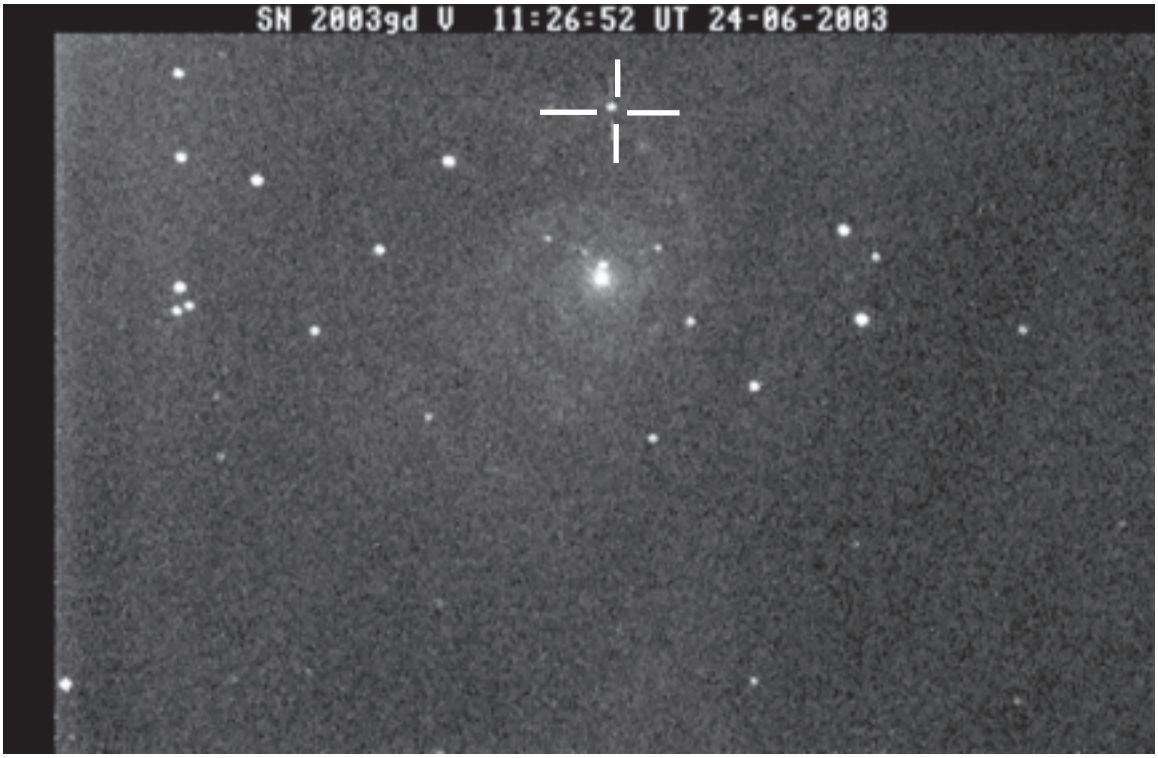
# SIRIUS ASTRONOMER

www.ocastronomers.org

The Newsletter of the Orange County Astronomers

**July 2003** *Free to members, subscriptions $12 for 12 issues* **Volume 30, Number 07**


This month's cover photo is from Robert Evans. Robert write's; "The enclosed CCD pic is of the supernova that I discovered two weeks ago, SN 2003gd in Messier 74. The picture was made by former member of the club - Monsignor Ronald Royer, and the little marks indicate the SN, which is about 160 seconds south of the nucleus, and about 20 seconds east." Great work Robert!

## OCA CLUB MEETING

The free and open club meeting will be held Friday, July 11th at 7:30 PM in the Science Hall of Chapman University in Orange. Dr. Michelle Thaller returns with "The Invisible Universe: Infrared Astronomy," which will include new information on the SCIRTF project, including recent developments as the launch date approaches. She has also promised to bring back her wonderful infrared camera, which provided so much entertainment and insight during her last talk.

## STAR PARTIES

The Anza star party this month is on Saturday July 26th and is our annual Starbecue. The Black Star Canyon site will be open this month on July 19th. Members are encouraged to check the website calendar, for the latest updates on star parties and other events. Also, please use the Anza Webcam before driving out to Anza to potentially save you some driving time.

