# SIRIUS ASTRONOMER

www.ocastronomers.org

The Newsletter of the Orange County Astronomers

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Most amateur astronomers are familiar with the Pleiades (M45) which appear prominent in the constellation Taurus throughout most of the night this month. Be sure to take the opportunity to observe the Pleiades--and the other 109 Messier objects--this year at our annual Messier Marathon on March 25th! (photo credit: Larry McManus)

## OCA CLUB MEETING

The free and open club meeting will be held Friday, March 10th 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 Dr. Gary Petersen, addressing the question of life elsewhere in our own solar system.

NEXT GENERAL MEETING:

April 14th

## STAR PARTIES

The Anza site will be open this month on March 25th. The Black Star Canyon site will be open this month on March 18th. 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, March 3rd at the Centennial Heritage Museum at 3101 West Harvard Street in Santa Ana.
GOTO SIG: Apr. 3rd
Astrophysics SIG: Mar. 17th, Apr. 21st
Astro-Imagers SIG: Mar. 21st, Apr. 18th
EOA SIG: Mar. 27th, Apr. 24th
Dark Sky SIG: TBA (contact coordinator for details)

# President's Message

## By Barbara Toy

The 2006 Board has been officially installed, and has had its first meeting, and the year already seems to be speeding by pretty fast – it's close to mid-February as I write this, and we'll be well into March when this issue of the Sirius Astronomer reaches you. As you might have noticed, I'm shifting my contributions to our newsletter to the President's Message for the year – but may still produce further episodes of "Around OCA" as well if I find a topic that really doesn't fit in a President's Message.

Things continue to change around our club…

**A Sad Farewell to Tim Hunt as Anza House Coordinator…**

If you've spent much time around Anza House or the Football Field in the last couple years, you most likely know Tim Hunt. Even if you didn't know him by name, you've probably talked to him – he's the friendly and helpful gentleman who has kept things running smoothly at Anza House over the last year as the Anza House Coordinator. Partly because he was a regular at Anza House, he kindly agreed to take on the responsibilities of Anza House Coordinator when Larry Carr was no longer able to fill that position. The fact that Anza House has been running smoothly, with a minimum of disputes, complaints or other problems is a tribute to his efforts, and we are really grateful to him for taking on that position and for all he has done to keep Anza House functional as the coordinator.

Unfortunately for us, Tim has been transferred to a position in Tennessee – a bit far from Anza for him to continue looking after Anza House effectively. He has therefore had to give up his coordinator position, much to our regret. He tells me, though, that all of his family is in this area, and he'll be back periodically. He intends to remain a club member, and to be as active in the club as the distance will allow – and he may even be able to make it out to Anza or to meetings on occasion when he is out here visiting family and friends. He'll be most welcome at any event he can attend – and I look forward to hearing about his experiences with fellow astronomers in Tennessee!

**…And We Now Need a New Anza House Coordinator**

Since Tim has to leave us, we now need a new Anza House Coordinator. This is the person who keeps the Anza House supplies stocked up (primarily toilet paper, paper towels, trash bags and cleaning materials – the costs are reimbursed by the club), keeps sign-up forms available so people can reserve their rooms, along with pay envelopes, and collects the money paid for overnight stays to give to Charlie Oostdyk. The coordinator also arranges for the house to be kept clean – ideally, by coordinating volunteers to take care of different aspects of the cleaning rather than doing it all him/herself. Some past coordinators have also made repairs and improvements when they had the skills to do the work, or have obtained help from other members who had the necessary skills.

As anyone who has spent much time out at our Anza site knows, Anza House is a wonderful facility that makes our observing site much more comfortable to use than most other dark sites around. The Anza House Coordinator is vital to keeping Anza House running smoothly. If you spend time at Anza regularly, please consider taking this position on – it's a great way to help keep our Anza site a great and comfortable viewing facility, which benefits the club as a whole as well as the people who use Anza. If you're interested in this position or have questions, please contact me about it.

**People Who Go Beyond the Call of Duty**

We are a club of volunteers – all of the maintenance of our facilities and most of the actual construction is done by volunteers from within the club. At Anza, our major club facilities are Anza House, the club observatory, and the general use pads in the Football Field below Anza house. These all take maintenance, and we have members who have taken on official responsibility for this – besides the Anza House coordinator, Don Lynn as the Anza Site Custodian does a tremendous amount of repair and maintenance work around the site every star party weekend, and, as the Observatory Custodian, I'm generally responsible for the club observatory. Fortunately, we also have some club members who don't hold any specific position in the club but who regularly go out of their way to clean things up and make repairs that they see need doing.

