SIRIUS ASTRONOMER

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The Newsletter of the Orange County Astronomers

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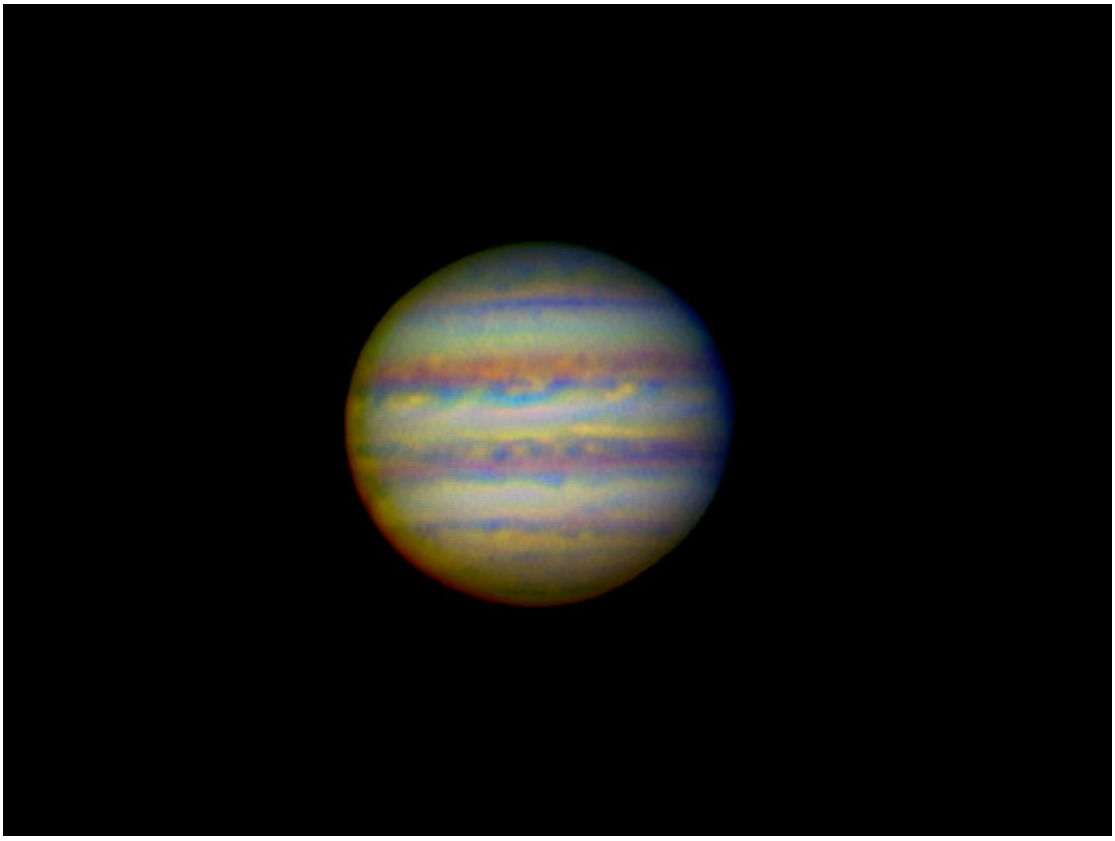
GET READY FOR RTMC MAY 26-28TH!



After a brief hiatus, Jupiter is now available for observing all night, rising in the constellation Libra with the end of evening twilight this month. This always-satisfying target offers something for observers with even the most modest equipment (photo credit: John Castillo)

OCA CLUB MEETING

The free and open club meeting will be held Friday, April 14th 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 Brian Hart of UC Irvine - "Illuminating the Structure and Evolution of the Universe with X-Rays'

NEXT GENERAL MEETING:

May 12th

STAR PARTIES

The Anza site will be open this month on April 1st and April 29th. The Black Star Canyon site will be open this month on April 22nd. 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, April 7th at the Centennial Heritage Museum at 3101 West Harvard Street in Santa Ana.
GOTO SIG: Apr. 3rd, May 5th
Astrophysics SIG: Apr. 21st, May 19th
Astro-Imagers SIG: Apr. 18th, May 16th
EOA SIG: Apr. 24th, May 22nd
Dark Sky SIG: TBA (contact coordinator for details)

President's Message

By Barbara Toy

So far, 2006 doesn't seem to be giving us any better skies for viewing than 2005 – at least as of mid-March, as I'm writing this. By the time this reaches you, the rains of February and March will undoubtedly have caused a population explosion among the weeds at our Anza site – so this is a good time to remind folks that it's

Weed Clearance Time at Anza!

Two years ago we learned first-hand what happens when we get careless about controlling the weeds at our Anza site. The greatest damage we had from the fire that burned over a good chunk of our property was in areas where weeds hadn't been cut back around various pads – fortunately, the fire didn't reach the observatory level or Anza House, and, though it came close, it missed the club observatory and Star Cruiser. There were a number of sheds and storage containers that the firefighters had to work hard to protect (including, I'm sorry to say, the rather decrepit trailer that used to provide housing for people operating the club observatory). Their job would have been a lot easier if we'd kept the shrubs and other growth cut back from the structures, and if we'd cleared the grass and weeds from around all of the pads and buildings before the fire.

Although pad and observatory holders have always had the obligation to keep the areas around their pads and observatories clear, the Board clarified the policy after the fire and set May 31 of each year as the firm deadline for weed clearance around the pads and observatories to be completed. Our fire was in early June, so clearing the weeds and other growth by the end of May in some years could be cutting it close. The end of May tends to coincide with RTMC, which is held Memorial Day weekend – a lot of the Anza regulars spend that time out near Big Bear instead of Anza, which cuts into the time that might otherwise be available for weed-cutting, so it's important to plan ahead and get the weeds and shrubs cut back before that final weekend in May. That's particularly so this year, as the May Anza star party is the Saturday of RTMC weekend (May 27, to be precise).

