SIRIUS ASTRONOMER

www.ocastronomers.org

The Newsletter of the Orange County Astronomers

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This image shows one of the Mars Exploration Rover Opportunity's first breathtaking views of the martian landscape after its successful landing at Meridiani Planum on Mars. On the left, the rover's mast can be seen in a stowed position. Opportunity landed on January 24 at approximately 9:05 PST. The image was taken by the rover's navigation camera. (Image Credit NASA/JPL)

OCA CLUB MEETING

The free and open club meeting will be held Friday, February 13th at 7:30 PM in the Irvine Lecture Hall of the Hashinger Science Center at Chapman University in Orange. The featured speaker this month is Gary L. Peterson, with a presentation on "Atmospheres and Oceans of the Terrestrial Planets".

STAR PARTIES

The Black Star Canyon site will be open this month on February 14th. The Anza site will be open February 21st. Members are encouraged to check the website calendar, for the latest updates on star parties and other events.

Please check the website calendar for the outreach events this month! Volunteers are always welcome!

You are also reminded to check the web site frequently for updates to the calendar of events and other club news.

COMING UP

The next session of the Beginners Class will be held on Friday February 6th (and next month on March 5th) at the Centennial Heritage Museum (formerly the Discovery Museum of Orange County) at 3101 West Harvard Street in Santa Ana.
GOTO SIG (formerly ETX SIG) Feb. 16th
Astro-Imagers SIG: Feb. 17th, Mar. 16th
EOA SIG: Feb. 18th, Mar. 17th
Astrophysics SIG: Feb. 20th, Mar. 19th

President's Message

By Barbara Toy

It's hard to believe that it's now been a year since my first President's Message. Thank you again for trusting me to lead this great organization. All of the past presidents I've talked to agree that the position takes time and energy – but it is truly an honor to hold it. And, I'm happy to report, there's a quite a bit of fun that goes with the position, as well – and life as president is far from dull!

Kicking off our new year, for those who haven't yet seen see the election results…

The OCA Election

In spite of our best laid plans, the January Sirius Astronomer was delivered late from the printer, and was delivered without ballots. This meant that Charlie Oostdyk had to "generate" (his word) the ballots, stuff them in every issue that was to be mailed, and then do all of his normal processing to get them all into the mail. This took time, so I expect that many of you didn't actually receive your copy until after the meeting on January 9. The ballot was posted on the website shortly after it was finalized in December, I sent out an email to all members who have given us their email addresses with the ballot as an attachment, and we had plenty of ballots at the meeting – hopefully, none of you who wanted to vote had any problem getting a ballot so that you could cast your vote.

Bob Evans is the person who very capably takes responsibility for collecting the ballots, checks to be sure they are valid, and then counts them and tabulates and verifies the results. It is a tedious but very necessary job, and, of course, must be done by someone who can be utterly impartial – so nobody connected with the Board can be involved. We are very grateful to Bob for the professional way he handles this job, and for his willingness to continue doing it over the years.

The final results of the election for the 2004 Board are:

President:	**Barbara Toy**
Vice President:	**Dave Radosevich**
Secretary:	**Bruce Crowe**
Treasurer:	**Charlie Oostdyk**
Trustee:	**Bob Buchheim, Gary Schones, Tony Obra, Joel Harris, Craig Bobchin, Tom Kucharski and Stephen Eubanks**

The downside of having an actual choice between well-qualified candidates, of course, is that not everyone can be elected. I must therefore regretfully inform you that Bob Swifka, who is a long-time member, was not elected to the Board – this time. I truly hope that he will run again and serve on the Board in the future. This is the second time that Tom Kucharski has run for a Board position – he won this time, showing that persistence pays.

You don't need to be a member of the Board, of course, to have input on our decisions, or to bring issues to our attention. All members are welcome at the Board meetings, though we do need to know in advance if you plan on coming, since we are meeting in a private facility and our hosts have legitimate security concerns.

E-Mail Issues

As the situation with the ballots demonstrates, there are times when we have to contact the membership fast and doing it by regular mail won't work (any time we do a first-class mailing to the membership, it takes several hours to get everything printed and to stuff the envelopes and apply the address labels, plus about $350 for postage, so it's not something we undertake lightly or that we can do in a day). As I found out from working with Charlie Oostdyk to send out the email about the ballots, sending an email message to our membership also requires a certain amount of time and effort, but is a lot easier and faster than a physical mailing would be. It is not something we want to do very often – all of us get far too much Spam, and we don't want club communications to be seen in that light – but we do need that capability for those urgent situations that crop up now and then.

