SIRIUS ASTRONOMER

NEWSLETTER OF THE ORANGE COUNTY ASTRONOMERS
See our web site at http://www.chapman.edu/oca/

April 1999 *Free to members, subscriptions $12 for 12 issues* **Vol. 26, No. 4**

John Sanford, former OCA President and ***Giuseppe Sala,*** OCA member from Italy, pose in front of the C-14 and John's favorite canine ***Wolfy***, just before removing the telescope from the Anza Observatory in late February. The telescope has been at Anza since 1984, and was moved to John's Starhome Observatory near Porterville. Photo by Wayne Johnson

CHAPMAN MEETINGS

The next meeting of the OCA is on Friday, April 9, at 7:30pm in the Science Hall of Chapman University in Orange. The free and open meeting will feature Dr. Lee Lindblom, a theoretical astrophysicist visiting at Caltech, who will talk about "Gravitational Wave Astronomy." There will also be a "What's Up?" presentation by Chris Butler, plus open slides/videos.

STAR PARTIES

The Silverado site will be open for observing on Saturday, April 10. The Anza site and Observatory will be open Saturday, April 17. Come prepared for cold weather --- dress warmly --- and if in doubt, check the satellite weather pictures before leaving town or call the observatory.

COMING UP

In May, OCA member Joel Harris will speak on the August 1999 Total Solar Eclipse. Coming in July will be the Orange County Fair. Volunteers are desperately needed!! Would you be willing to donate time at the Fair during a weeknight? Please contact Jim Benet, the Outreach Coordinator, at (714) 693-1639 or by email at jimbenet@csi.com.

The President's Message

by Wayne P. Johnson (aka Mr. Galaxy)

Well, it appears that spring is springing and activity is starting to pick up at our Anza Observatory site. If you haven't had a chance to get out there yet, you will be pleasantly surprised at the facilities that await your visit.

At the first March Star Party more than half dozen of our Anza House volunteers (Karen, Lea, Andrea, Russ, Dave, Anwar, Jim and a couple others who I may have missed) had a get-together, which included a wonderful chili dinner afterwards, to put up curtains and have a general house cleanup to make the place look great. As most of you know, we had a hantavirus scare in Anza early in March. Apparently it didn't affect our area, but just to be on the safe side Karen, who has a business that takes care of cleaning up in those type of situations, made sure that our house was cleaned out and any problem along that line was eradicated. We thank her very much for volunteering her time and her company's resources to that effort making the house safe for everyone. We still need to plug holes to prevent critters from getting in the house. Please be aware that since humans aren't using the facilities all the time, Mother Nature's little helpers like to try to reclaim their property! The job of putting up the curtains is still not complete, but the Anza House volunteers made a good dent in that project. Having curtains in the house will allow for somewhat normal activity inside the residence while there are people observing outside. The lights will still need to be somewhat dimmed while we ascertain how they affect activities outdoors. We are still looking for people to help out with installing swamp coolers and plumbing at the house. The house seems to stay warm enough during the winter, but it needs some help cooling off during the summer. Contact Roy Weinberger if you know of some good used swamp coolers that would be adequate for our place. Anza House consists of two doublewide trailers butted end-to-end and contains about 1500 square feet for those who can help out. I don't know if there is ducting in the mobile homes for the air.

While we were at Anza that weekend we were also able to find six other able-bodied volunteers in the Football Field area and recruit them to help move the dome for the MOCAT telescope onto its new pad. Thanks for the help guys! The dome still needs to be rotated a little for its final orientation, but we will do that later. We have a layout of the 12-inch Cassegrain telescope's footprint so that we can offset the dome on the pad by about 15 inches to center the telescope inside the structure. The dome needs to be secured to the pad and sealed, but we probably won't do that until we bring the telescope mount up to the site. It is currently at Craig Otis' work facility waiting to have some major cosmetic work done to it.

After we did all that we finally had our annual Messier Marathon coordinated by Doug Millar who did his best to chase away the clouds. He did pretty well up until midnight. Duties at home caused me to leave about that time though it looked like the skies were trying to clear as I was driving down the street. Did it clear up enough for members to complete the marathon? We'll find out at the meeting! See you there.

I should make a brief remark about the structure of our meetings. After every odd-numbered month (Jan, Mar, May, etc.) General Meeting we try to schedule a mini-Board meeting. For this reason, we shorten the General Meeting by eliminating the Open Slides and Raffle segments. At every even-numbered month (Feb, Apr, June, etc.) General Meeting we will try to have the Open Slides and Raffle segments, if there is enough interest. I have some good items for the raffle this month and hope you will enjoy them enough to participate. For the April meeting we will have a special, short presentation on the upcoming solar eclipse by Mike Simmons in the Open Slides segment. Next month Joel Harris will be our guest speaker on how and where to observe the last eclipse of the Millenium.