Of course, the areas around the pads and observatories are only part of the story. We also have weeds growing in the roadways around the site, and around Anza House, the Football Field, the club observatory, and other general use areas, and we need volunteers to help cut them back. Many of the pad and observatory holders go out of their way each year to clear areas beyond what they are required to do, and we generally have had other people volunteer to help with the clearance, as well. If you are one of these generous licensees or other volunteers, we definitely thank you! There are always more weeds than volunteers to cut them back, though – so please plan to join the ranks of Anza weed-clearing volunteers, and help us protect the club's most valuable asset!

Weed Clearing Equipment

The club actually owns two gas-powered weed-eaters, one that is hand-held and one that looks a bit like a power lawnmower, but, as of the time I'm writing this, neither is in operating condition. The hand-held weed-eater has two fuel lines that need to be replaced, and the other one needs some mechanical work (including cleaning, changing the spark plug and similar maintenance). If you can help us get these two pieces of equipment back into service, it would be deeply appreciated – please send me an email at btoy@cox.net or call me at 714/606-1825 if you can help with either of these.

When they are operating, these weed-eaters are available to any club member to use at the Anza site. In addition, Bruce Waddington is generously allowing members to use his electric weed whacker, which is stored in the same structure as the club weed-eaters – the container across from the club observatory. If you use these or any other equipment available to club members, please be sure to leave it in at least as good a condition as you found it!

Anza Clean-Up Day on April 29

To help get the weeds taken care of before the deadline and to do some general spring cleaning, the second Anza star party in April will be an official Anza Clean-Up Day – if you're one of the regulars who is planning to be out at Anza anyway, please come out early that day to help out. If you're one of the members who come out to Anza mainly during the summer months – kick the observing season into gear by coming out and helping to get the site in good condition for your summer enjoyment (the temperatures make working out there in the spring a whole lot more enjoyable than in the summer!). If you don't generally come out to Anza, this would be a great opportunity to get familiar with the site and get to know some of the regulars better – there's nothing like

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ASTROSPACE UPDATE

April 2006

Gathered by Don Lynn from NASA and other sources

Planets in reverse - Astronomers using the Very Large Array radio telescope in New Mexico have discovered a newly forming solar system with the inner part orbiting one direction and the outer part orbiting the other way. The system is about 500 light-years away in Ophiuchus, and has not yet formed planets. When planets do form in a few million years, likely the inner planets will orbit in the opposite direction of the outer planets. This is the first known system of planets or pre-planets with 2 directions of orbiting. There are some known galaxies with inner and outer parts orbiting oppositely, so the same mechanism may be operating here.

The sound of a supernova – Computer simulations of stars ending their lives in supernova explosions have been unable to duplicate the energy observed in actual supernovas until now. The energy transmitted by neutrinos and convective motion are simply not powerful enough. A new simulation includes sound waves, and that appears to solve the mystery. Apparently sound waves transmit most of the energy that blows away the outer parts of the star during a supernova. The frequencies involved are 200 to 400 hertz, which are tones found near the middle of a piano keyboard.

New type of object I – A team of astronomers has found a new kind of object: a neutron star that shows no activity most of the time but once in a while spits out a single burst of radio waves. They are being termed Rotating Radio Transients, or RRATs, and 11 of them are now known. The rotation periods of these lie between .4 and 7 seconds, but on most rotations no radio signal is emitted. The bursts last only a few milliseconds (up to .03 seconds), and then silence reigns for from 4 minutes up to 3 hours. The odds of detecting these are slim, since they are silent most of the time, and even when they do emit, the result is similar to radio noise from non-cosmic sources. So it is likely that huge numbers of these objects exist, but have just not been discovered. The discoverers estimate hundreds of thousands may exist in our Milky Way, somewhat more than the estimate of normal pulsars (neutron stars that emit radio pulses each time they rotate). None of the RRATs shows any evidence of having binary star companions. It was conjectured that the RRATs might be a known type of pulsar that occasionally gives off a huge pulse in place of one of the normal pulses, but the magnetic fields of the RRATs were far weaker than the fields of the occasional-strong-pulse pulsars. The RRATs were discovered while conducting a survey to locate pulsars, which found over 800 ordinary pulsars in addition to the RRATs.

New type of object II – A pulsar has been found that is only detectable for about a week, then appears to switch off for about a month. We ordinarily see radiation (usually radio) from pulsars each time they rotate, like seeing a lighthouse beacon. Pulsars generally slow down their rotation by very tiny but measurable amounts. The new pulsar slows by different amounts when it is off and when it is on. When we observe pulses ("on") the slowing is 50% greater than when off. Theorists believe that pulsar slowing is caused by a process with magnetic fields that throws off particles. This discovery gives them a laboratory to test the slowing theory.

New type of object III – Scientists using the Swift satellite detected a new kind of gamma-ray burst (GRB) on February 18. It was closer (only 440 million light-years), less powerful, and longer (over half an hour) than nearly all other GRBs. The combination of these was unique. It was suggested that it might be a GRB viewed from a greater angle than previously, or that it was a precursor to a supernova. The debate was answered in a few days when a supernova showed up at the location of the GRB. Telescopes of all wavelengths (visible, radio, ultraviolet, X-rays, etc.) were looking at the afterglow of the GRB when the supernova showed up, so it will probably be one of the best observed supernovas ever.

Gamma-ray bursts (GRBs) – The Swift satellite not only found one of the nearest GRBs, but it found the farthest GRB. This one is so far that it took the (gamma-ray) light about 13 billion years to reach us. The GRB was of the type that is caused by a supernova explosion that produces a black hole. The unusual features of this burst were its length (over 8 minutes), multiple flares at the end of the burst, and time dilation. Closer GRBs do not have the multiple flares, indicating such supernovas proceeded somewhat differently early in the history of the universe than they do now. This is probably due to element content or size of stars being different. Time dilation is the apparent slowing of time during the burst that is caused by the expansion of the universe that took place while the burst was traveling to Earth. This is part of the reason for the length of the burst. It was only a about a minute (still long for a GRB) when it was emitted, but stretched to over 8 minutes by the time it arrived at Earth. This means that the time it takes for a very massive star to explode in a supernova is only about a minute. Since it took about 2 minutes to aim Swift's X-ray and ultraviolet telescopes at the location of the burst, the time dilation allowed X-ray and ultraviolet observations before the burst ended. Only one other object has ever been observed farther than this GRB, and it is a quasar.