Please remember to keep Charlie informed about any changes in your email address, as he keeps all of our membership records current. Also, if you use a Spam filter, please be sure your settings will allow any messages from the club to get through to you. If you have any questions about how you can do that, Charlie is probably the best person to answer them (Charlie@cccd.edu).

Retrospective – In Context

The start of another year is a good time to look back as well as forward. A lot happened this last year. On the larger (though perhaps not cosmic) scale, we had the Challenger disaster, war in Iraq, the recall election, Mars Mania, Voyager in the news again, and (finally!) another successful Mars landing – to list just a few. Closer to home, we've seen big changes in the ranks of our volunteers, experienced solid growth in our Outreach Program (capped by our

largest outreach ever, Mars viewing with an estimated 10,000 people at the UCI Observatory on the night after closest approach), been saddened by the deaths of Bill Kuhn and Tom Cave, seen the Kuhn telescope get back into revitalized operation, and had a spectacular display of wildflowers at Anza followed by an all-too-lush explosion of weeds in a localized version of conditions that set the stage for the most devastating fire season in years – again, just a few of many memorable aspects of the year.

Comparing the Contact Lists on the back of the Sirius Astronomer from February, 2003, and January, 2004, gives a sense of some of the changes we've seen over the last year. Steve Condrey is now the editor of the Sirius Astronomer instead of Darren Thibodeau, the "chair" of the AstroImagers SIG is now held jointly by Leon Aslan and Bill Patterson instead of Greg Pyros, the Telescope Loaner Program Coordinator is now Bob Bell instead of Henry Fry, and the Anza House Coordinator is now Larry Carr instead of Stephen Eubanks. Although there isn't a separate heading for it (yet), our Website Editor is Russ Sipe, who will be assisted on the more technical aspects of the site by David Pace, marking a reorganization of the management of the site after Liam Kennedy, who had been our Webmaster for about five years, left that position.

It's always hard to say farewell to those who are leaving these activities because their circumstances make it too difficult for them to be involved in club activities in general, especially when it's a matter of health, and we are particularly sorry that Henry Fry has had to withdraw from his club activities – we will miss him, and wish him good health and good luck in the coming year and what we hope will be many years beyond. Fortunately, most of these changes merely mark a shift in the interests or priorities of the volunteer who has left the position, and those people are still around and active in other areas. The changes also show the vitality of these different club activities, which continue to develop in new directions as new volunteers have stepped forward to fill the vacant leadership positions. It's great to see their enthusiasm and creativity applied to the responsibilities they've taken on, and I'm really looking forward to working with them in the year ahead.

In one case in particular, this last year has seen a major shift in focus – with the result that the club now has a new Special Interest Group (the OCA-TV SIG) and a television program appearing regularly on Cox Communications in southern Orange County, and soon to be appearing on Adelphia and COMCAST – and the programs are available in DVD form for those who prefer it or who don't get the broadcasts. Our primary purpose as a club is education, both of our members and of the general public, and this program is a new way for us to reach both members and the public with astronomical information from our meetings and other sources. The member who had the concept and who has been the driving force behind its success is Liam Kennedy – for those of you who might wonder what he's been doing with his time since stepping away from all of the different activities he's handled in the past, he's finding the creation and editing of the programs quite a time-filling (but enjoyable) challenge!

Outreach for the Future…

I mentioned that our Outreach Program has continued its steady growth, a testament to Jim Benet's energy and capability as Outreach Coordinator as well as to his hearty (and hardy) band of Outreach Volunteers. We're now heading into our busiest season of Outreach activities with the schools, and you can see by looking at the calendar on the website that we have a lot of events coming up between now and the beginning of Daylight Savings Time in April. Of course, the more events we have, the more we need volunteers to help out – it's the volunteers, their telescopes (and other equipment), and their enthusiasm that really make these events work.

For those who haven't tried it, Outreaches are tremendous fun and generally don't require more preparation than putting your equipment in your vehicle and going to the location where the event is happening (though, of course, if you want to do more, you're welcome to, and some people on occasion have set up computerized visuals or brought other things to help show what's out there). Once at the event, you set up your equipment, set it on an attractive celestial object, and let the people there see it (it's even better if you can share just a smidgen of information about what they're seeing). You don't even have to commit to coming to any particular number of events – some come to almost all of them, others come to one or two a year, or maybe just those that are closest to them, and there's quite a range in between. Of course, the more you attend, the better you get to know the other regular volunteers, which (for me, anyway) makes coming to the events even more fun. And, while you're there showing children and their families what they can see through the eyepiece and talking to them about the wonders that are out there beyond our atmosphere, you have the joy of sharing something really precious with people who genuinely appreciate it. It's a major (and completely legal) upper – the perfect way to put a hard day of work behind you!

