i>	16 <i>Bob Mc., Aubrey</i>	17 <i>Punch, Sheila</i>	18 <i>Jon</i>	19 <i>Doug</i>	20 <i>Jim O., Larry L.</i>
21 <i>Anna</i>	22 <i>Bill, Ken</i>	23 <i>Aubrey, Larry E.</i>	24 <i>Punch, Sheila</i>	25 <i>Ken, Rich G.</i>	26 <i>Doug, Jerry L., Bill Ind. Oasis 108</i>	27 <i>Jim O., Eugene</i>
28 <i>Anna</i>	29 <i>Bill</i>	30 <i>Aubrey</i>	31 <i>Punch, Sheila</i>			

## MAY, A MONTH OF PROGRAMS

May promises to be very busy if all goes as planned. Programs are scheduled every Saturday of the month, and as always a need for docent assistance is anticipated.

Friday evening downtown on May 5 is the monthly Lunar Adventure program. Following that in the early hours of May 6 is the Meteor Madness program for the Eta Aquarids meteor shower. The evening is the first in a four-event series called Stars and Music. JazzWerx, the student section of the Tucson Jazz Society, is scheduled to perform in the picnic area from 7:15 to 8:15, followed by a star party until 9:15.

May 13 on Kitt Peak was originally reserved for Tohono O'odham night. In the past those evenings have been very well attended and enjoyed equally by participants and staff. That program has been scaled back this year to a T.O. school night and the level of participation is difficult to predict. Although outreach has received a number of inquiries recently

from schools on the Nation concerning daytime visits and perhaps that bodes well for the 13th.

Jupiter reaches opposition in early May and two weeks later Kitt Peak hosts a program to highlight the event. Featured speaker will be Dr. Adam Showman of the Lunar and Planetary Laboratory whose research topics include atmospheres of gas planets. He will speak from 10:00 to 11:00 to start the program. Afterward the visitor center telescopes will be available for observing and refreshments will be available.

The meteor and Jupiter events require guests to park in the picnic area and be shuttled to the visitor center. Docents will be needed to assist with parking. If the response to advertising is significant, docents will also be needed to assist with the crowd in the visitor center. Any help that docents can provide will be appreciated. Contact Robert Wilson or use the forum calendar to schedule yourself for an event.