## COMING UP

Beginners class will be held on Thursday July 3rd, at the Discovery Science Museum located at 3101 West Harvard Street in Santa Ana. The Astrophysics SIG will be meeting on July 18th. The Astro-Imagers' SIG will meet July 15th. The EOA SIG will meet July 16th. Please check the website calendar for the many outreach events this month! Volunteers are always welcome!

# President's Message

**by Barbara Toy**

Here we are in July, with summer observing in full swing – unless this year's exceptionally heavy "June gloom" stays with us, that is! For those who do their observing from Anza, the cloud cover can mean darker skies when it covers the light domes from the cities to the west of us. For those of us trying to do any viewing from Orange County this June, however, the "gloom" has been very frustrating!

**Coming up at Anza –**

Our July Star Party on July 26 is also our annual potluck "Starbecue," which is set around 5:00 up at the club observatory. For those who haven't been to one, the club has a gas barbecue that gets hauled up to the observatory for the event, so people can grill whatever they bring with them. Please bring enough to share (aim for enough for around six people besides whoever's in your party – we don't expect you to feed the entire crowd!). Besides standards like hamburgers and hotdogs, I've seen (and eaten my share of) all kinds of interesting skewered items, including some particularly memorable salmon a couple years ago – we welcome imaginative entries on the grill!

The club supplies paper plates, cups, flatware, napkins and soft drinks. All the food is brought by the people who come, so salads, chips and dips, other side dishes, deserts – all are welcome! There's a microwave in the observatory warming room, so you can warm things up if necessary. Plan to bring your own chair for seating, though a lot of people eat while standing or wandering around and talking to people. It's definitely not planned as a sit-down dinner! If you have a folding table you could bring, we can usually use more than the three club tables. As to parking, space around the observatory is limited, so please park at the levels below it and walk up.

We do need volunteers to help set up for the party and to clean up afterward; if you're willing to help out, please contact me (btoy@cox.net or 714/606-1825). Also, if you bring something and it isn't all eaten, please make sure you take the leftovers with you when you leave the Starbecue. We hate to see leftover food spoil, and we hate even more to attract the local wildlife with an easy dinner!

Another great activity we're planning for that night is a "Member Observatory Open House." If all goes well, the member observatories on the Anza site will be open to visitors for a couple of hours after sunset, to give people a chance to see what they're like inside and how they work – so plan to visit them, see the different approaches people have taken, and learn about how they're being used.

Still Some Time To Name An Asteroid: The deadline to propose names for one of the asteroids discovered by Minor White and Myke Collins is July 31, 2003. This is a great chance to honor someone in a unique way – for details, see: http://www.mpc643.org/.

**Sirius Astronomer – What the Data Shows**

Thanks again to all of you who have sent me the information I requested about when you received your copies of the Sirius Astronomer. In the time I've been on the board, I've heard a lot of complaints about late deliveries, and the information you sent has helped give us a better picture of what is happening after each issue goes to the Post Office.

As a brief overview of the process, the editor chivies, cajoles and otherwise pries material for each issue out of the contributors, ideally by the 20th of each month, and then does what needs to be done to assemble the pieces into the newsletter, which can take several days. It then goes to the printing company, which prints it up, center-staples and folds each issue, and delivers the lot to Charlie Oostdyk, a process that usually takes about a week. He then prints the mailing labels, edge-staples and labels each of about 750 issues, organizes them into the required groupings, and delivers them to the post office, a process he usually manages to complete within 48 hours. The post office then does its thing, and they eventually wind up in your mailboxes. The purpose of my survey was to figure out where any problems are after the SA gets to the post office.