So, one of my recommendations for the coming year is for all of you who haven't tried coming to an Outreach event to plan to come to just one, to see what it's like for yourself. Talk to Jim Benet or one of the other regular volunteers if you have questions or want a contact to make you feel more comfortable in going out for one – we're a very friendly group, and are eager to make you welcome any time you want to join us!

(And I do mean that "we" literally – I'm an ardent Outreacher myself, and proud to be one of Jim's "regulars." Take it from one who's been to almost all of the club's Outreaches in the last four years – though not as many as Jim has

(continued on Page 4)

Virtual Astronomy

by Dave Kodama

This month I have comets on my mind since there are a couple of promising comets (one visible now) predicted to show in 2004. These are C/2002 T7 (LINEAR) and C/2001 Q4 (NEAT). Both have predicted peak magnitudes better than magnitude 1, though they may not be as easily visible as their peak magnitudes might suggest. Remember also that the best prediction for a comet magnitude is that the predicted magnitude will be wrong! The rate at which dust and gas are being released from a comet greatly complicates the job of generating a magnitude prediction, so no matter what is predicted, it is worth your while to monitor a comet which is in view.

C/2002 T7 is presently (mid-January) dim, but with a distinct tail, and visually within the range of a small telescope in the evenings. It will disappear into the sun in the West by mid February, but in the mean time, images have been accumulating on the web:

http://encke.jpl.nasa.gov/
http://hometown.aol.com/tricks46/myhomepage/photo.html?mtbrand=AOL_US — Mike Holloway
http://www.ocastronomers.org/astroimages/album.asp?ID=869 — John Sanford*
http://www.ocastronomers.org/astroimages/album.asp?ID=856 — Arnie Rosner*
http://www.eanet.com/kodama/astro/2003/1227/4.htm — Dave Kodama*

*OCA member

By April, C/2002 T7 will be a morning object and on its way toward peak brightness. But the bad news is that it will again dip into the sunrise around May 10th as it nears the peak predicted brightness. Finally, it will pop out of the sunset again in late May towards the southwest, where it will stay through June as it rapidly fades from naked eye visibility. This complicated dance of the comet with the sun will make imaging the comet a challenge and necessitate good planning, but there will no doubt be good coverage by amateurs. OCA members are invited to post your pictures in our web image gallery as well as submit them to me so that I can include it in a special OCA C/2002 T7 web page.

Positional information for C/2002 T7 can be found at:

http://cfa-www.harvard.edu/iau/Ephemerides/Comets/2002T7.html

Daily positions as well as downloadable orbital element files for popular planetarium software are available from links from the page above.

To keep up with the latest visual observations as well as images of C/2002 T7, you should also consider signing up for some comet-oriented Yahoo discussion groups:
http://groups.yahoo.com/group/CometChasing/
— visual observations only
http://groups.yahoo.com/group/Comet-Images/
— comet image postings

In addition, Greg Crinklaw, moderator of the visual observation group above publishes a very useful monthly guide to currently visible comets which includes star charts. The page can be found at:
http://www.skyhound.com/sh/comets.html

President's Message (continued from Page 3)
been to – an Outreach is a really great way to spend an evening, and a really great Outreach will leave you walking on air for days afterwards. But you don't have to take my word for it – come and find out for yourself!)