Chandra (X-ray space telescope) – The Chandra northern deep-field view, produced from 23 days of exposure on a single area, has been compared with the Hubble northern deep-field image (of the same area). Nearly all the 600 X-ray objects found correspond to galaxies seen in visible light, and thus are likely caused by supermassive black holes at the centers of those galaxies. Matter falling into black holes creates X-rays. During periods when matter is falling into the black holes at the centers of galaxies, those centers of those galaxies are called active galactic nuclei. This study showed about 10 times the number of active galactic nuclei as studies done in visible light, which shows that most active galactic nuclei are hidden by dust, which is penetrated by the X-rays but not visible light. Further study is needed to determine if the numbers of active galactic nuclei changed over the life of the universe. This study did determine that 2 characteristics of active galactic nuclei have not changed over the life of the universe: the ratio of X-ray strength to that of other wavelengths of light, and the X-ray spectra. This makes active galactic nuclei different from quasars,

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See us at ASTROIMAGE 2006
Register Now! August 11-12, 2006 • Curtis Theater, Brea, CA
Orange County Astronomers

The Orange County Astronomers present an information-packed conference covering the latest in astroimaging and techniques.

- *Presentations from well known astroimagers, including Rob Gendler, Robert Reeves, Chuck Vaughn, and others.*
- *Keynote address by Tony Hallas*
- *Print and Electronic image galleries*
- *Tutorial sessions*
- *Exhibitor displays*

For registration and updates: http://www.ocastronomers.org/astroimage/

GEARING UP FOR RTMC!

Karen Schnabel

RTMC is coming up in May and the library needs some help! First, I would like to actively request any book donations from our members. Magazines, unfortunately, do not bring enough income in, and they are very difficult to haul up to Big Bear. However, I'll take ANY type of book. And, I can give you a tax donation receipt, if you'd like. As most of you know, the donated books are sold at RTMC each year, which helps support the new purchases for the library. I use the bulk of the money for books, DVD's, and video's, and would like to continue to be able to buy exciting new things for the library! If you are unable to bring the books to the meetings, let me know and I will make arrangements to come pick them up.

Anyone going up to RTMC could help me out by bringing books and other items up and back. I need 4-5 volunteers to bring up 2 boxes of books each on Friday. I also need someone with a truck or van who can bring the canopy and tables back on Sunday. We break down right after lunch on Sunday, so if anyone is heading back at that time, I'd appreciate it if you could bring the big stuff. Once back in Orange County, I can arrange to pick the canopy and tables up from your house, if needed. There is also a large (approximately 3'x4', but fairly light) piece of plywood that needs to go up and back.

Volunteers are needed to help out at the booth itself. This year we will be selling only books (no magazines). But we have a new thing for the kids - a beanbag toss! Anyone willing to help out for an hour or two on Friday or Saturday would be much appreciated. The booth is open from 12-5pm on Friday and from 10am-5pm on Saturday. Sunday is fairly slow, so I would only need someone to help break the canopy down after lunch.

Please let me know if you can help. You can contact me at karen@schnabel.net or 949-887-9517. THANKS!

MEMBERS ASSISTING THE LIBRARY

The OCA library would like to thank our members for their contributions these last few months. Leonard Stein donated a a set of Astronomy software in December. In January, Bob Buchheim donated The Surface of Mars book and for those astrophysics buffs out there, Philip Beilin donated The Geometry of Spacetime. Mike Lee donated a wonderful stack of books and Barbara Toy donated a set of 6 video tapes, which came through her SIG. All have been added into the library. Thanks to all of you!

The Sombrero Galaxy, M104 (photo credit: Dan Bonis)

VOLUNTEER OPPORTUNITIES

NEEDED – NEW ANZA HOUSE COORDINATOR

As Tim Hunt is now in Tennessee, we need a new Anza House Coordinator. This person generally oversees Anza House and takes care of such things as keeping supplies in stock, determining what repairs and maintenance are needed and arranging for that to be done, collecting the money from the money box and getting it to the club treasurer, keeping the reservation sheets in stock, encouraging people to keep things tidy and to remove their trash when they leave, and dealing with the various things that inevitably crop up whenever a stream of people uses a facility over time. It's a great way to contribute to making the Anza site a better place for all of us – if you're interested in the position, or want more information, please contact Barbara Toy at btoy@cox.net or 714/606-1825.

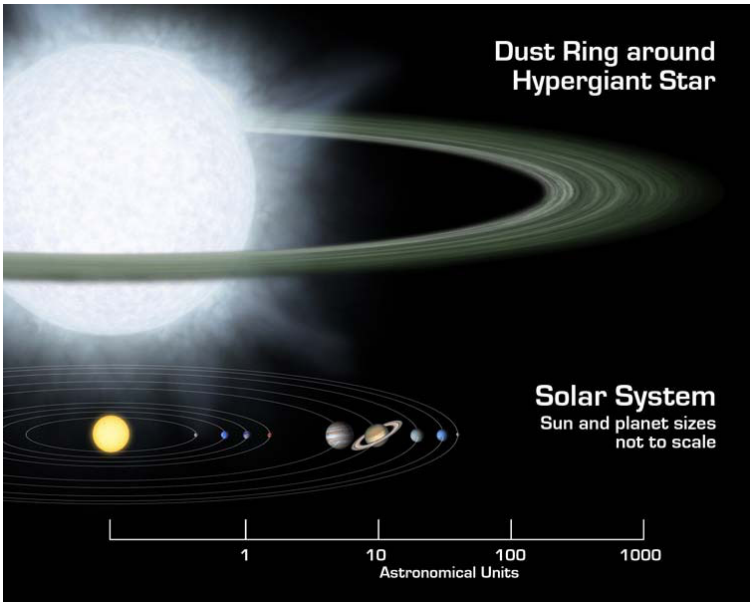
TECHNICAL ASSISTANCE NEEDED FOR OUR WEBSITE

We need someone to handle the technical side of the OCA website. Hassi Norlen is our Website Editor, and deals with content and a lot of the day-to-day maintenance, but we need someone who can deal with the "down-and-dirty programming" aspects of the website. If you have knowledge of VBScript, JScript, Javascript, Access Databases, Microsoft IIS (Internet Information Server) and ASP (Active Server Pages), as well as HTML, and understand and are able to code dynamic web sites running under Microsoft IIS developed using ASP and Microsoft Access databases, you have the necessary skills for this, and we could really use your help.