**Continued on page 3...**

We changed the office we mail from in March, and April was the first issue this really affected. That month, everything went unusually well – Darren Thibodeau was able to finalize the SA and get it to the printer earlier than usual, the printer was very fast in doing the run and getting it to Charlie, and Charlie was able to do his part right away (even though he works full time) and to get it all to the post office on 3/27, about a week earlier than usual. The result – most people got their copies on 3/29 or 3/31, 2 to 4 days after they got to the post office. Besides the early deliveries, the biggest change from before was that even the more distant recipients, who had been getting them 8 to10 days after delivery to the post office, got them within 4 days. The latest delivery reported to me was in Garden Grove on 4/7, though another Garden Grove delivery was reported on 4/2 and most of the surrounding cities reported deliveries on 3/29. (55 reports total)

Things on our end worked out pretty well for the May issue, which went to the post office on 5/1. The largest number of reported deliveries was on 5/3 (Sat., at 2 days), and there was another cluster of reported deliveries on 5/9 (at 7 days), from Los Angeles and Riverside Counties, most of which had received their April issue in 2 days. The latest reported delivery that month was 5/10 (8 days), in Whittier. (35 reports total)

Bringing us to June. Darren had work problems that ultimately made it impossible for him to put the SA together, so he turned it over to Liam Kennedy, unfortunately very late in the schedule. Many, many thanks to Liam for stepping in, putting the SA together, and getting it to the printer within 24 hours of getting the contents from Darren. Even though Charlie was very busy at work himself, he managed to do his processing and get them to the post office within about 48 hours of receipt, on 6/5. Most people reporting from Orange County received it 2 days later, and the deliveries after that were pretty spread out, with no real second cluster as in April and May. The latest report I've received is for delivery in San Jose on day 13, much worse than in the prior two months. Even sadder, places like Duarte and Palos Verdes, which both got their April issues on Day 2, slipped to Days 7 and 9, respectively, for June. There were no reports of deliveries outside of Orange County before Day 6, and Seal Beach and La Habra, both of them within OC, reported receipt on Days 9 and 10. (30 reports total)

Conclusions? Unfortunately, the reporting samples overall are quite small, given that we mail out well over 700 issues each month. However, I had several people who reported in all of these months, which gives one way of checking for patterns, and there weren't many zip codes with more than one person reporting each month, which maximized the geographic distribution of the sample. If the delivery pattern we saw for April held up in later months, I'd say our post office problems were resolved. Unfortunately, that didn't happen, though most people who reported to me got deliveries within 6 days, even in June, and most people in OC that reported to me got their copies in 2 days. I suspect that the difference in delivery patterns is due to when the SA was delivered to the post office each month – different flows of mail at different times of the month would change the resources available for processing bulk mailings all along the route. If any of you have inside knowledge about the post office and its operations that would help us understand what's going on, we'd appreciate your thoughts on the subject.

As to the future – we haven't totally solved the delivery issues yet. What we can potentially control most easily is when the SA gets to the post office, but, to get real control over that, we need more people helping out with the process. As we saw with Darren's problems in June, having the full burden of producing the SA each month fall on just one person creates a major problem if there's an emergency and that one person can't get it done. Put simply, Darren needs help with the job of editing and producing the SA. We need some volunteers - if you can help us out with any aspect of the Sirius Astronomer, please contact Darren, Liam or me.

**Mars Activities at Griffith Observatory**

In case any of you think that Griffith Observatory is out of action simply because it's closed for renovation, it has an extensive program of Mars-related events over the summer and fall. Anthony Cook, Astronomical Observer for Griffith Observatory, has notified us of the schedule, and wants to know if any of you would be willing to bring your telescopes for public viewing at any of these events. It's a great opportunity to reach a lot of people and educate them about the wonders of the night sky, with Mars as the well-advertised center of attention. If you can make it to any of these, please contact Mr. Cook at Griffith Observatory or by email to tcook@earthlink.net. The scheduled events are:

Special Mars observing sessions, all Saturdays in August (2, 9, 16, 23, and 30); star party starting each Saturday at 8 p.m. with Mars viewing from 11 p.m to 1 a.m. Location: Griffith Observatory Satellite at the south end of the Los Angeles Zoo parking lot in Griffith Park. There will be Mars related presentations in the mini-planetarium until 10 p.m., with workshops on observing Mars by Tim Robertson, Association of Lunar and Planetary Observers (ALPO).

Tuesday, August 26, for closest approach (at 2:51 a.m.), an all night observing session until approximately 3 a.m. Location: South lawn of the Gene Autry Museum of Western Heritage adjacent to the Observatory Satellite.

September and October, nightly viewing all nights except Mondays from 7 to 10 p.m. at the Observatory Satellite. There will also be public viewing on Labor Day, Monday September 1.