In Closing…

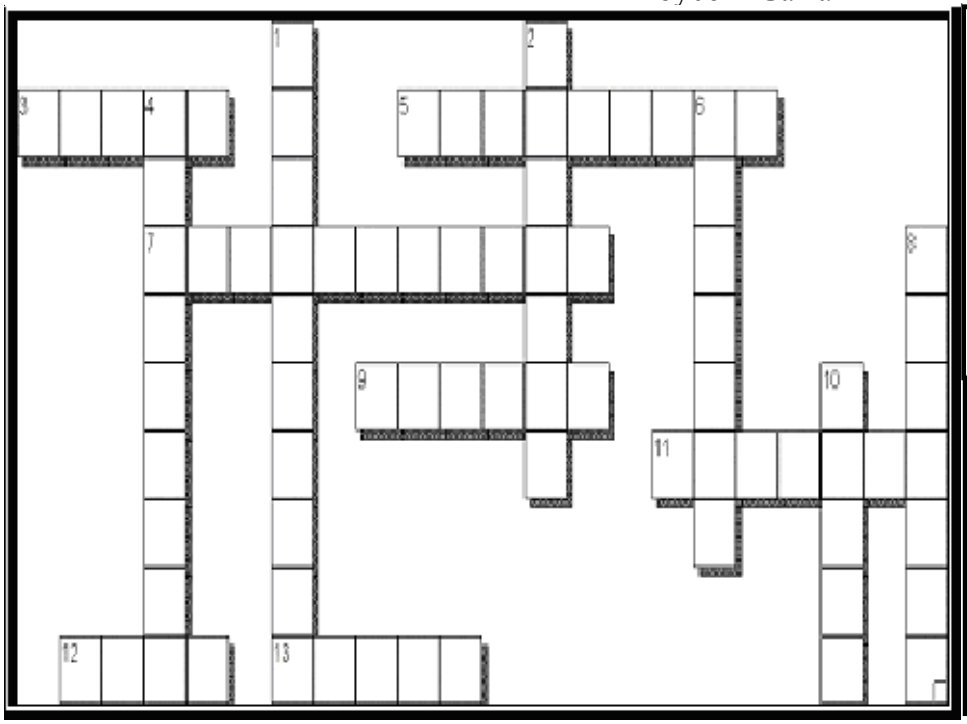
As long as we're looking back at 2003 – doesn't it seem that we had a lot more overcast viewing nights than usual? Here's hoping that in 2004 the clouds will show up on moony nights only, and that the weekends around new moons will all be clear, with great seeing!

OCA Crossword Puzzle

(Theme this month: Constellations)

February 2004

by John Garza



ACROSS:

3. Long ears with cotton tail.
5. The eye of the bull.
7. His name is not all that he is.
9. The twin on the left.
11. Contains prototype of a famous Variable Star.
12. Ancestor of the harp and guitar.
13. The hunter has this star in his right foot and is really a double star.

DOWN:

1. Its brightest star is scorching.
2. The lions brightest star.
4. In England it is known as the Plough and in Germany the Wagon.
6. The eye of the scorpion.
8. He holds Medusa's head.
10. The Swans head.

Moon and Venus over Corona del Mar 7:00 January 24 (Image courtesy Wally Pacholka)

Rent-A-Scope: An Easy Chair View of the Universe

Equipment/Vendor Review by Al Kelly

Arnie Rosner is a very nice fellow. I was exchanging e-mails with him on some astronomy topic or another when he mentioned that he had gone into the telescope renting business. I expressed ignorance, so he guided me to his website (http://www.arnierosner.com/are/index.htm) and offered to set aside some time for me to check out his remote imaging systems. This was far too good an opportunity to let pass; however, having never operated an imaging system remotely, my expectations were not high. I know that the capabilities available to some amateur budgets are truly amazing, but I expected very lethargic imaging response and all sorts of difficulties on basic imaging issues, such as centering, focus, and tracking. Boy, was I wrong!

Arnie has two highly capable (and expensive) imaging systems on line. The telescopes are 12" Takahashis, one a Mewlon (a 3572mm FL Dall-Kirkham optical design) and the other an FRC (a 2340mm FL Richey-Chretien optical design). They reside on Software Bisque's Paramount GT1100s and ME mounts, with highly accurate "go to" and tracking capabilities. The Mewlon is equipped with an FLI IMG1024 "Dream Machine" CCD camera, while the TRC carries an anti-blooming SBIG ST8E CCD camera. Both have automatic filter wheels, auto-focusing, and autoguiding via guidescope-mounted ST7 and ST8 CCD cameras.

The most amazing part of the whole operation to me was the easy and responsive user interface via the internet. I'm sure it helped that I used broadband internet access via cable modem, but dial-up access should work just as well, just slower. After Arnie provided me a user name and password, here's how it went:

1. I fired up Internet Explorer and went to the link for the telescope (I used the Mewlon first) and logged on. I was greeted by a screen with a star chart which asked (among other things) for the name of the object to be centered.

2. I typed in NGC 925 and was immediately told that the scope was slewing to the selected object. In about 20 seconds I was told that the object was centered and the scope had settled.

3. I went to the field for entering an exposure time, entered 3 seconds and checked the block for "centering image".

4. I clicked on "Take Image" and was greeted a few seconds later by a binned image (i.e., adjacent pixels added together in a multiple "binning" arrangement to allow high sensitivity and small, fast downloads) which showed that NGC925 was almost exactly centered in the frame. Clicking on the center of NGC 925 caused it to be shifted to the center of the frame and another picture to be displayed showing that this had happened. Magic!