If you can help us out with this, please contact Hassi Norlen (hassi@norlens.net or 714/710-9444) or Barbara Toy (btoy@cox.net or 714/606-1825).

Planets in Strange Places

By Trudy E. Bell



Artist's rendering compares size of a hypothetical hypergiant star and its surrounding dusty disk to that of our solar system.

Red star, blue star, big star, small star—planets may form around virtually any type or size of star throughout the universe, not just around mid-sized middle-aged yellow stars like the Sun. That's the surprising implication of two recent discoveries from the 0.85-meter-diameter Spitzer Space Telescope, which is exploring the universe from orbit at infrared (heat) wavelengths blocked by the Earth's atmosphere.

At one extreme are two blazing, blue "hypergiant" stars 180,000 light-years away in the Large Magellanic Cloud, one of the two companion galaxies to our Milky Way. The stars, called R 66 and R 126, are respectively 30 and 70 times the mass of the Sun, "about as massive as stars can get," said Joel Kastner, professor of imaging science at the Rochester Institute of Technology in New York. R 126 is so luminous that if it were placed 10 parsecs (32.6 light-years) away—a distance at which the Sun would be one of the dimmest stars visible in the sky—the hypergiant would be as bright as the full moon, "definitely a daytime object," Kastner remarked.

Such hot stars have fierce solar winds, so Kastner and his team are mystified why any dust in the neighborhood hasn't long since been blown away. But there it is: an unmistakable spectral signature that both hypergiants are surrounded by mammoth disks of what might be planet-forming dust and even sand.

At the other extreme is a tiny brown dwarf star called Cha 110913-773444, relatively nearby (500 light-years) in the Milky Way. One of the smallest brown dwarfs known, it has less than 1 percent the mass of the Sun. It's not even massive enough to kindle thermonuclear reactions for fusing hydrogen into helium. Yet this miniature "failed star," as brown dwarfs are often called, is also surrounded by a flat disk of dust that may eventually clump into planets. (Note: This brown dwarf discovery was made by a group led by Kevin Luhman of Pennsylvania State University.)

Although actual planets have not been detected (in part because of the stars' great distances), the spectra of the hypergiants show that their dust is composed of forsterite, olivine, aromatic hydrocarbons, and other geological substances found on Earth.

These newfound disks represent "extremes of the environments in which planets might form," Kastner said. "Not what you'd expect if you think our solar system is the rule."

Hypergiants and dwarfs? The Milky Way could be crowded with worlds circling every kind of star imaginable—very strange, indeed.

Keep up with the latest findings from the Spitzer at www.spitzer.caltech.edu/ . For kids, the Infrared Photo Album at The Space Place (spaceplace.nasa.gov/en/kids/sirtf1/sirtf_action.shtml) introduces the electromagnetic spectrum and compares the appearance of common scenes in visible versus infrared light.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

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working together in a good cause to help build friendships!

What should you bring to help with the work? A weed-whacker, if you have one (even if all of them are working, there are a lot more areas that need clearing than the three the club has access to could handle at one time), pruners, clippers, maybe a chainsaw for heavy growth, and maybe a shovel to help fill in holes in the walkways and roadways. Heavy work gloves can help save your hands from stickers, splinters, thorns and other unpleasantnesses of clean-up work. Large trash bags to hold material to be taken away. And, if anyone has access to a truck that could be used to take waste to local Transfer Station (we don't actually have a dump out there) – that would be very helpful, indeed!

You can pitch in whenever you get out there, but the earlier you arrive the better. To have enough time to do a decent amount of clearing and cleanup and also have time to set up for your evening activites, it's best to get there by around noon – if you get there in the morning, there's the added advantage that it's usually cooler, which is generally desirable even in the spring.

'Tis a Great Season to Donate...

As we get into Spring Cleaning season, many of you probably are finding that you have a lot of things taking up space in your home, garage, etc., that you no longer need and would really, in your heart of hearts, like to get rid of. Well, it just so happens that, thanks to the ongoing efforts of Larry McManus, we still have our eBay donation program going. You can give the club all those things that have built up over the years, such as sporting and exercise equipment, computers and related equipment, tools, pictures, any kind of collectible – in fact, anything that might possibly have some value to it, including astronomical equipment – and Larry will handle selling it for us on eBay. You get a tax deduction and the chance to clear out some unwanted items, and the club gets some money for such needed projects as the new moving roof for the club observatory and the perimeter fence for our Anza site. Since Larry set it up, this has truly proven to be a "win-win" program that has brought over $3000 to the club already. This is a good start toward paying for the new roof, but we've still got a long way to go, so please bring in whatever donations you can!

Larry is usually at the general meetings and you can give him items you want to donate at the meetings. You can also contact him directly and make arrangements to deliver them to him outside of the meetings or (especially for bigger items or if you have a lot to turn over to him) to have him arrange to pick them up. You can reach him at 714/731-5542 or lmcmanus@clearpointadv.com; for questions about the program, please contact Wendy Adams at wadams@clearpointadv.com and put "OCA eBay" in the subject line.