Clear skies!!

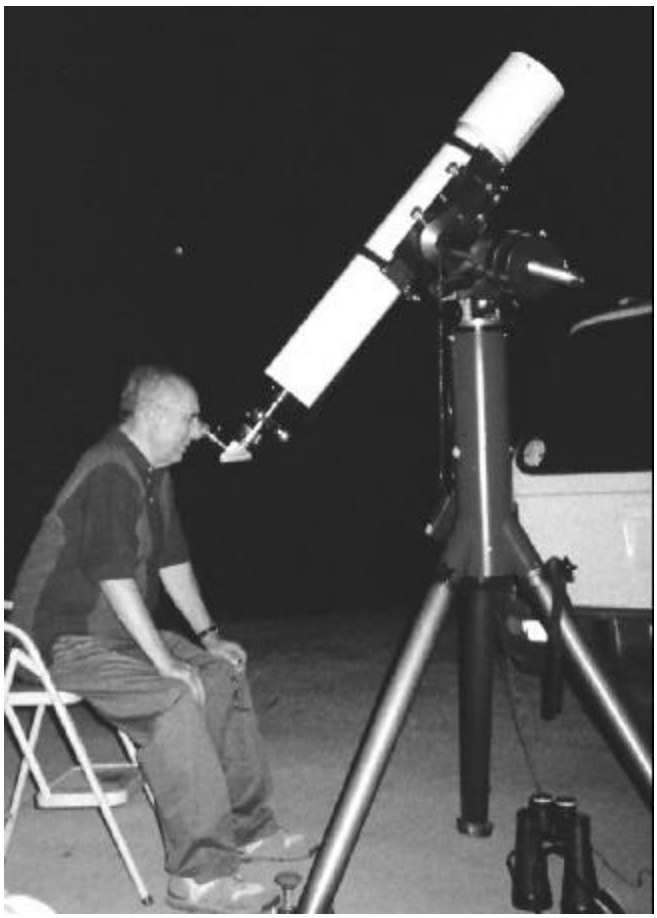
Life at Starhome

by John Sanford

OK, so the Editor has been bugging me about writing something about observing conditions here at Starhome, above the valley fog, here in the foothills of the Sierra. In case you are a new reader, I was an active OCA member since about 1971, and recently retired after 30 years of teaching at Orange Coast College's Photo Department. I bought a house up here where it is quite dark and the temperature extremes are not too bad. The sale closed in August, and I moved up between August and December, visiting about every other weekend until finally finishing teaching and "officially" moving out of my Coast Mesa house on the 18th of December.

Snow at Starhome, January, 1999.

The summer was hot and dry here at my 2300' altitude, and the sky was spectacular and mostly clear until well into December. Then winter came and the clouds rolled in. It has been largely cloudy since December, with some breaks when the jet stream deviates from being overhead. Most of the cloudiness comes from a "tropical jet" which is a stream of relatively warm damp air originating somewhere out Hawaii way. The major winter storms passed north of me here about 200 miles north of Los Angeles, but the jet always seemed to be here except for a few days when a strong front would push it east. There was one interesting week when the north edge of the tropical jet was pushed just south and east far enough so that it snowed here about 6 inches, the first sizable snow since 1990 according to the locals.



John at his 6-inch refractor

I set up my 6-inch f/9 Starfire Astro-Physics refractor in the center of my driveway and got a pretty good polar alignment after a few drift tests. Now I can shoot at least 15 mins. exposure with round stars using a piggyback camera. So far, I haven't shot through the 6 inch (except for Moon, planetary, and Sun shots) for a couple of reasons. I plan to set it up with a 4" f/6.7 Apogee guide refractor and an old ST-4 guide CCD imager so that I can take autoguided 60 to 90 minute exposures, which can be stacked, which is the state-of-the art for film photography right now. The plugs need to be redone, so until that has been accomplished, there isn't much sense in trying to take hand-guided images. I also will do CCD imaging using a 658x496 pixel Pegasus camera when I get my C-14 set up here later this spring. It has been moved from the corner of the OCA Observatory at Anza where it resided for about the last 10 years (and served as a "spare" and auxiliary instrument to the Kuhn 22-inch telescope).