5. I then clicked on "Turn Color On" and "Set Up LRGB Images". A table popped up, where I entered the exposures times and number of exposures through each filter, clear, red, green, and blue. I saved these settings and clicked on "Return to Sky Chart", where clicking on "Take Image" started the automatic acquisition of the entire image set. More magic!

Within a few hours, Arnie had sent me an e-mail with a link to the zip file containing all my images. All I had left to do was download the file, download some calibration frames (darks and flats), and process the images into a beautiful color composite image. Since that time I have taken a few more images with his systems, including remote activation of the autoguiding capability, which is so easy that it only requires about 5 mouse clicks. The system has never failed to function well and Arnie's oversight assures that the acquired images are available for download very rapidly.

If you are well-heeled and want to take the occasional mountaintop astroimage, but have trouble getting away, you may find Rent-a-Scope right up your alley. Thousands of dollars on equipment and travel costs could go into immediate, high-quality imaging. Those of us less touched by trickle down, but sharing a common imaging interest with others, may find that a few bucks apiece will rent the desired time and equipment necessary for the image(s). Either way, anyone who finds Rent-a-Scope attractive will be amazed by the flexible and friendly user interface.

OCA Star Party Dates: 2004

Black Star Cyn Star Parties

Date	Sunset	Astro. Twilight	Moonrise
Jan 17, 2004	17:07	18:34	03:49
February 14	17:33	18:57	02:47
March 13	17:57	19:20	01:47
April 10	19:18	20:44	01:44
May 8	19:38	21:15	00:33
June 12	20:01	21:44	02:58
July 10	20:03	21:44	01:29
August 7	19:44	21:17	23:59
September 18 *	18:52	20:15	21:23 (set)
October 9	18:23	19:46	03:16
November 6	16:53	18:18	01:01
December 4	16:42	18:10	23:47
January 8, 2005			

Anza Star Parties

Date	Sunset	Moonrise / set
Jan 24, 2004	17:13	20:32 (set)
Feb 21	17:40	19:16 (set)
March 20	18:02	18:03 (set)
April 17	19:23	—
May 15	19:44	04:27
June 19	20:03	22:02 (set)
July 17	20:00	20:42 (set)
August 14	19:37	—
Sept 11	19:02	04:30
October 16	18:15	20:02 (set)
November 13	16:48	17:42 (set)
December 11	16:43	—

Notes:

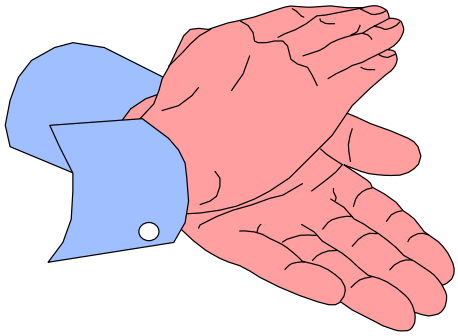
- Silverado star parties are normally the Saturday prior to Anza, *except* September star party (Sept 18) is the Saturday *before* Anza.
- Times above are local time (i.e. PST, except Apr 4 through Oct 31, 2004 are PDT)

footnotes:
*= has been sent key, 2004 permit, and directions.

OCA Hosts: Our lock is currently the newest (i.e. least rusted) one on the chain: a Master Lock with an Orange plastic band, and a hasp that is slightly longer than the others.

MEMBERS ASSISTING THE LIBRARY

The OCA library would like to thank our members for their generous contributions.
·Emma Benavides donated a box of new textbooks in December.
·Jim Benet gave the library several great books at the January meeting.
Liam and Anna Kennedy donated a $20 Barnes & Noble Gift Card to the library for purchases of new books



Some books will be added into the library and some will be sold to bring in funds for new books.
Thanks to everyone for their efforts!

FOR SALE

Dark sky site: 5 acres, 3,550' elev (never snowed in), darker than Anza; w. 1,100 sq ft home: 3b+2ba, only 3 yrs old, tile & wood-laminate flooring, freshly painted interior, extra pad for observatory, etc. All utilities, very safe community. Zoned for adding 2nd home, horses, etc. ½ hr. south of Lake Isabella, 2½ hrs N. of LA. $129,000. Pictures available. Jay.Glowacki@aero.org, eve 310-831-4199.

ASTROSPACE UPDATE

February 2004

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 Web site (http://www.ocastronomers.org), select Space Update Online, and the topics are there to click on.