Marilyn Saeed spent a long time and put a lot of effort into cleaning Anza House at the star party at the end of January, and it was even cleaner than it was after the last special cleaning day by the time she finished. Marilyn often helps out when she sees a need – she was one of the people who helped keep the club booth running at the last RTMC, for instance. When Bob Bryant spends a few days out at Anza, he often takes care of repairs that nobody's gotten around to doing yet – one that I found

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# Evaluating a Picture That Seems Too Good To Be True

Don Lynn and Wally Pacholka

There's been an interesting discussion on our AstroImage email group of the picture that accompanies this article, which is supposed to show sunset at the North Pole. It has been emailed around and was picked up by the Snopes "Urban Legends" site, though, at the time this is written, no position is stated on the site about whether they've concluded that it's real or not; see http://www.snopes.com/photos/natural/northpole.asp.

Don Lynn's conclusions, which have been sent to the Snopes site, are (updated for the Sirius Astronomer) are:

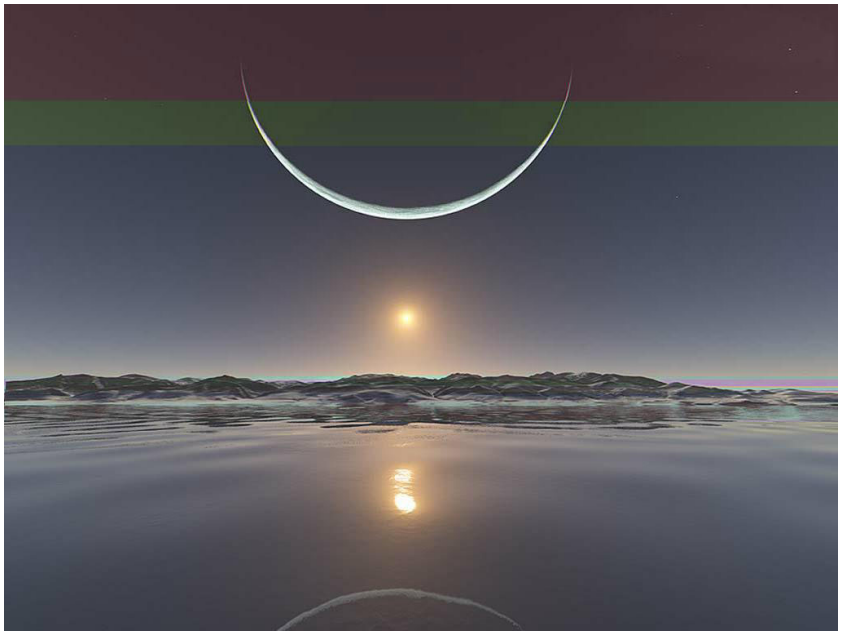
The image is fake (was digitally altered from the original image) because:

1. The moon, viewed from Earth is never more than about 9% different in size than the Sun. This is derived from the sizes of the Sun and Moon and their maximum and minimum distances from a viewer anywhere on Earth. The Moon is 20 times the size of the Sun in this image.

2. If taken at the North Pole, then the moon is north of the Sun in the picture. The moon is never farther than 6 degrees from the Sun when it passes north of the Sun in its orbit. This is limited by the tilt of the Moon's orbit. As shown, the moon is centered about 8 degrees from the Sun, about 16 times the Sun's diameter, which is just over 1/2 degree.

3. The width of the crescent is far too large for when the moon is 8 degrees from the Sun. Measurement of the picture and a little trigonometry shows that this image of the Moon was lighted by the Sun a little over 15 degrees away.

4. Sinusoidal waves in water do not produce 2 nearly round reflections, as shown (of the Sun) in the picture. The curvature of such waves will distort the reflections to make them considerably smaller or larger in height, and so appear quite elliptical.



5. The reflections of the Sun should be the same size (in width) as the Sun, not larger (waves in the direction shown will not distort width).

6. The object and its reflection should be centered above and below the horizon. In the image, they are a little lower.

7. Orange glow shown in the sky resembles that which occurs after the Sun is below the horizon. There is generally a much greater height of orange glow when the Sun is above the horizon.

8. The color of the moon and Sun should be nearly the same (light passes through almost same path of atmosphere, which is what colors them), but are vastly different in the picture.

9. The features on the moon shown include maria (dark plains), but the direction in relation to the Sun says this should be the southern edge, which is all cratered highlands, not maria.

There are probably more differences between the image and what could be seen in reality, such as the shadow angles on the ice, lack of Earth-shine, and what appear to be stars in the sky. In summary, the image of the Moon and the reflections were certainly added digitally, because they do not match reality. Likely the Sun was added also.