Future plans include a roll-off observatory that is in the early design stage now, housing both telescopes. Observing plans include searching for supernovae, comets, and imaging and measuring positions of same, as well as continuing to make "pretty pictures" which are sold to the media by my agent, Science Photo Library in London, and myself through Astrostock. One of these for example, is a 6-hour polar star trail, which I did at f/8, which had little sky fog, but 90 degrees of trail! That's how dark it is...

Hope you all will read my "life story" in the Star Trails column by David Levy, appearing in the May issue of Sky and Telescope magazine.

I plan to go to the eclipse in central Europe (11 August) with Giuseppe Sala and other Italian amateurs (and maybe a couple of OCA members!) and visit old acquaintances in the British Astronomical Association in England on the way back. I do hope any OCA members who would like to see the dark sky here will come up and visit Wolfy and me here at Starhome!

John Sanford
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APRIL'S FEATURED SPEAKER

Dr. Lee Lindblom
Visiting Associate in Astrophysics, Caltech

Einstein's theory of gravitation predicts that moving masses will emit gravitational waves just as moving charges emit electromagnetic waves. I will discuss briefly and qualitatively the theory of these gravitational waves, and the detectors now being constructed in the hopes of observing them. I will also discuss the best theoretical guesses about the kinds of astrophysical systems that might be emitting strong enough waves for us to detect.

Orange County Astronomers
Spring Outreach Programs

1. Tuesday, 16 March 1999
2. Wednesday, 24 March 1999
3. Thursday, 25 March 1999
4. Wednesday, 21 April 1999
5. Saturday, 22 May 1999

Please contact Jim Benet if you can participate in any of these Outreach Programs. Phone: (714) 693-1639 Email: jimbenet@csi.com The Outreach schedule is posted on the website at **www.chapman.edu/oca**.

Outreach Objectives

1. Educate the public in astronomy.
2. Promote interest in astronomy.
3. Build OCA membership.

Event #1:	Stone Creek Elementary School School Science Fair, 150 People
Host:	Kathy Wartrich
Date:	Tuesday, 16 March 1999
Time:	Viewing starts at 7:30 PM
Place:	Stone Creek Elementary School
Address:	2 Stone Creek South; Irvine
Directions:	Take the I-5 South to Jamboree exit. Turn right onto Jamboree and go 1 mi. Turn left onto Edinger Ave and go 1 mi. (Edinger becomes Irvine Center Dr.) Turn slight right onto Culver Dr. and go 0.4 mi. Turn left onto Warner Ave (0.1 mi). Turn right onto W Yale Loop for 0.1 mi. Turn right onto Stone Creek South and go 0.2 mi to the school.

Event #2:	Esther Walter Elementary School First Graders, 50 People
Host:	Teali Fielder
Date:	Wednesday, 24 March 1999
Time:	Viewing starts at 7:00 PM
Place:	Esther Walter Elementary School
Address:	10802 Rustic Lane; Anaheim
Directions:	Take 57 to Katella Ave. Head west on Katella 5.3 mi to Rustic Lane. Turn right onto Rustic Lane for 0.2 mi to Esther Walter Elementary School.

Event #3:	Landell Elementary School Entire School, 300+ People
Host:	Corina Castinada
Date:	Thursday, 25 March 1999
Time:	Viewing starts at 7:00 PM
Place:	Landell Elementary School
Address:	9739 Denni St.; Cypress
Directions:	Take 91 Freeway West to Valley View exit. Exit towards Orangethorpe Ave. Turn left onto Valley View;go .8 mi. to La Palma. Turn right onto La Palma and go 1 mi. Turn left onto Moody St. and go 2 mi. Turn right onto Ball Road and go 0.5 mi. Turn right onto Denni St. and go 0.3 mi to Landell Elementary School.

Event #4:	Esther Walter Elementary School Third Graders, 60 People
Host:	Teali Fielder
Date:	Wednesday, 21 April 1999
Time:	Viewing starts at 7:00 PM
Place:	Esther Walter Elementary School
Address:	10802 Rustic Lane; Anaheim
Directions:	Take 57 to Katella Ave. Head west on Katella 5.3 mi to Rustic Lane. Turn right onto Rustic Lane for 0.2 mi to Esther Walter Elementary School.

Event #5:	Astronomy Day Public Viewing, 500 People
Host:	Orange County Astronomers
Date:	Saturday, 22 May 1999
Time:	Viewing starts at 7:00 PM
Place:	Carl Thorton Park
Address:	1800 Block of Segerstrom; Santa Ana
Directions:	Take 55 Freeway to Dyer. Head west on Dyer about 5 mi to Carl Thorton Park. (Dyer turns into Segerstrom.)

Thank you so much for your help!