In a related area, if you have books – any books – that you want to get rid of, please turn them over to Karen Schnabel, our club librarian, to be sold to benefit the club library. If the books you donate happen to relate to astronomy in any way, she will definitely consider whether they should be added directly to the library, but any that are duplicates or that otherwise wouldn't quite work with the current collection (we have limited space, so she can't include everything she might like to include in the library) are particularly valuable additions to our sales inventory. People who have visited the club library over the last year or so may have noticed that Karen generally has a sales table running during the meetings, and some of the donated books are sold there (especially those that aren't related to astronomy), but she is also putting together a good inventory of books that would be particularly attractive to the folks who attend RTMC for our annual sales effort there on Memorial Day weekend. The RTMC sale usually gives our library budget its biggest cash infusion, so she is definitely looking for promising items to sell there!

A Couple Things About Our Website...

Thanks to some innovations that Liam Kennedy incorporated into the website when he was our club Webmaster, it is very easy for members to upload pictures and articles to the website on their own, without the need to go through anyone else. Please keep our primary purpose in view when you're adding something to the website, though – anything you upload to the site should have something to do with astronomy (our definition is broad enough to includes astrophysics, the space program and the full range of astronomical equipment) and/or the club. If you have any doubts about whether something would be appropriate to post, please run it by Hassi Norlen, our Web Editor.

Another feature of our website that a lot of people seem to overlook these days is the member publications portion – you can get to it by going to the drop-down menu for "E-zine" and clicking on "Published Members." This gets you to a page that shows all of the members who have posted information about the various articles, pictures, etc., they have had published, including where and when. There was a flurry of activity in that area of the site after Liam got it working, but that died down over time and there aren't very many recent postings. If you've had anything published that's related to astronomy, please remember to post the information in this section so fellow club members and others will be able to learn about it.

To add information about your publications, you need to sign into the site as a member, then go to the "Published Members" page. Click where it says "Add your own publication details," and you should get a pop-up window that asks you for the information for your entry. Fill in the requested information, then click the button at the bottom when you're done to have it added to the website database. Please include information on articles you have published in the Sirius Astronomer as well as any other publications (which can include online publications as well as traditional printed media). You can put in past publications as well as current ones – in fact, we'd like you to post the information about everything you have ever had published that is related to astronomy. So, check through your archives for any past publications, and be sure to remember to post the information about any new publications you may have!

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since the ratio of quasar light to galaxy light has definitely dropped; that is, there are far fewer bright quasars making visible light now than there were early in the history of the universe.

Cosmic rays – It has long been theorized that one type of cosmic ray, called anomalous cosmic ray, is generated at the solar system's termination shock, that boundary where the solar wind and solar magnetic field collide with interstellar wind and magnetic field. However, when the Voyager I spacecraft crossed the termination shock over a year ago, the predicted particle counts were nowhere near the values to support this theory. A new theory says that the anomalous cosmic rays do indeed originate at the termination shock, but only in certain areas of it where the magnetic field is just right. Voyager I did not hit one of those points, but Voyager II will within 2-3 years, at which time the particle measurements will confirm the new theory (or not). Also, the IBEX spacecraft, scheduled for launch in 2008, will be able to map the entire termination shock, and provide further relevant data.

Cassini (Saturn mission) made the first of 4 planned Titan flybys that are specifically looking for evidence of a subsurface ocean. Methane makes up about 2% of Titan's atmosphere. Calculations show that methane should break down over millions of years, so there should be no methane left in the atmosphere. Therefore the methane is being replenished from some source. One theory, that it evaporates from methane oceans on the surface of Titan, was disproved by recent images of Titan by Cassini and the Huygens lander. The remaining plausible theories are that methane is released from the icy crust of Titan by icy volcanic activity or that methane is released from a subsurface ocean of liquid methane. Cassini's 4 passes by Titan (the ones looking for the ocean) will be at different angles and distances, and careful tracking of the radio signal will allow a gravity map to be made, and any gravity changes to be detected. Liquid inside Titan would cause certain gravity changes over time. The 4th pass is in 2008, so results of the ocean search will not be available until then. The presence of a subsurface ocean may not distinguish between the methane source theories, since a water-ammonia subsurface ocean has also been theorized. But the gravity map and other observations might distinguish.

Cassini appears to have found evidence of liquid water reservoirs that erupt in **geysers** on Saturn's moon Enceladus. High-resolution images show icy jets and towering plumes ejecting large quantities of particles at high speed. Scientists examined many scenarios to explain this and determined the likely explanation is that geysers erupt from near-surface pockets of liquid water. The other moons where we have evidence of liquid water are all covered with ice miles deep, so it raises questions of how pockets of water could exist close to the surface of Enceladus. The next chance to get a close up view of Enceladus is when Cassini flies by it in spring 2008.

Cassini has also observed electrons rising from Saturn into **aurora**. Aurora on Earth is generally from electrons dropping from space down magnetic field lines to Earth, but small amounts of electrons have been detected going the "wrong way". This is the first detection of wrong way electrons on Saturn.

Stardust (comet sample return) – Preliminary analysis of the Stardust samples showed that they contain minerals (including olivine and various calcium, aluminum and titanium minerals) that had to have formed near the Sun, where it is hotter, mixed in with those formed in the Kuiper Belt, far from the Sun. The best theory to explain this is that very strong jets formed early in Sun's history, and these propelled material formed near the Sun outward to where the comets were forming. Stardust collected samples of interstellar dust in addition to comet dust, and analysis of the interstellar dust will begin soon.

Super Earth – Another Super Earth has been found, that is a planet that is more massive than the Earth, but is too dense to be a gas giant. The discovery is orbiting a red dwarf star at about the distance our asteroid belt is from the Sun, and has 13 times the mass of Earth. This is nearly as massive as the gas giant Uranus, but the density shows it has no substantial gas. This must mean that this planetary system ran out of gas (literally) during planet formation. Probably planets form more slowly around stars with considerably less mass than the Sun, and the star blows away the gas before the planets finish forming. The temperature at the newly discovered planet's distance from its star would indicate the planet is cold and icy. The discovery was made using microlensing, that is, observing the bending of light by gravity when the star and its planets pass in front of a more distant star. The observation would have detected any Jupiter sized planets in the system, but did not find such. In fact, a planet as small as the Earth would probably have been detected if it existed there. These differences from our solar system may indicate that different size stars tend to form different planetary systems.