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# Western Amateur Astronomers Board Meeting Notes

by Tim Hogle

I have some very exciting news to report from the winter Board meeting of the Western Amateur Astronomers (WAA – an umbrella organization of astronomy clubs, of which OCA has been a longstanding member). The WAA's purpose is to promote communication between astronomy clubs for their mutual benefit, to give awards for recognition of outstanding achievement in the world of amateur astronomy and to promote astronomy in general.

WAA's most well known function is annually awarding the prestigious G. Bruce Blair Medal to an individual who has made truly outstanding contributions to amateur astronomy. The news is that this year the honoree for this award is OCA's own Chris Butler. Congratulations Chris!! The press release on the award appears below this article. Chris is in very highly esteemed company. The list of past recipients goes back to 1954 and is listed on the WAA web site at http://www.waa.av.org. It includes several other OCA members and nominees. The award is to be presented at the Riverside Telescope Makers Conference in May.

For those of you who have followed my reports here in the past, the Board meeting was again held at Starhome, the observatory of our own longstanding member and several times OCA president, John Sanford in Springville, nestled at the foot of the western Sierra Nevada. John is still enjoying retirement with his observatory and its 14" Celestron and 6" Starfire refractor. Following the meeting, those of us who could stay were treated to an evening of exceptionally steady seeing and (with the refractor) one of the best views of Saturn I've had without a spacecraft.

As I have mentioned previously, the WAA Board is soliciting ideas for a replacement for our 50-year old logo. So far, there have been only two entries; both artistically pleasing, but we would like to have more to select from. If you have some artistic interests and would be interested in creating a logo, we would be glad to have your input. While we have stopped short of actually having a logo contest, be assured that full and eternal credit will be given to whosoever should create the selected design. There are no specific requirements attached to the design, but it should contain the letters WAA and/or the full name, and be suitable for use in monochrome for letterhead, posters and clipart, though a graphically rich version for pictures, and web pages would be welcome as well. It would also be nice to have the design embody the purpose of WAA as described in the first paragraph above. My contact info is on the back of the Sirius Astronomer if you would like to submit an entry or discuss it further.

WAA will again have an information booth at RTMC this year. Stop by and say hello. For more info about WAA, log on to the Web site.

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# John Christopher "Chris" Butler to Receive the G. Bruce Blair Award

John Christopher "Chris" Butler is an internationally renowned artist and public speaker whose work focuses on astronomy, nature, and maritime subjects. His illustrations are done with a passionate attention to accuracy and fine detail, and have appeared in thousands of publications worldwide. Chris's sensitive integration of nature and the universe in his paintings portrays the harmony of the universe through unique perspectives that stimulate the imagination very effectively.

A captivating speaker, Chris is widely in demand for his insightful and entertaining lectures on astronomical and other topics, illustrated with his own art. Chris's unique art and presentation style reflects his diverse experience; he currently serves as a senior art director for planetarium and exhibit programs for the Griffith Observatory in Los Angeles. He has been the director of a children's science museum, a tour guide on the *Queen Mary*, a technical illustrator, a representative for a telescope manufacturer, an amateur astronomer, and a financial analyst on the space shuttle program. ■

## 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).

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Wally Pacholka had these comments:

> The image is obviously a fake, as the moon and sun should be approximately the same diameter in the sky no matter where on Earth you viewed them, except perhaps if you view them from a bar somewhere.

And, in another email, which compared this picture to a photo taken by Matthias Haenel that appeared on the SpaceWeather site (http://www.spaceweather.com) on 2/11/06, which showed an enlarged moon setting behind buildings in Tenerife, Canary Islands:

> …There is no sun in the spaceweather photo. I understand the large moon illusion when the moon is near the horizon, but the North Pole photo is a fake as the sun is in the same photo and does not enjoy the same large sun illusion. What appears to be the sun in the spaceweather photo is a street lamp. The sun and moon should be about the same size when viewed in the same picture from any where on earth. The moon could never be several times the apparent size of the sun in the same photo. The spaceweather shot is a real shot of the moon only, the North Pole shot is a fake with the moon being several times the apparent size of the sun. Wally

With the number of pictures and articles passed around to us all by email these days, it's a real benefit to have the help of people like Don and Wally to help us evaluate them when they seem a bit too good to be true – as in this case.