These should be a lot of fun – I hope you can make it to at least some of them!

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## RTMC Nightfall Star Party Availability

If any members of the OCA are interested in attending the RTMC's Nightfall star party in Borrego Springs on September 26-27, there are 19 rooms still available as of today. We expect that the remaining rooms will be booked soon. Room reservations can be made by calling the Palm Canyon Resort at (800) 242-0044 and indicating that you are with the RTMC or astronomy group. Further details are available on the RTMC Web site at http://www.rtmc-inc.org/nightfall.html. A brief announcement in your club's newsletter might be useful.

Alson Wong
RTMC

## Astrollaneous

### A call for help

**With a new position I have taken with a company in Moorpark , I am finding Sirius Astronomer difficult to get done in a timely manner each month. I am asking the membership for help in getting this task done monthly. Anyone interested, please email me at darrent@mwscommunications.com for details. Your help will be greatly appreciated.**

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# NASA's Space Place

## New from the Jet Propulsion Laboratory

Many clubs would like to be able to have access to NASA videos to use as part of the club monthly program. In order to support the clubs who carry our column, we are now offering a video lending library.

You can go to the following URL:

http://spaceplace.nasa.gov/astro_clubs/videos/index.shtml

and see brief descriptions of the videos we have to lend. You can make your selection on-line, and the video will be mailed to you within 24 hours — if we have it available at that time.

Please note that we have a limited number of each video — they are for loan only. If they are not returned promptly, we will not be able to continue this service. (So, please resist the temptation to end it to those who missed the meeting — and just get it back to us so that others can borrow!)

This is a video lending service we offer to astronomy clubs that subscribe to our monthly column. We offer this free service on a first-come, first-served honor system. We have limited quantities, so after you view a tape, place it in the pre-addressed envelope, affix $3 postage, and return so it can be shared with other astronomy clubs.


**Continued on page 6...**

## Astronomy / Space Alert for Southern California

Astronomy/Space Alert for Southern California (also known as Launch Alert) is a free, e-mail based newsletter providing coverage of missile launches from Vandenberg AFB. Other topics covered include southern California astronomy and space news.

Many of the events mentioned in the newsletter are visible over a large portion of the Southwest. To subscribe, go to:

http://mailman.qth.net/mailman/listinfo/launch-alert

# As the worm turns.....

### Images from the Valley of Fire!

**Sirius Astronomer received email from member, Wally Pacholka with links to some of his images taken during his Valley of Fire trip. The image below shows Sagittarius over face rock. These images really should be viewed in color and are stunning. Point your browser to http://www.astropics.com/vfire/ and enjoy!**