Astrophysics SIG Meeting

by Christine McGill

The Astrophysics Special Interest Group (SIG) of the OCA meets in the trailer at the Discovery Museum in Santa Ana (Harvard & Fairview streets) on the third Friday of each month, starting at 7:30 p.m. The purpose of the group, which is coordinated by Gordon Pattison, is to make astronomy accessible to the layman. Topics for discussion cover a broad range of subjects, from the latest scientific discoveries to the history of astronomy, the electromagnetic spectrum, gravity waves, and even quantum mechanics. Group members usually make the presentations. The meetings tend to be small and informal, which allows for plenty of question-and-answer type discussion. I've gone to several of these meetings and greatly enjoyed them. After one discussion, I was interested in reviewing the history of mathematics, since its development so closely relates to the history of astronomy. So, Gordon and the group encouraged me to give the talk!

Recently, the group has been viewing videotaped lectures from a 1998 series entitled: "Understanding the Universe." Chris Buchen obtained these tapes and has been sharing them with the group. Professor Alex Filippenko of U.C. Berkeley presents the lectures. A gifted lecturer, Filippenko reminds me of Carl Sagan, because he, like Sagan, has the ability to make complicated subjects comprehensible within narrow time constraints (the lectures are 45 minutes each).

The lecture I viewed was #27, "The Dark Side of Matter." The professor begins with a discussion of the rotation speed of the Milky Way galaxy. If our galaxy's rotation speed is plotted as a function of distance, the result obtained is a "rotation curve." (The speed is measured through studies of the motions of stars and clouds of gas.) The speed varies from zero at galactic center to a constant 220 km/s at a radial distance of about 1 or 2 kiloparsecs (one parsec = 3.26 light-years). It then maintains that value for the remainder of the distance, about 15 kiloparsecs. Vera Rubin was the first astrophysicist to show that spiral galaxies have flat rotation curves, according to Filippenko. But, within our own solar system, about 9 parsecs from galactic center, the reverse is true. The Sol system has an orbital speed that declines with increasing distance from the sun. Filippenko asks: how can we explain the first truth? The answer is that there is an increased amount of matter at great distances from the centers of spiral galaxies. He manipulates Kepler's Third Law of Planetary Motion to describe the mass M enclosed within a circle (i.e., a galaxy) of radius R. The algebraic equation is: $M = V^2R/G$, where V represents orbital speed and G represents Newton's gravitational constant. For the Sol system, the equation (when converted to the appropriate units) gives the amount of matter enclosed within the Sun's orbit as equal to 100 billion solar masses. Since most of this matter is in the form of stars, and the mass of a typical star is one-half Sol's mass, the number of stars in the Sol system is about 200 billion.

The case for increased matter at great distances holds because galaxies rotate at constant speeds and also because mass grows at a constant rate as the radius increases. But, studies have shown that there is not enough *visible matter* at great galactic distances for spiral galaxies to account for the increased mass. Filippenko concludes that there is *dark matter* at these very large distances. It is mostly distributed in a galaxy's halo. Furthermore, estimates suggest that over 80% of the mass in a typical spiral galaxy is made up of dark matter. The theory also seems to apply to elliptical galaxies, binary galaxies, and small clusters of galaxies as well. What is the dark matter comprised of? To date, the best guesses are some combination of neutrinos, brown dwarves and massive, Jupiter-like objects.

The final part of the lecture discusses theories of the nature of dark matter. Astronomers believe that at least some of it is made up of MACHOs, or MAssive Compact Halo Objects. Evidence for this is seen with the phenomenon of gravitational lensing of light. Light from a distant, non-variable source along our line of sight on earth is bent, or curved, as it passes through a strong gravitational field, such as what a MACHO would generate. What we see is a spike, a momentary increase in brightness, or even a ring (called an "Einstein ring") as the light source is occulted. The really cool thing is that this phenomenon is independent of wavelength! The gravitational lensing effect is the *same* for x-ray, visible, radio and ultraviolet light sources.

I really enjoyed this lecture, right through to the end, where Filippenko discusses one or two further implications of the flat rotation curve at great galactic distances. But, you'll have to go to the Astrophysics SIG meeting and see the video for yourself to find out what they are!

Virtual Astronomy

by Dave Kodama

For the April edition of this column, I thought I'd back up a bit to February's AstroImage '99 Conference, which was held at Cal State Fullerton. Last month's *Sirius Astronomer* reviewed some of the talks given, and you can read more on the OCA web site at:

http://www.chapman.edu/oca/ai99/ai99.htm

where you will also find links to material related to each of the talks.