Mars - On Christmas day, the European Mars Express orbiter successfully entered orbit about the red planet, and the piggy-backed lander Beagle 2 (named after Darwin's ship) landed on Mars. The orbiter is, as I write this, beginning its observations of Mars, but the lander has not been heard from. Attempts to hear or contact the lander were made by Mars Express, the 2 NASA orbiters already there (Mars Global Surveyor and Odyssey), and various Earth-based radiotelescopes. In the past there have been only 3 successful landings on Mars (2 Vikings and Pathfinder), out of 12 attempts. And that does not even count Mars Climate Orbiter, which landed on the planet by accident (well, actually it was more a case of smashing into it). As an advocate of planetary exploration, I would really like to see more successes, but it looks like Beagle 2 may have joined the list of failures.

On January 3, the **NASA Mars Rover Spirit** landed successfully in Gusev Crater, which appears to have been a lake in the distant past, and has been returning fabulous pictures of the surface. The craft has cameras with the best resolution ever landed on a planet, resulting in very detailed and sharp images. The cameras have capability for 3-D pictures, as well as color (through tri-color), ultraviolet and infrared. Just before landing, it was found that dust devils had partly cleared much of the far end of the planned landing area of surface dust, which would make finding and analyzing rocks easier. By sheer chance, Spirit landed a bit toward the far end of the area, perfectly placed. Instruments indicate that Spirit bounced 28 times in its airbag during the landing, but moved horizontally only about 300 yards, since the retro rockets had done their job so well to eliminate motion before dropping onto the surface. It was decided to turn the rover on its landing base and exit the right-rear ramp, since efforts to retract a bubble of the airbag next to the front ramp were not completely successful. Spirit has a small plaque on it dedicating the Mars landing to the last crew of Space Shuttle Columbia.

Initial findings are that the area is devoid of large rocks (as predicted), but littered with small rocks. Rocks cover 3% of the ground around Spirit, as opposed to 20% at the Viking and Pathfinder landing sites, but 3% is still more than expected on an ancient lakebed. There are more cracked and fragmented rocks than the other sites, and they will be studied up close to see if freezing water was involved, or other fragmenting processes. Also seen are more pits, possibly impact craters or possibly not. Suspiciously spherical indentations seen near the lander were immediately explained as bounce marks from the airbags during landing. On the initial target list for the rover to visit is a crater over 200 yards away, since it reveals what is under the surface, and hills more than a mile away. The hills and craters visible from the landing site have been matched to features visible in images from the orbiters, so the exact landing location is now known. By the time you read this, Spirit should have done considerable geology on rocks and soil. Also by then, its twin rover Opportunity should have landed on the other side of Mars, in an area with minerals that usually form on Earth with water.

Stardust (comet sample return mission) - successfully flew through the head of Comet Wild 2 on January 2, trapping comet debris in its aerogel sampler, and has sealed it in the return capsule. It will take 2 years to orbit back to Earth and land in Utah, at which time the sample will be analyzed in the lab that did the Apollo moon rocks. During the flyby, 72 pictures of the comet nucleus were returned. This is only the third comet nucleus ever imaged, and they are by far the clearest pictures. At least 7 jets of material were seen being expelled from the nucleus, and for the first time images showed where on the surface the jets originated. Craters on the nucleus had edges much sharper and less raised than would be expected for impact craters, and looked more like sinkholes. They may be a product of material loss rather than impact. The nucleus was nearly spherical, in sharp contrast to the other 2 imaged, Halley and Borrelly, which were roughly peanut shaped. Theorist now have to explain how such small bodies (The nucleus of Wild 2 is only about 3 miles across) could form spherically, now that accepted theory explained only irregular shapes. The debris encountered in the head were far more bunched than theory predicted, and managed to penetrate at least the first of 3 layers of protective shield. Particles twisted the spacecraft often, but the maneuvering jets returned it to the safe direction (shields forward) every time nearly instantaneously, before hitting anything further. If particles had penetrated into the spacecraft, even a grain of sand moving at the encounter speed of 12,000 mph would have severely damaged the instruments.

Largest lensed quasar - When a quasar, or any distant light source, lies beyond a massive object, such as a galaxy or galaxy cluster, General Relativity tells us that the space around the massive object is warped, causing light from the distant quasar to be bent, with a result similar to a lens bending light. The result is that the quasar will appear as multiple images, and brighter images than would occur without the space warp. Until now, of the about 80 known lensed quasars, the largest separation between such multiple images was 7 arc seconds. A larger massive object will generally produce a greater separation between the multiple images. A lensed quasar found by the Sloan Digital Sky Survey (SDSS) has been measured to have a 14.6 arc second separation between multiple images (4 images in this case).