Spitzer (infrared space telescope) has observed polycyclic aromatic hydrocarbons (PAHs) in 50 blue compact dwarf (BCD) galaxies, and found that the ones with low metal content had little or no PAHs. This is what was theoretically expected, since the PAHs contain carbon, which is generated by successive generations of stars. So the galaxies that have not had many generations of stars have not generated the metals nor the carbon necessary for PAHs. A few of the galaxies with higher metal content did not have substantial PAHs however, and it is believed that intense ultraviolet light in those galaxies is breaking up the PAHs as fast as they form. Here's why this may be interesting: The BCD galaxies are thought to be the closest objects that exist today to the initial building blocks that later made large galaxies soon (within a billion years or less) after the Big Bang. And the PAHs are thought to be the building blocks out of which chemicals formed that participated in the beginnings of life. So study of the PAHs in BCDs may tell us how soon life could possibly have formed after the Big Bang.

SOHO (solar space telescope) observations over the years of vibrations on the surface of the Sun have allowed scientists to determine the motions of material inside the Sun. This allowed calculation of time intervals when material, and therefore the magnetic field carried by the material, will repeat its location within the Sun. Adding this information to a computer model of the Sun has allowed it to fit the sunspot counts for the last few hundred years. This model predicts that the next sunspot cycle will have 30 to 50% more sunspots, flares and coronal mass ejections than usual, and that the cycle will arrive about a year late. Check it out over the next 11 years or so and see if the prediction is right.

Scientists working with SOHO data have developed a new technique for seeing sunspot activity on the **back side of the Sun**. This is better than the method announced awhile ago in that the new technique can see the entire surface of the Sun, including poles, where the old method saw at best 1/3 of the far side. The Sun rotates once in about 27 days as seen from Earth, so sunspots are normally out of view for about 14 days at a time. Vibrations on the near side of the Sun are observed by SOHO and these are analyzed to detect the effects of sunspots'

magnetic fields on the speed of the vibrational waves as they travel through the Sun.

FUSE (ultraviolet spectroscopic space telescope) – suffered failure of the 3rd of its 4 reaction wheels last year. They are used to point and stabilize the telescope. FUSE was designed to operate with 3 of them running, and had been reprogrammed to use only 2 after the second failure 4 years ago. So they reprogrammed it again to use only one wheel, and it is back in operation. The lack of wheels is compensated by powering electromagnets in the spacecraft, which push on the Earth's magnetic field and turn the telescope. FUSE has taken 52 million seconds of observations since its launch in 1999, which has resulted in volumes of scientific papers and discoveries.

Rossi (X-ray space telescope) – A new analysis of 10 years of data from Rossi shows that the diffuse glow of X-rays from the Milky Way matches the distribution of binary white dwarf stars and active-corona stars. It had long been in dispute whether this X-ray background came from stars or hot gas, so this study settles the dispute in favor of stars. White dwarf stars can produce X-rays if they have a companion star close enough to periodically dump material onto the white dwarf. Such a pair is known as a cataclysmic variable star. Active-corona stars are ones where a companion star stirs up the outer atmosphere (corona) of the star, which results in emission of X-rays. X-ray telescopes do not yet have the resolution to match the X-ray background with individual stars, particularly distant ones, and so this new study had to statistically analyze the data. To get the amount of X-rays observed, there must be over a million cataclysmic variables and nearly a billion active-corona stars, both of which are considerably higher than previous estimates of the numbers of these types of stars. Black holes and neutron stars, which can also produce X-rays, were shown not to contribute any substantial amount to the X-ray background within the Milky Way.

Pulsar leaving – Astronomers using the Very Long Baseline Array (VLBA), a series of radiotelescopes stretching from Hawaii to the Virgin Islands, have accurately measured the location and speed (in 3 dimensions) of a pulsar that is exceeding the escape velocity of the Milky Way, and so will leave our galaxy. The pulsar's path can be traced back to a group of giant stars in Cygnus. It is quite likely that the supernova explosion, which is necessary to have produced the pulsar, also propelled the star on its speedy exit path. It is moving over 670 miles per second, and current theoretical work doesn't show how a supernova can push a star to this high a speed, so theoreticians will have to rethink their work. The VLBA is involved in a project to measure the locations and speeds of many pulsars.

Hot exoplanet – A team of astronomers using the Spitzer (infrared) Space Telescope has detected a planet orbiting so close to a nearby star (63 light-years away) that heat from the star keeps the planet at about 1550 degrees F. Spitzer could not resolve the planet separately from its star, but subtracting the light of the star only (taken while the star eclipsed the planet) from the light of both gave a detection of the planet. The planet is a gas giant with 1.26 times the diameter of Jupiter, a mass of 1.15 times Jupiter's, and its density about that of Saturn. The orbital period (year) is 2.219 Earth days and its distance from its star is about 30 times smaller than Earth's distance from the Sun. This is the 3rd exoplanet detected in infrared, but it is the closest and brightest. Further observations may be able to make a temperature map of the planet, by measuring the changes as the planet enters and exits eclipse.

Pluto's moons – Pluto's 2 recently discovered moons have so many characteristics in common with the long-known moon Charon that it is probable that all 3 were formed by a single collision, probably billions of years ago, very early in the history of our solar system. They match in orbit shape (nearly circular), orbit plane, orbital resonances and color. Further observations will attempt to determine their rotational periods, shapes, densities and surface compositions, to see if these also support the common origin theory. Theoretically, ordinary meteor impacts on the moons should produce thin rings about Pluto, so observations will search for rings. If Pluto is typical of large Kuiper Belt objects (KBOs), then multiple moons may be common around KBOs. Most KBOs are more distant than Pluto, and so it would be more difficult to find moons there; but a moon search is planned of the Centaurs, which are KBOs that have been deflected by gravitational interactions into orbits closer to the Sun (and us).