One talk in particular stirred a fair amount of interest within the audience particularly because it makes electronic imaging accessible possible for a very low cost, and gives the user instant results. This was the talk by OCA member Liam Kennedy who described his experiments with adapting a used black & white PC camera (QuickCam) for planetary and lunar photography. It cost him about $70 (purchased on the Internet, of course) and a little bit of tinkering and soon he was producing very nice planetary images, including an interesting time-lapse sequence of the Galilean moons racing around Jupiter. You can see his results on his personal web site at:

http://www.thekennedys.net/Astronomy

Following his lead, I revisited the original article in *Sky & Telescope* ("QuickCam Astronomy" by John Buchanan, June 1998, p.120) which got him started. This led to the web site of the author of the article at:

http://www.geology.ewu.edu/jpb/lho/lho.htm

Following the links on this page revealed an amazing amount of information on this little niche of astronomy:

http://www.webdog.com/frivolous/hyakutake.html
http://www.geocities.com/CapeCanaveral/5409/qc_index.html

The first web page listed has possibly the oldest astronomical QuickCam photo – a fuzzy little image of Comet Hyakutake taken just about 3 years ago! Not terribly impressed? How about the second web site? Here you will find António Cidadão's excellent QuickCam photo web site, which includes images of the planets and moon. In addition, he has some sequences of shots showing the moon progressing through its phases, some mosaics of the lunar terminator, a 3-D image of the moon (get your red/blue 3D glasses out for this), and even a preview of an ambitious online lunar atlas which is called "Moon-LIGHT." This web site also includes information on how to modify the QuickCam for astronomical use. More descriptions on how the QuickCam can be adapted can be found on these sites:

http://www.virtual-insanity.com/astrophotography/
http://perso.club-internet.fr/uranos/disassemble_quickcam.htm
http://www3.gamewood.net/astronomy/ccdinfo/qc/

One of the limitations of using a low-cost solution like the QuickCam as opposed to a "real" astronomical CCD camera is its inability to take long exposures. It is an unfortunate characteristic of CCD's that during long exposures (exceeding about 5 seconds), electronic noise associated with the temperature of the CCD overwhelms the image signal. To overcome this, astronomical cameras are cooled with refrigerants such as liquid nitrogen, or more commonly for amateur instruments, with an electronic cooler. Not too surprisingly, the QuickCam enthusiasts haven't let the lack of cooling stop them. Here's a link to a page describing how you can add an electronic cooler to the QuickCam:

http://www.gti.net/pryczek/

If you'd like to visit these web sites yourself but don't want to get tangled up typing these URL's go to the AstroImage '99 link mentioned at the top of this page where I've taken the liberty of adding them to the page on Liam's talk.

If you have any comments or you would like to receive weekly OCA meeting notices, you can reach me via email at: kodama@alumni.caltech.edu.

Space Update

Gathered by Don Lynn from NASA and other sources

(To find out more on these topics, or those of past months' columns, through the World Wide Web, send your Web browser to our OCA website: http://www.chapman.edu/oca/, and select Space Update Online.)

Lunar Prospector - analysis of data from last year's Lunar Prospector mission has measured the radius of the Moon's iron core to be between 180 and 260 miles. Essentially the same values were derived from both gravitic and magnetic measurements. This puts the mass of the lunar core at roughly 2% of the total mass, far less than the Earth's core, long known to be 30% of its mass. The result is a strong confirmation of the Moon formation theory stated in the 1970s, after years of analysis of the Apollo samples from the Moon. The theory states that the Moon formed when another planet (about the size of Mars) struck a glancing blow to the Earth, knocking material mostly off the Earth's surface, which then coalesced into the Moon. The other two theories of Moon formation were that the Moon and Earth coalesced simultaneously near their present positions during the formation of the planets, and that the Moon was captured gravitationally in a near miss with Earth after the Moon had formed somewhere else in the Solar System. Neither of these theories fit the composition of the Apollo samples, and both predicted Moon iron core sizes greatly different than that found by Lunar Prospector.

Another new discovery from Lunar Prospector: there are localized magnetic fields in the Moon's crust exactly opposite the Crisium, Serenitatis and Imbrium basins – three of the "seas" that cover much of the lunar near side. This supports earlier evidence linking magnetic concentrations with large impact basins on the other side. Lunar Prospector also mapped distributions of various elements on the surface by spectrometer, with the last results being obtained from a lower orbit, for more precise localization. So look for more results from this spacecraft as the analysis proceeds.