**Thank you Wally!**

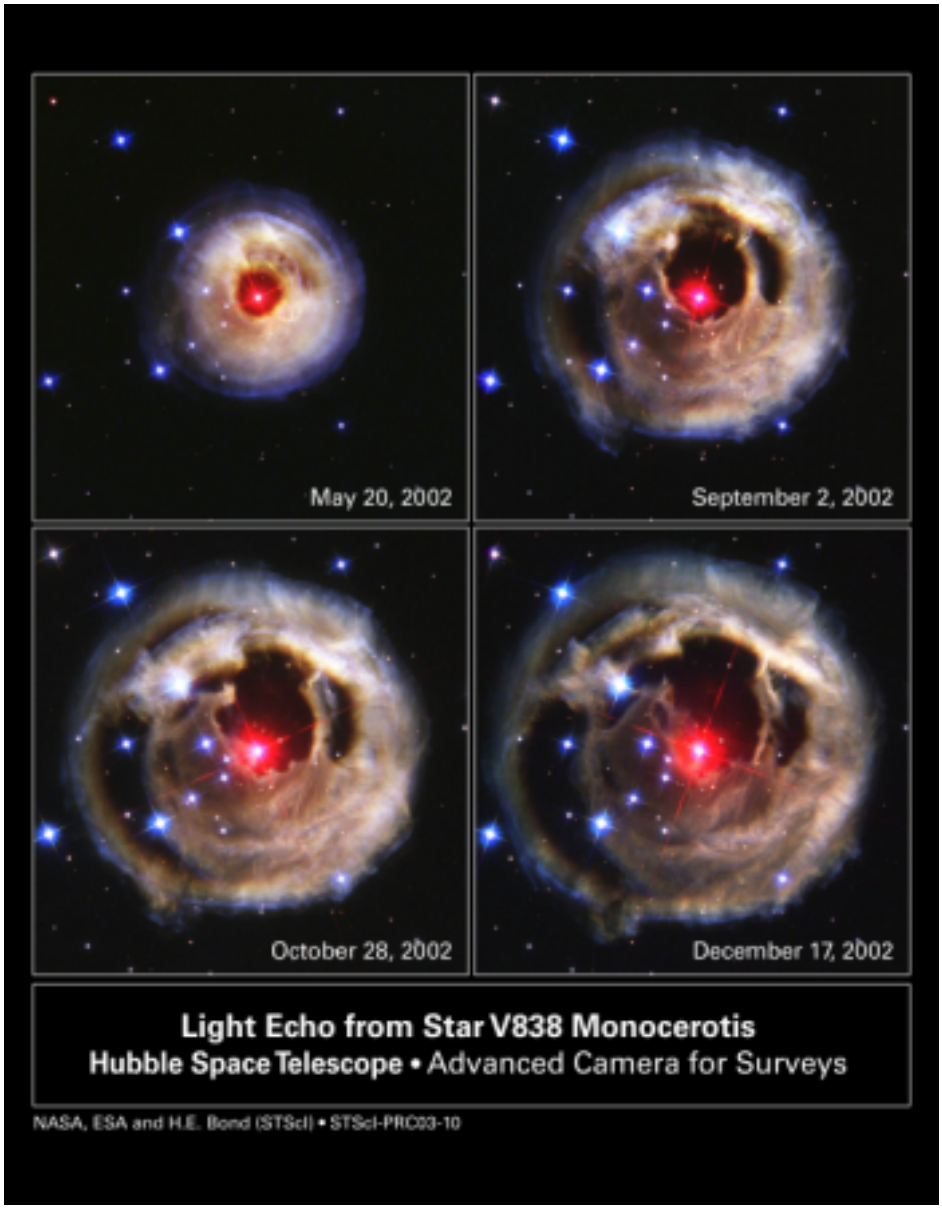
**the Editor**

### RTMC Update

OCA Member, Jim Windlinger was nice enough to share this image of former AstroImage conference chairman Garth Buckles, set to enjoy a night with his new AP 900 mount.

OCA president Barbara Toy submitted this club group picture taken at this year's RTMC.

## Hubble Watches Light from Mysterious Erupting Star Reverberate Through Space




In January 2002, a dull star in an obscure constellation suddenly became 600,000 times more luminous than our Sun, temporarily making it the brightest star in our Milky Way galaxy.

The mysterious star has long since faded back to obscurity, but observations by NASA's Hubble Space Telescope of a phenomenon called a "light echo" have uncovered remarkable new features. These details promise to provide astronomers with a CAT-scan-like probe of the three-dimensional structure of shells of dust surrounding an aging star. The results appear tomorrow in the journal Nature.

"Like some past celebrities, this star had its 15 minutes of fame," says Anne Kinney, director of NASA's Astronomy and Physics program, Headquarters, Washington. "But its legacy continues as it unveils an eerie light show in space. Thankfully, NASA's Hubble has a front row seat to this unique event in our galaxy."

Light from a stellar explosion echoing off circumstellar dust in our Milky Way galaxy was last seen in 1936, long before Hubble was available to study the tidal wave of light and reveal the netherworld of dusty black interstellar space. "As light from the outburst continues to reflect off the dust surrounding the star, we view continuously changing cross-sections of the dust envelope. Hubble's view is so sharp that we can do an 'astronomical cat-scan' of the space around the star," says the lead observer, astronomer Howard Bond of the Space Telescope Science Institute in Baltimore.

Bond and his team used the Hubble images to determine that the petulant star, called V838 Monocerotis (V838 Mon) is about 20,000 light-years from Earth. The star put out enough energy in a brief flash to illuminate surrounding dust, like a spelunker taking a flash picture of the walls of an undiscovered cavern. The star presumably ejected the illuminated dust shells in previous outbursts. Light from the latest outburst travels to the dust and then is reflected to Earth. Because of this indirect path, the light arrives at Earth months after light coming directly toward Earth from the star itself.