Andromeda galaxy – The few observations that have been made of stars in the halo surrounding the Andromeda galaxy have found that there are more metals (and other elements heavier than helium) in them than in stars in the halo surrounding our Milky Way galaxy. The stars in the Milky Way halo are known to be rather metal-poor, compared to the stars in the Sun's little part of our galaxy. This is because Milky Way halo stars formed early in the history of the galaxy, before most of the heavy elements were produced within stars and by supernova explosions. The different metal content would imply that the 2 galaxies formed in a different way or at different times. A new study of 10,000 stars in the Andromeda galaxy, of which 1000 were found to be in the halo, concluded that most halo stars were about as metal-poor as Milky Way halo stars, so the difference doesn't really exist. We can now believe that Andromeda and the Milky Way formed about the same time in the same way.

Extreme helium stars were discovered more than 60 years ago, but it took until now to prove how they are formed. Fewer than 2 dozen of the extreme helium stars are known. They are supergiant stars, less massive than the Sun, but many times larger and hotter. They contain mostly helium, with significant amounts of carbon, nitrogen and oxygen, but almost no hydrogen. Since there are vast amounts of hydrogen in every cloud from which stars might form, it was not clear how the extreme helium stars could form. Only the cores of stars undergo the nuclear reaction from hydrogen to helium, so huge amounts of hydrogen are still left that must be disposed of by any theory. About 20 years ago a theory was proposed that certain binary pairs of white dwarf stars could merge into a single star and then swell up to become an extreme helium star. Detailed visible light and ultraviolet spectra were recently taken of 7 extreme helium stars, using the Hubble Space Telescope and 2 ground-based telescopes. This allowed very accurate measurements of the amounts of over 2 dozen different elements, and these agreed with the theoretical amounts that would result from the merging of 2 white dwarfs.

Mars Reconnaissance Orbiter (MRO) indeed began orbiting Mars on March 10. There are now 6 working spacecraft at Mars. It will spend 6 months lowering its orbit to be close enough to make its planned observations, using aerobraking (dipping into the top of the atmosphere to slow by friction). MRO has on board the most powerful telescopic camera sent to any other planet, an advanced mineral mapper, a ground-penetrating radar, an infrared atmospheric sounder, and a weather camera that will

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cover the whole planet daily. The radar may be able to map subsurface layers of sediment, helping understand the water history of the red planet. With a huge antenna and powerful radio, MRO can send data to Earth at 10 times the rate of previous Mars spacecraft. It is planned to send more data back than all previous Mars missions combined. It will also relay data from missions on the surface.

Mars Express continues to radar Mars and has mapped the depth of the northern polar cap. It found no flexure of the ground from the weight of the overlying polar cap, which means the planet's crust there is quite strong. A strong crust implies little heating of the crust from core heat conducting to the surface. The Mars Express radar has lower resolution, but higher penetration, than the MRO radar, which will begin operation in a few months.

XMM Newton (European X-ray space telescope) has observed the collision of a pulsar with the ring of gas surrounding its companion star. The pulsar orbits a Be star, one that rotates so fast that its equator bulges out and flings off material that forms a ring around the star. Twice in every orbit, which takes 3.4 Earth years, the pulsar plunges through the ring. During the plunge, X-rays and gamma rays are emitted, not only from the collision with the ring, but also from the collision of the pulsar wind with the Be stellar wind. Little is known about pulsar winds, so this is a great opportunity to learn more. Scientists expected to see more radiation from electrons with certain energies than was actually observed. The collision was also observed by the HESS gamma-ray observatory in Namibia.

Cepheid cocoons - Using the Very Large Telescope Interferometer in Chile and the CHARA Interferometer at Mount Wilson, a team of astronomers has discovered envelopes surrounding 3 Cepheid variables, including Polaris. These are the first time matter has been found around Cepheids. The envelopes are 2-3 times the diameter of their stars. This discovery may imply such envelopes are common, but have remained undiscovered until now because milli-arc-second resolution is needed to distinguish them, only recently achieved with interferometers. It is important to understand if these envelopes affect our use of Cepheids to measure distances, since the distance scales used to measure most of the universe depend on Cepheids.

Metal-rich cloud – Astronomers using the Very Large Telescope in Chile have found a metal-rich (4 times the metal content of the Sun) hydrogen cloud about 6 billion light-years away by the spectrum that it impressed on light from a more distant quasar. Theoreticians have long claimed that the number of stars that have ever formed in all visible galaxies should have created far more metals (and other elements heavier than helium) than have been found in galaxies and interstellar gas. At least part of the missing metals could be explained if such metal-rich clouds are found to be common. Further observations are needed to see if such clouds are common. Another explanation could be that the smaller galaxies, which are the ones too dim to see, may contain large amounts of metals. Proof of this will require larger telescopes to see those fainter galaxies.

Jets - It has long been theorized that jets of material are confined by magnetic forces. For the first time the magnetic field that contains jets in a forming planetary nebula has been measured. The field was tightly wound, exactly what would be expected in order to confine the material. The jets were found to contain water molecules. The observation was made with the VLBA radiotelescope.

GEMS (glass with embedded metal and sulphides) constitute a major component of primitive interplanetary dust. For the first time a team of scientists has reproduced the structure of GEMS in the lab. This was done by heating samples of the mineral olivine under high vacuum at temperatures ranging from about 900 to 1400 degrees F. The iron in the artificial GEMS was coated with silicate material. This explains why dust seen around stars seems to be too rich in silicates and lacking in iron, since only the properties of the dust grain surfaces can be measured remotely.

NASA budget – Despite earlier promises that the International Space Station and the Vision for Space Exploration (manned mission to the Moon and possibly Mars) could be carried out without affecting NASA's science missions, the new proposed NASA budget for 2007 and beyond has cuts in science. Many science areas are getting budgets that do not keep up with inflation, so are effectively budget cuts. Some areas are canceled, cut or delayed: Astrobiology funding cut 50%, astronomy and astrophysics research cut by 20%, mission to Jupiter's moon Europa canceled, Terrestrial Planet Finder canceled, Space Interferometry mission delayed, Mars sample return mission delayed indefinitely, 2 Scout missions to Mars canceled, SOFIA (airborne observatory) canceled, LISA and other Beyond Einstein missions delayed indefinitely, Dawn (asteroids orbiter) canceled. The claim was made that cancellation of Dawn was a separate issue, based on failures of the program to meet requirements. Vigorous objection to these cuts by scientists, Congress and the public may restore some of these cuts, but probably not nearly all of them.