The same study also used the Hubble Space Telescope to examine 4 of the most distant quasars found by SDSS for evidence of multiple images from gravitational lensing, but found none. This was unexpected, since most of the farthest quasars appear brighter than theory predicts, and it was thought that gravitational lensing was brightening them. Theorists now have to explain how quasars, particularly distant ones, which are therefore being seen as they were early in the history of the universe, can be as bright as those 4 are.

Mature early universe - The Gemini North telescope in Hawaii has completed a survey of over 300 galaxies at a distance that has been termed the Redshift Desert. The problem is that objects far enough away that we are seeing them as they were 3 to 6 billion years after the Big Bang experience a redshift that places key spectral features at the same wavelength as sky glow. So few spectra had ever been taken of galaxies at this distance. The new survey used sheer light-gathering power (8-meters), long exposures (30 hours), a spectrograph that takes 100 spectra simultaneously, and a newly developed technique that subtracts out sky glow. Galaxy spectra were successfully taken that were 300 times dimmer than the sky glow. The result is that these galaxies were found to be much more evolved than theory predicted, in terms of galaxy shape, completion of the early phase where little galaxies crash together often, number of stars, and high metal content of stars. The theorists will be busy explaining this.

Supernova companion - Although theory says that a Type I supernova explosion can occur only if the star has a companion star in close orbit about it, such a companion has never been found, until now. Excuses given for this lack include that such an explosion probably wipes out the companion, and that it is extremely difficult to find archived images of stars before they become supernova, much less finding a companion that is likely dimmer. In fact such finds in archives have been located in only one case before this new one, supernova 1993J. It was seen exploding just over 10 years ago in the galaxy M81, and its parent star was found some time later in archives. HST and the Keck Telescopes in Hawaii examined the gas-cloud remnant of 1993J recently, and found the companion star still there. The neutron star or black hole expected to have been produced by the supernova has still not been found.

Hubble Space Telescope (HST) - A Wolf-Rayet (W-R) star is one that began with at least 20 times the mass of our Sun, and has reached a time near the end of its life where it emits fierce stellar winds, greatly reducing its mass. A study of a large fraction of the known W-R stars in our galaxy was made with the Planetary Camera of the HST to look for nearby companion stars. 23 possible companions were found, which will now be confirmed by spectroscopy. It had been suggested that theory of how W-R stars behave would better match observations if they were binary, that is, had companion stars. This new study suggests that the majority or perhaps most are binary. The common method of determining distances to W-R stars now has to be re-examined, since it assumed all light seen was coming from the W-R star, not combined with the light of a companion star. The study may also explain a few W-R stars that appear to have more mass than theory predicts any star can form with, in excess of about 100 Suns. These apparently massive stars may actually be 2 or more stars too close to have been seen separately yet.

Magnetar forms - A rare class of neutron stars with extremely powerful magnetic fields has been termed magnetars. The Rossi X-ray Timing Explorer discovered another magnetar last summer. Examination of more than a decade of archives from Rossi and other X-ray satellites showed that the object was a very dim X-ray object up until about January 2003. Astronomers believe that they have witnessed the formation of the magnetar. It is spinning about once every 5 seconds, and its spin rate will be carefully monitored to confirm that it slows at the rate predicted for magnetars.

Chandra (X-ray observatory) observed a suspected black hole (SS 433 in Aquila about 16,000 light years away) with jets whose companion star eclipses parts of the jets. X-ray spectra were taken during eclipses, and then the spectra of what was covered was reconstructed to produce spectra of much finer resolution, that is of smaller objects, than could actually be seen. This produced measurement of the jet's length (a million miles), the temperature of various parts of the jet (10 to 100 million degrees C.), chemical abundances in the jet, the jet opening angle, the size of the companion star, its mass, and the mass of the suspected black hole. That mass (16 times the Sun) ruled out the only other explanation, which was a neutron star, so it is definitely a black hole. This is by far the most detail known of any black hole jet, and may help astronomers understand exactly how they work.

Solar Mass Ejection Imager - is a new type of camera that for the first time takes pictures of the electron clouds streaming about the Earth after being ejected by the Sun. Previously they could only be measured in place, by flying a satellite through them. The camera blocks out sunlight and starlight in order to detect the very faint scattering of light by electrons. A surprising find is that every major ejection of particles by the Sun has resulted in high-altitude auroras (above 500 miles). Though shuttle astronauts have in the past reported seeing such aurora, far above their spacecraft, theorists have been trying to ignore the phenomena because they could not explain how it could happen in air so extremely thin.