The outburst of V838 Mon was somewhat similar to that of a nova, a more common stellar outburst. A typical nova is a normal star that dumps hydrogen onto a compact white-dwarf companion star. The hydrogen piles up until it spontaneously explodes by nuclear fusion — like a titanic hydrogen bomb. This exposes a searing stellar core, which has a temperature of hundreds of thousands of degrees Fahrenheit.

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By contrast, however, V838 Mon did not expel its outer layers. Instead, it grew enormously in size, with its surface temperature dropping to temperatures not much hotter than a light bulb. This behavior of ballooning to an immense size, but not losing its outer layers, is very unusual and completely unlike an ordinary nova explosion.

"We are having a hard time understanding this outburst, which has shown a behavior that is not predicted by present theories of nova outbursts," says Bond. "It may represent a rare combination of stellar properties that we have not seen before."

The star is so unique it may represent a transitory stage in a star's evolution that is rarely seen. The star has some similarities to highly unstable aging stars called eruptive variables, which suddenly and unpredictably increase in brightness.

The circular light-echo feature has now expanded to twice the angular size of Jupiter on the sky. Astronomers expect it to continue expanding as reflected light from farther out in the dust envelope finally arrives at Earth. Bond predicts that the echo will be observable for the rest of this decade.

The research team included investigators from the Space Telescope Institute in Baltimore; the Universities Space Research Association at the U.S. Naval Observatory in Flagstaff, Ariz.; the European Space Agency; Arizona State University; the Large Binocular Telescope Observatory at the University of Arizona at Tucson; the Isaac Newton Group of Telescopes in Spain's Canary Islands; and the INAF-Osservatorio Astronomico di Padova in Asiago, Italy.

*Printed with permission from NASA, ESA and H.E. Bond (STScI)*

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

**RHESSI (Reuven Ramaty High-Energy Solar Spectroscopic Imager)** - What are the odds of seeing a Gamma Ray Burst (GRB), which happen about once a day in random directions all over the sky, in the field of view of a telescope observing the Sun? Doesn't matter that it shouldn't have happened, because it did in RHESSI's view. This is the first instrument observing a GRB in which polarization could be detected, and it was found that the gamma rays are quite polarized. The polarization supports only one of the two leading theories about how GRBs are produced, namely that they are the result of supernova explosions. The strength of the polarization indicates that the magnetic field where the burst was produced is stronger even than that measured on any neutron star, which have the strongest known magnetic fields.

**Exoplanets (planets outside the Solar system) Weighed** - For the first time, the masses of planets orbiting a rapidly spinning pulsar have been measured. The method used was for 13 years to precisely measure variations in the pulsing of the pulsar caused by the planets gravitationally pulling the pulsar about during their orbits. The method was so accurate that it measured the perturbations that each planet had on the orbits of the others. The pulsar is 1500 light years away in Virgo, and is known to have 3 planets, but only two of them were accurately measured with these observations. The results show that the two measured planets are orbiting in about the same plane as each other, and have 4.3 and 3.0 times the mass of the Earth. The proportions of the planets' distances from their pulsar are nearly the same as those of Mercury, Venus and Earth in our Solar System.


...continued on page 9

The plane of the orbit of the third planet could not be determined, but if it is the same as the other two, then its mass has to be about 1/40 that of the Earth. These are the most accurate masses ever obtained for any exoplanets, and are by far the smallest exoplanets known.

**Dwarf Novae Distances** - Astronomers, using the guidance sensors on the Hubble Space Telescope (HST) as if they were an observing instrument, have discovered that the brightness of outbursts in dwarf novae relates to their orbital periods. Knowing the actual brightness and the apparent brightness allows calculating of the distances of any dwarf novae. These novae are a type of cataclysmic variable star, that occasionally give outbursts from material falling into a white dwarf star from a very close companion star. Their periods of orbiting the companion range from 78 minutes to 48 hours. The HST guidance sensors were able to measure the parallax (apparent movement caused by the Earth's yearly motion) of 6 dwarf novae, and this produced the most accurate distances ever measured for dwarf novae. Dwarf novae are considerably farther and brighter than previously thought.