Instant AstroSpace Updates:

Venus Express (European Venus mission) has tested its main engine in preparation to going into orbit about Venus on April 11. Look for great observations of Venus in coming months.

The Japanese Space Agency has launched a 27-inch diameter infrared space telescope, called **Akari**, which will survey the entire sky in 6 months, then spend the next year observing chosen targets in detail, until the liquid helium coolant runs out. A mechanical cooler will extend its life after that, but at lower sensitivity.

The launch of the Space Shuttle **Discovery** has been delayed from May to July, but officials still hope to get 3 shuttle missions into space this year.

The first clear detection of changes in **Mars' upper atmosphere** caused by solar flares was made by the Mars Global Surveyor (MGS). The effects were seen in the radio signal from MGS to Earth when it passed through the affected parts of Mars' atmosphere.

The Sun was devoid of sunspots for 21 of the days in February, so the beginning of **solar minimum** was declared.

The Very Large Telescope (8-meter) in Chile has begun operation of its **adaptive optics** system to counteract the blurring of our atmosphere, using a laser to project a target star into the sky. This is the first such system in the southern hemisphere, though Palomar and a few others in the northern hemisphere are operational.

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AstroImage 2006 Conference – Get Your Registration In Early!

It's been a lot more complicated to get everything to the point that we could actually start taking registrations for our upcoming AstroImage 2006 conference than I ever expected when we started the planning process, but the registration page is finally in place, complete with the ability to pre-order your AstroImage 2006 polo shirts, tee shirts and/or hats (this way, you can order the sizes and colors you want, and your selection won't be limited to what we have on hand at the time of the conference itself). By the time you see this, there should be a button on the homepage of our website that will allow you to go directly to the AstroImage 2006 webpage, or you can go through the dropdown menu under "About OCA" on the homepage (just click on "AstroImage Conference"), or you can go directly to the conference webpage at **www.OCAstronomers.org / astroimage/ 2006 /** . One link on the conference page goes to the registration page and another to the "Astro-Wear" page for the shirts and hats.

Dave Kodama and Jim Windlinger deserve special thanks for their efforts to get this up and running before they took off to see the solar eclipse (Jim to Turkey, Dave to Libya). Jim has been making the arrangements for the shirts and hats, and Dave has been responsible for getting the webpages themselves working and linking them to the club's website – and, without the hard work they put into this, we'd still be a long way from being able to get people registered.

So, please take advantage of what their work has produced, and get your early registration for the conference in along with your order for your shirts and hats – the conference logo will be embroidered on them (not just printed), and they will truly be good (and useful) additions to your wardrobe!

In Closing

Well, as usual, we have a lot going on in the club – I've only mentioned a few things here, and you can find a lot more on the calendar on the club's website and in such places as the website announcements. With the weather warming up, I look forward to seeing more of you out at the star parties and other club events!

FOR SALE Two full Starlight Xpress CCD Systems, model ICX027. 500 pixels per line X 256 useable lines. Sony chip ICX027 with interface card for frame grabber and interface box for parallel port. Also includes computer with TheSky, Adobe Photoshop, and other CCD processing programs. All documentation, cables, frame grabber monitor. Originally $2000 each; asking only $800 for both. Can provide assistance in learning the system once it is set up. Jim Leonard, First Light Observatory, Inyokern, CA 760-377-3474

FOR SALE Desert Oasis with an eye on the sky—Custom Santa Fe and Observatory. Hill top location on 5 acres, 5000' under roof, 3 bedrms, 4 baths, spacious kitchen, family rm, great rm, formal dining, hobby & work rms; Ceilings 8' to 14', large covered flagstone patio and garden entryways, Private courtyard off master bedrm, 3 fireplaces. Detached 288 ft^2 observatory (12' x 12' lab with computer controls; 12' x 12' observation deck; and 12' x 12' storage area under observation deck), 10' steel ASHDOME, CELESTRON C14 (hand picked mirror) white OTA, PARAMOUNT GT-1100S, MERIDIAN SYSTEMS dome control hardware & software. See attached website & links for more details, photo gallery, virtual tours, etc. Contact Ernie Bigsby (623-826-8051); Dave Bigsby (623-826-8053) or ebigsby.mywindermere.com (MLS# 2428445).

FOR SALE Celestron 14 complete - includes optical tube, corrector cover plate, finder, 2-inch diagonal, drive-control box, counterweights, fork, wedge, tripod, few eyepieces. Early orange-tube model, but in good condition. Unused for several years because of bad back. No reasonable offer will be refused. Offers accepted until April 25, 2006. Call Carroll Slemaker at (949) 586-5673 to arrange appointment to inspect equipment.

FOR SALE

1. Unitron 3" Photo-Equitorial with all the original 1970's accessories and wood boxes. Unihex ep holder (in fitted box) with 7 Unitron oculars (in fitted box), finderscope, 4 x 5 camera with plate holders (in fitted box), solar projection screens, and slow-motion controls for the EQ mount (no motors). The objective is damaged with a 3/8" flake on the edge of one element. Price: $2000 o/b/o

2. Alt-Az mount: Light Speed Telescopes Mark 2.5 Wagon superduty mount with manual slow-motions and 8000 step encoders. Easily carries 35 lb load - ultimate giant binocular or RFT mount. Scope or binocular mounts on heavy duty sliding dovetail for front to back balance, and the 10" wide cradle adjusts up and down. Comes with Quick Release tripod mount, and everything is clear anodized. New condition. Price: $3000 o/b/o

Contact Cort Schuyler at 760-724-0373 or cschuyler@cox.net for more details.

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