WIRE (Wide-field InfraRed Explorer) - the good news is that WIRE was launched successfully, and the bad news is that WIRE ran out of gas before making any observations. The spacecraft was designed to study how densely filled with star-forming galaxies the universe has been over its history, study star-forming regions in our Milky Way, search for theoretical methane dwarfs, look for debris disks about stars, and survey the asteroid belt. A Pegasus rocket successfully launched WIRE into orbit March 4th. Telemetry soon showed abnormal temperatures and spinning, followed by more problems, and the preliminary results from an investigation show that the protective cover over the telescope came off three days early. Shortly following this, the infrared telescope pointed itself directly at the Sun, which would have caused no damage with the cover on. This began melting the solid hydrogen brick that was to cool the infrared detectors to nearly absolute zero for the next several months of observations. The melting in turn caused hydrogen jets to spew out and spin the spacecraft out of control. By the time spinning was stopped by ingenious commands from spacecraft controllers to use its magnetic orientation capabilities, all the cooling hydrogen had escaped.

If you want a really nice 12.5-inch Cassegrain telescope, ask NASA. They will probably give WIRE away if you will pick it up. Much of the same capabilities of WIRE (except wide-field capability) will be available in the much larger and more expensive SIRTF (Space InfraRed Telescope Facility) long planned for launch in 2001, so WIRE will probably not be replaced, and major infrared work will have to wait about 2 years.

SOHO (SOlar and Heliospheric Observatory) - has solved a long-standing mystery: the source of fountains of electrified gas flowing from the Sun. This flow, called solar wind, has been known to have two components: a high-speed one, in which particles move at about 2 million miles per hour (mph), and a low-speed one, moving only about 1million mph. Solar wind has long been known to flow when coronal holes appear above the Sun's surface. Coronal holes are places in the Sun's corona, or upper thin atmosphere, where magnetic field lines escape into space. SOHO observations showed that the high-speed solar wind flows from the edges of honeycomb-shaped magnetic patches under the coronal holes. To visualize this, it's as if the solar wind is coming from the grass growing between stepping stones (the magnetic patches) set closely on a lawn.

Yohkoh (Japanese Solar Observatory) - has produced a method of predicting (by a few days' time) coronal mass ejections on the Sun that can disrupt satellites and communications networks and cause power outages. Scientists have found a strong correlation between an S-shaped pattern on the Sun, called a sigmoid, and the likelihood that an ejection will occur from that region. The sigmoids are likely the result of twisted solar magnetic fields. The discovery came after examining two years of continuous solar observations in x-rays.

Hubble Space Telescope (HST) - will get an extra servicing mission from the Space Shuttle, due to failing gyroscopes. The next regularly scheduled service mission by astronauts was to be late in the year 2000, but since all three spare gyroscopes have now either completely or partially failed, NASA decided that it cannot take the chance that the remaining gyroscopes will last that long. Therefore, the service mission is being split into two flights: one in October and the other at the originally scheduled time. The same crew of astronauts will fly both missions, since they are already training for all activities. It will be the first time ever that an entire crew will fly a repeat Shuttle mission. Like previous service missions, two pairs of astronauts will spacewalk to perform the service work, each pair on alternate days.

It is possible that the HST's infrared camera/spectrometer, which must be cooled nearly to absolute zero to work, can be recharged with nitrogen coolant and can resume operation. As you may recall, the coolant evaporated in January, months earlier than planned, because two parts that were not supposed to touch were found to be in contact, transmitting heat into the coolant.

The first mission will replace all the gyroscopes, the guidance sensor, the failed spare transmitter, worn heat insulation, and the computer. It will also include installation of a battery protection kit to shield it from voltage and temperature problems and add a new solid state data recorder. The second mission will install the Advanced Camera for Surveys (ACS), a replacement for the Faint Object Camera (ACS is 10 times more powerful than FOC), replace the solar arrays with a new design, install two cooling systems for instruments that work better cold (including the infrared camera/spectrometer), and replace more insulation.