**Flattest Star** - Observations with the new interferometer on the Very Large Telescopes in Chile have measured the diameters of the fast-spinning hot (20,000 degrees) massive (6 times the Sun) star Achernar, and found that the equatorial diameter is 56% larger than the polar one. This is due to centrifugal force swelling out the equator, effectively flattening the star. It is now the flattest star known. The effect was much larger than expected, and will keep the theorists busy explaining it. It will probably require unexpected circulation patterns of material within the star or centrifugal mass loss. The equatorial diameter is .00253 arc seconds, which at its distance of 145 light years, calculates to 12 times the diameter of the Sun. With further development of the capabilities of the interferometer, it is expected to get images of the surface of large stars such as Achernar, not just measure the sizes.

**3-D Map of Stellar Neighborhood** - The first detailed map has been made of space within about 1000 light years of the Solar System. We are in the middle of a large irregular bubble of less dense gas, connected by tunnels to other bubbles, and extending up and down out of the plane of our Milky Way galaxy. The map is the result of 5 years of observations from several ground-based telescopes measuring the effects of gas clouds on the light from more than 1000 stars in all directions and various distances. It is thought that the bubble was created by a supernova explosion about 1 to 2 million years ago, but intense stellar winds from a cluster of hot stars or a large star moving through are also possibilities. Further observations with current and planned spacecraft should prove which is the cause.

**RAVE (RAdial Velocity Experiment)** - What do you do with a telescope when it has imaged all the sky that it can? In the case of the UK Schmidt telescope (the Australian twin of the Palomar Schmidt), you install a new instrument and survey the sky again. The new instrument is a fiber optic device called 6dF that feeds 150 spectrographs simultaneously. It will be replaced in 2006 with one that feeds 2250 spectrographs. RAVE is the name of the project to use these instruments to survey the sky, and they expect to measure the chemical composition and radial velocity (speed towards/away from us) of 50 million stars over the next several years. The proper motions (speeds across our line of sight) and the distances to millions of stars have been accurately measured with the recent Hipparcos and Tycho projects. RAVE will fill in the third dimension of velocity. The resulting map should allow astronomers to better model how the Milky Way had to have formed and collided with smaller galaxies in order to result in the distribution of stars and their velocities that exist today.

**...continued on page 10**

**Saturn** - one of the windiest planets, has over the last 7 years had an unexpected and dramatic change in weather: its equatorial winds have subsided from over 1000 miles per hour to a mere 600. The winds were first measured by the Voyager spacecraft in 1980. The recent change was measured by analysis of markings in images by the Hubble Space Telescope (HST). Winds far from the equator were found to have remained steady of the same time period. The change could be part of a seasonal cycle on Saturn, but we will have to continue observations over the many more years to tell. Each of the 4 seasons on Saturn takes over 7 Earth years.

**Nearby Galaxy** - New observations with the Byrd radiotelescope at Green Bank, West Virginia, suggest that an object (known as Complex H) formerly believed to be a gas cloud somewhat outside our Milky Way galaxy is actually a small satellite galaxy in orbit about the Milky Way. Because it is orbiting in retrograde (the opposite direction from most others), it did not fit the pattern expected for a satellite galaxy, and the intervening dust and gas of our own galaxy blocked most observations of it. Radio frequencies that penetrate such gas and dust were used in the new observations. They showed the satellite galaxy has a tail of material being stripped off by gravitational interaction with the Milky Way. It is about 33,000 light years in diameter, lies about 108,000 light years from the Milky Way's center, and contains 6 million solar masses of gas.

**Nearby Star** - A faint red dwarf star has been found during a survey designed to find white dwarf stars that move rapidly among the other stars, and the preliminary distance measured for it is 7.8 light years, making it the third closest star system to the Sun. Only the Alpha Centauri system and Barnard's Star are closer. A more accurate distance measurement will be made to confirm this. The star is located in Aries, is 7% the mass of the Sun, and gives off 300,000 times less light than the Sun, explaining why it was not noticed before. It is dimmer than a typical red dwarf should be, so if the distance is confirmed, then the theorists will have some explaining to do. The white dwarf search was conducted by searching through archived images from an asteroid search program. With the large amount of astronomical data being collected electronically now, discoveries made by reprocessing data looking for other types of objects are becoming more common.