String of galaxies - Using 4-meter telescopes in Chile and Australia, astronomers have discovered in the southern constellation Grus a string, or supercluster, of galaxies about 300 million light years long. It is so far from us that light took almost 11 billion years to arrive, so the string existed when the universe was 20% of its age now. Although a "Great Wall" of galaxies of comparable size was discovered in 1989, it was thought that objects of such size could not have formed so early in the history of the universe.

Gas giant survival - A new simulation of the formation of gas giant planets shows that they form somewhat beyond the distance that Jupiter is now from our Sun, but migrate inward toward their sun due to the gravitational perturbations of material in orbit outside the planet, which has not yet accreted into planets. It is a race to finish

(continued from page 9)

accreting the nearby available material before the planet is forced too close to its sun and is swallowed. This explains why 30% of all planets found outside our solar system are "hot Jupiters", a term used to describe gas giant planets that orbit closer to their star than Mercury does to ours, and so are hot from strong sunlight. Hot Jupiters barely managed to win their accretion race before being swallowed. The simulation showed that if the gas giant is swallowed, all the inner planets are also. This result means that our Solar system may have been lucky in that Jupiter won the accretion race quickly and migrated only a little, which allows the Earth to still be here.

Exoplanet with magnetic field - A Sun-like star called HD179949 was reported in 2000 to have a "hot Jupiter" type planet orbiting it every 3.09 days. The star was studied with a spectrograph on the Canada-France-Hawaii Telescope, and found to have a hot spot on it that rotates at the speed of the orbiting planet, not at the speed of the star's rotation. The hot spot was observed to remain synchronized with the planet for over 100 orbits. It appears that the planet has a magnetic field that is linked magnetically to a point on the star, causing the observed hot spot. This is the first evidence of a planet outside our solar system having a magnetic field.

Relativity confirmed - Some of the theories competing with Relativity, as well as some modifications of Relativity to make it consistent with quantum theory, predict that the speed of light in a vacuum is not quite constant, along with other slight deviations from Relativity. Recent measurements of the spectra of the highest energy gamma rays from 2 active galaxies and the Crab Nebula have confirmed Relativity predictions, including constancy of the speed of light, to a higher degree than any previous experiment or measurement.

Instant AstroSpace Updates:

SIRTF, the recently launched infrared observatory, has been renamed in honor of Lyman Spitzer Jr., the first person to propose, in 1946, placing a telescope in orbit. The **Spitzer Space Telescope** has begun returning amazing infrared images.

The average color of the universe has been measured over the past 11 billion years by looking at progressively farther galaxies, and it has changed from bluish toward reddish over that time. The implication is that hot young blue-white stars have steadily become less common.

A star called LBV 1806-20, found several years ago, has been seen only in infrared, due to the surrounding dust blocking visible light. Its true brightness has now been measured, and it is probably the most luminous star known, at about 40 million times that of the Sun. Study has shown it is unlikely, but still possible, that it is a multiple star that cannot yet be separated.

A new study of the central stars in 11 planetary nebula found that 10 of them are binary stars by measuring the wobble caused by the pair orbiting each other. Only a small percentage of planetary central stars were known to be binary before, but this study suggests a binary is necessary for the formation of the nebula. Further study is planned.

Chandra (X-ray observatory) has discovered rich deposits of neon, magnesium, and silicon in the pair of colliding galaxies known as The Antennae. This supports the theory that colliding galaxies trigger vast amounts of star formation, including massive stars that quickly (several million years) become supernovas and explode heavy elements into space for thousands of light years.

Double pulsar - The first pair of pulsars orbiting each other has been found by the Parkes radiotelescope in Australia. All other known pulsars that are part of binary systems are paired with ordinary stars. By chance, they orbit edge on to us, so one pulsar eclipses the other, offering opportunities to measure the effects on the pulses as they travel through the other's atmosphere.

In late December it was noticed that the air pressure in the **International Space Station** was slowly dropping. Astronaut Michael Foale believes he has found the leak in a small air hose.

Bacteria have been found living encased in lava more than 4000 feet underground in Hawaii. The implication is that life elsewhere in the universe may live in more harsh conditions than we thought possible.

MESSAGE FROM THE EDITOR

The deadline for submissions is the 15th of every month, unless otherwise posted in the Sirius Astronomer or at the monthly meeting. Submissions must be e-mailed to SiriusAstronomer@ocastronomers.org for consideration. Be sure to include any pictures you wish to have printed with your article with appropriate credits! Ad copy should be submitted in PDF or MS Word format and include all pictures and graphics.

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