Compiled by Barbara Toy

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# NASA's Space Place

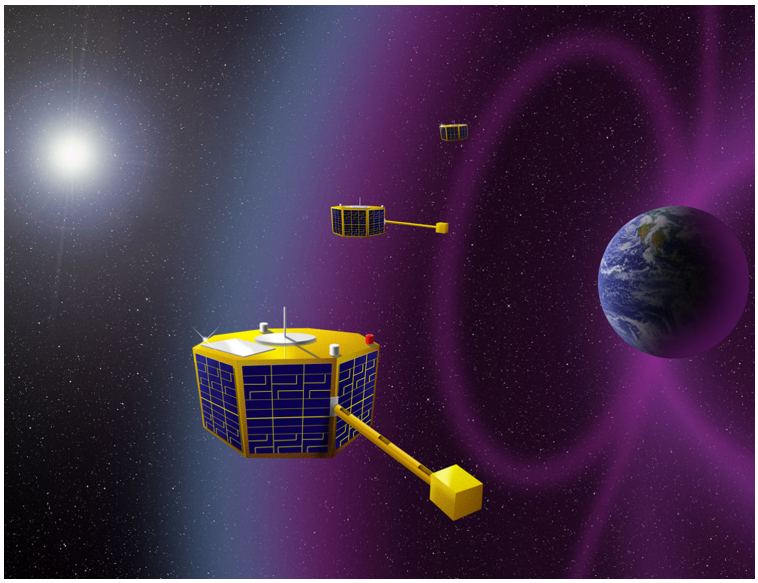
## Micro-sats with Macro-potential

By Patrick L. Barry

Future space telescopes might not consist of a single satellite such as Hubble, but a constellation of dozens or even hundreds of small satellites, or "micro-sats," operating in unison.

Such a swarm of little satellites could act as one enormous telescope with a mirror as large as the entire constellation, just as arrays of Earth-bound radio telescopes do. It could also last for a long time, because damage to one micro-sat wouldn't ruin the whole space telescope; the rest of the swarm could continue as if nothing had happened.

And that's just one example of the cool things that micro-sats could do. Plus, micro-sats are simply smaller and lighter than normal satellites, so they're much cheaper to launch into space.



*The Space Technology 5 mission will test crucial micro-satellite technologies*

In February, NASA plans to launch its first experimental micro-sat mission, called Space Technology 5. As part of the New Millennium Program, ST5 will test out the crucial technologies needed for micro-sats—such as miniature thrust and guidance systems—so that future missions can use those technologies dependably.

Measuring only 53 centimeters (20 inches) across and weighing a mere 25 kilograms (55 pounds), each of the three micro-sats for ST5 resembles a small television in size and weight. Normal satellites can be as large and heavy as a school bus.

"ST5 will also gather scientific data, helping scientists explore Earth's magnetic field and space weather," says James Slavin, Project Scientist for ST5.

Slavin suggests some other potential uses for micro-sats:

A cluster of micro-sats between the Earth and the Sun—spread out in space like little sensor buoys floating in the ocean—could sample incoming waves of high-speed particles from an erupting solar flare, thus giving scientists hours of warning of the threat posed to city power grids and communications satellites.

Or perhaps a string of micro-sats, flying single file in low-Earth orbit, could take a series of snapshots of violent thunderstorms as each micro-sat in the "train" passes over the storm. This technology would combine the continuous large-scale storm monitoring of geosynchronous weather satellites—which orbit far from the Earth at about 36,000 kilometers' altitude—with the up-close, highly detailed view of satellites only 400 kilometers overhead.

If ST5 is successful, these little satellites could end up playing a big role in future exploration. The ST5 Web site at nmp.jpl.nasa.gov/st5 has the details. Kids can have fun with ST5 at spaceplace.nasa.gov, by just typing ST5 in the site's Find It field.

**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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memorable, partly because I spend a lot of time in the observatory, was replacing the seat in the observatory restroom because the old one was in very poor condition. Bruce Waddington is another member who takes on projects when he sees a need – such as checking for damage to the electrical wiring after the fire that burned over part of our site two years ago, installing a dual white light/red light system in the observatory warming room, and leaving his electric weed whacker for general use in cutting back the weeds on site. John Castillo, Tom Kucharski, Tom Munnecke, Ray Stann, Bob Buchheim and others have helped to repair and paint the existing moving roof and support structure on the observatory to help it survive the winter. I know other members contribute time and effort to help out at Anza, and, like all of the members I mentioned, they do it without any fanfare. We are very grateful for all of those efforts, which are really needed to keep our site running well.