**Auroral Puzzle Solved** - It took observations from 5 spacecraft to explain the origin of a puzzling type of aurora, seen as bright spots in the Earth's daytime atmosphere, called "dayside proton auroral spots". They were shown to occur where the Earth's magnetic field was fracturing (called magnetic reconnection), allowing protons from the Sun to pass through the magnetic field and collide with air molecules. This discovery allows scientists to detect magnetic reconnection remotely by using cameras that see dayside proton auroral spots.

**Distant Galaxy** - A galaxy has been found with the largest redshift that has been confirmed with accurate spectra. The redshift is 6.17, meaning that light from it arrives here with its wavelength stretched to 6.17 times normal by the expansion of the universe that occurs between the galaxy and us. That means the light left the galaxy when the Universe was only about 6.5% of its age now. The galaxy was found in a survey made with the wide-field camera on the CFH telescope in Hawaii by using a filter that passes only light with huge redshifts, and then an accurate spectrum (of this and many other candidates) was taken with one of the 8-meter Very Large Telescopes in Chile. Interestingly, the spectrum showed that the light of the galaxy is mostly from hot massive stars, not from hydrogen gas clouds, as had been predicted. This is good news for the observers, since they can detect more types of galaxies using the filter technique, and bad news for the theorists, who now have to explain the large number of hot stars in galaxies formed so early in the life of the Universe.

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**Mars Express (European Mars orbiter and lander) and Mars Exploration Rover "Spirit" (US lander)** have been successfully launched, and Mars Exploration Rover "Opportunity" (identical US lander) should launch by the time you read this. These three and the Japanese Mars mission (making its second attempt since 1999 to rendezvous with Mars) will all arrive about the end of this year, making for exciting times for Mars fans. Mars Express will radar Mars to a depth of about 3 miles and should be able to detect ice and water, as well as sand, lava, sediments, and other materials, and so should answer a lot of questions about Mars geological history.

## Instant AstroSpace Updates:

**SOHO (SOlar and Heliospheric Observatory)** has found the source of the faster segment of solar wind, and it is the straight spoke-like features on the Sun's surface that are called plumes; the previously held theory was that fast solar wind came from the surface between plumes.

New images made by the Hubble Space Telescope (HST) of the planetary nebula Henize 3-1475 show it to have 2 massive curved jets that give it the shape of a garden sprinkler, prompting that as a nickname for the nebula; its central star is 12,000 times the brightness of the Sun, has 3 to 5 times the Sun's mass, is 18,000 light years away, and material in the jets is traveling 2.5 million miles per hour, the fastest known for such an object; the jets spin once every 1500 years, and spit clumps out about every 100 years.

Rosetta, the European comet rendezvous mission that was delayed recently due to launch rocket problems, has been rescheduled for a later launch (next February) to a different comet (Churyumov-Gerasimenko); rendezvous will be late 2014.

Testing on the Gemini Telescope (8-meter telescope in Hawaii) of a new adaptive optics system, which is tuned for the altitude at which atmospheric distortions are being produced, has produced an image of the globular cluster M-13 with resolution about 12 times better than without adaptive optics; it is expected to do twice as well when the system is completed, resulting in diffraction limited images in the near infrared.

Over 1000 variable stars, most of them Mira-type slowly pulsing ones, have been discovered in the nearby galaxy Centaurus A during a series of near-infrared observations of two small zones of the galaxy over 3 years with one of the Very Large Telescopes in Chile, the first such variable star search outside our local group of galaxies; the work also confirmed the distance to Centaurus A (about 14 million light years), and found different age groups of stars.

SOHO (SOlar and Heliospheric Observatory) recently found two sun-grazing comets whose heads were completely destroyed by the Sun's heat, but whose tails remained intact for some time, the 2nd and 3rd ever seen; for the tails to remain intact under solar pressure, they had to consist of dust particles all the same size.

A geological layer that appears to be meteor debris has been found with age (380 million years) corresponding to another mass extinction (40% of species) of life, the 4th and oldest such impact-extinction correspondence known.

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