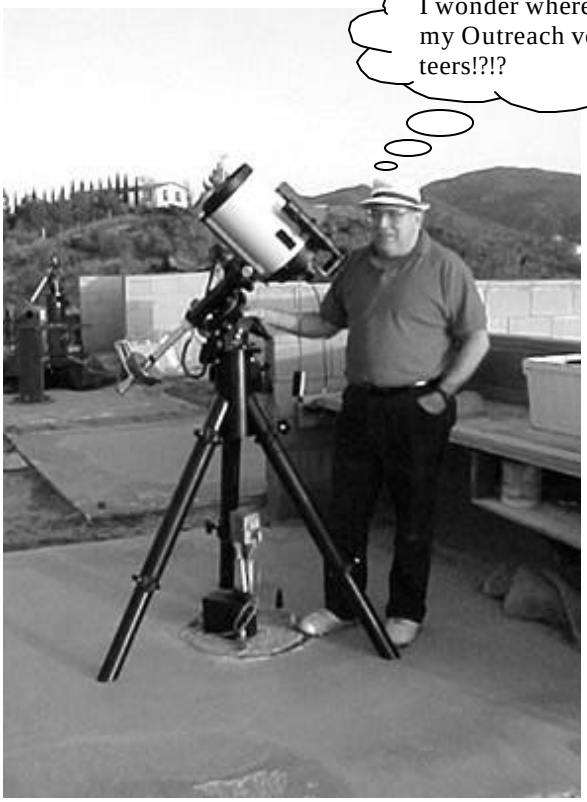
Space Shuttle (STS) - experimental results have helped to develop a new flu drug that may reduce or eliminate flu symptoms. Most shuttle flights in recent years have carried protein crystal growth experiments, because protein crystals can be grown far better in microgravity than on Earth. One result was the complete mapping of the molecular structure of the influenza virus. Knowing this structure allowed the development of a drug to block the virus. The drug must still undergo further testing to determine its effectiveness and safety before becoming available.

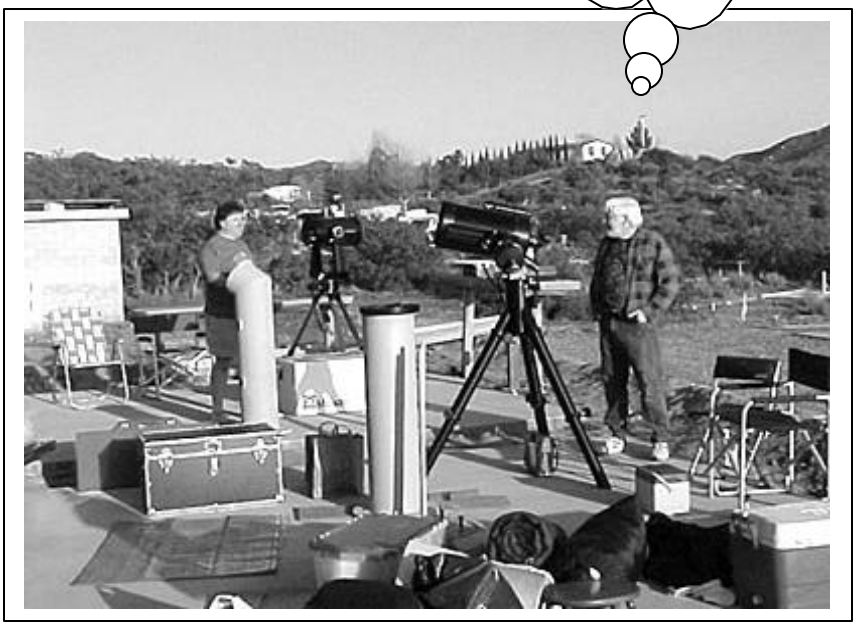
Mars Global Surveyor (MGS) - I'm surprised that none of the astute readers of this column called me on the error in the item last month on MGS. The spacecraft passes overhead going south (not north as reported) when you are on Mars and your Mars watch reads 2:04 AM. I hope none of you missed spotting the spacecraft due to this error. But then most of the readers of this newsletter are on Earth, not Mars.

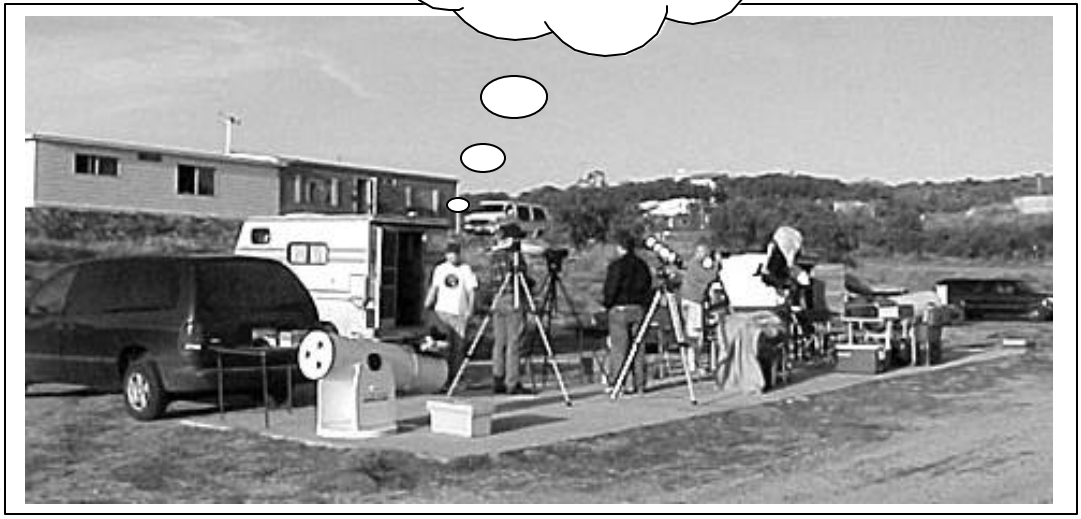
MGS is (as we go to press) making its first 3 weekly mapping cycles with its high-gain dish-shaped antenna still in the stowed position. The plan is then to deploy the antenna (to occur by the time you read this) and continue mapping. The antenna could not be deployed until after the final main-engine firings to keep it from contamination. The antenna is actually usable before deployment, but only by turning the whole spacecraft so that the stowed antenna is pointing at Earth. After deployment, the antenna will twist to point at Earth to send its data at the same time the spacecraft is pointing at Mars and collecting data. Controllers are being very cautious about the deployment, because the dampers (devices like screen-door closers) on similar antennas have lately had problems.

Comets - Like cars, comets leave carbon monoxide in their wake. It is known that comets have nuclei made primarily of water ice (as opposed to dry ice and other ices), so it was presumed that comet tails (at least the gas tails) were primarily water vapor. But a new study has found that comet tails contain more carbon monoxide than water. It was found that the lack of water ions is due largely to the relatively fragile nature of water molecules compared with carbon monoxide molecules when exposed to sunlight. Most water breaks up within a day of being thrown into the comet tail, while carbon monoxide usually takes 10 days or more to break up. The observations used in these studies were of comets Hale-Bopp and Hyakutake. Observations of comet Halley thirteen years ago, as well as the two recent comets, still have unidentified spectral features. It is hoped that the Stardust mission to comet Wild-2 will identify these other chemicals from the samples it takes from the comet.

Messier Marathon Moments







Text by Chris McGill; Photos by Dave Kodama

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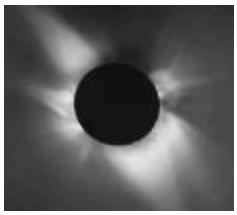

Total Solar Eclipse and Cultural Tour to Esfahan, Iran

The treasures of Persia have long attracted the intrepid traveler. On August 11, a total eclipse of the Sun occurs in the skies over Esfahan, Iran, providing a superior opportunity to experience both a total solar eclipse and an ancient culture. Of all of the natural phenomena that have awed humanity through the ages, a total eclipse of the Sun remains among the most beautiful, dramatic and powerful. Alpine Ascent International will host a tour to Esfahan -- considered by many to be the jewel of the Middle East -- where the chances of seeing the eclipse are an almost unheard-of 96%. Before and after the eclipse, Iran and the wonders of ancient Persia will be explored in such fabled places as the holy city of Qom, Shiraz, Tehran, and Persepolis, the cradle of Persian civilization.

Alpine Ascents International has led climbing and cultural expeditions throughout the world, including a successful expedition to view the 1994 solar eclipse on a 21,000-foot mountain in Bolivia. This is one of the few organizations with experience in leading trips to Iran.

Mike Simmons will be leading the eclipse observations. He is a former President of the Los Angeles Astronomical Society, Founding President and current Vice-President of the Mt. Wilson Observatory Association and former staff member at Griffith Observatory. Mike was a member of AAI's 1994 Bolivia solar eclipse/climbing expedition. For more information, see the eclipse expedition web site at http://www.mountainzone.com/AAI/eclipse.html, call Mike at (310) 794-8133 or send an e-mail to eclipse99@mwoa.org for a brochure by regular or by e-mail.

There will be a brief presentation on the 1994 Bolivian climb and eclipse expedition at the **OCA general meeting on April 9th.**

For Sale: ***"Beyond the Planets,"*** a book by Sarah Solomon. Photographs of 16 original oil paintings of nebulae with descriptive text. Ms. Solomon's paintings have been exhibited at Caltech, U.C. Berkeley, and the Smithsonian Institution. Cost: $15.00, plus $3.00 shipping and handling. Make check payable to: Eva Schmidler, 21192 San Miguel, Mission Viejo, CA 92692. For more information, write to the above address or send an email to: rayaridesign@earthlink.net.

For Sale: a **"heavy-duty" Meade tripod** for a 12-inch LX200, $300.00 obo. Contact: Jim Leonard, P.O. Box 1526, Inyokern, CA, 93527-1526. (760) 377-3474. Email: supersaw@ridgecrest.ca.us.

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