Anza gets a lot of use, and it's located in a pretty harsh environment, so things can deteriorate pretty fast without ongoing effort to defeat the forces of entropy. We really need everyone who uses our Anza site to contribute at least a little toward keeping it up – at a minimum, please make sure that you leave whatever area you use in at least as clean a condition as when you arrived. Even simple steps beyond that will help – such as picking up any litter you see, doing a quick rinsing or wiping of a sink, counter or other area that you notice is dirty, taking a trash bag out with you when you see someone else forgot to take it (and please remember to take your own trash, too – we can't get trash service out there at this point, so this is really important!). Beyond this, we could also use people vacuuming at least the common areas of Anza House (living/dining rooms, bathrooms, kitchens) at the end of every star party, and taking on such tasks as filling in holes that appear in the roadways or walkways on site (especially as the local burrowing animals get more active with the approach of spring). As the weather warms, particularly if we get much more rain, we'll have a thick crop of grass and weeds that will need to be cut back, and we'll need help with the weeds around Anza House, around the pads in the Football Field, around the club observatory, and along the roadways on site.

So, there are plenty of opportunities for you, too, to be one of those members who go beyond the call of duty and actively contribute to making Anza one of the best observing sites around. Give it a try – I think you'll find that the sense of satisfaction and achievement you get from doing something active to improve things at Anza will make your time there even more enjoyable. If you want suggestions on what you could do out there, please feel free to email me (btoy@cox.net) or talk to me about them in person or by phone.

And thanks again to all of you who are already contributing your efforts out at Anza – the site wouldn't be the same without you!

**Messier Marathon:**

We have a pretty long-standing tradition now of having a Messier Marathon in the spring, during the period when (at least theoretically) all of the Messier objects can be seen in one night. We're doing it again this year, at the March Anza Star Party, March 25. Bring whatever you generally view through, and come on out for a night of real fun!

We'll have the club observatory open, and I expect to be doing the Marathon with the Kuhn – which will be available for general viewing of the Messier objects as we find them. We also have two LX200's in the observatory that can be used by others for the Marathon – thanks to the generosity of John Hoot, who donated a 12-inch GPS LX200 for the Mocat project, the 12-inch that he donated earlier has now been returned to the observatory, and should be available in addition to the 10-inch (I say "should" because, as I write this, the telescope has been placed on its pier but hasn't yet been fully connected up for use. I'm hoping to get that done at the February star party).

If you're interested in using one of our LX200's, please let me know – it's particularly fun doing the Marathon in the observatory when all three scopes are in action!

For all of you imagers out there, we're also doing the imaging version of the Marathon again this year. Last year, Leon Aslan did a great job capturing all of the available objects up to the point the fog moved in, showing that it can definitely be done. I don't know how many people actually tried to do it photographically last year – I hope that there'll be many times that number this year!

What do you need to do the Marathon? Not much – something to do your viewing with, a form to keep track of what you've seen, and a way of finding the different objects. The real hard-core people find all of the objects the old-fashioned way, essentially by starhopping to the right location when it can't be distinguished through a telrad or finderscope (one doesn't really need to starhop to find M42/the Great Orion Nebula, for instance), and they most likely do it with a non-motorized Dobsonian. I have great respect for them, especially when I see them picking their way accurately through the Virgo galaxy cluster and other crowded and confusing sectors of the sky, but I admit that I have little desire to join their ranks. I'm one of those who've been charmed by the benefits of goto systems, and that's how I expect to be doing the Marathon myself – taking full advantage

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# ASTROSPACE UPDATE

March 2006

Gathered by Don Lynn from NASA and other sources

**Icy Trojan asteroid** – The Trojan asteroids are the ones trapped in the 2 gravity wells known as the Lagrange L4 and L5 points, which lie in Jupiter's orbit ahead and behind the planet. They became known as the Trojans because the first few discovered happened to be named after heroes in the ancient wars of Troy. It is believed that the Trojans formed elsewhere and were later (but still long ago) trapped in the L4 or L5 points, but it has long been debated whether they formed in the asteroid belt or the Kuiper Belt. 2 Trojans have been found to be composed mostly of ice (not rock) in a recent measurement, so at least in those cases they must have formed in the Kuiper Belt. In 2001 the Trojan Patroclus was found to be a binary, and its companion has now been tentatively named Menoetius (Patroclus's father in myth). So far, this is the only known binary among the hundreds of Trojans. Using adaptive optics on the Keck II telescope in Hawaii, astronomers tracked the orbit of this pair about each other. They orbit every 4.3 days at a distance of 423 miles. The masses of the pair were then calculated from the orbit. Using this and their sizes (76 and 70 miles), the density of each was calculated. These are the first measured masses and densities of any Trojans. The densities were 4/5 that of water, and this cannot be attained in such bodies, even with void spaces internally, if made of rock. Hence they have to be mostly ice with small voids. Astronomers will search the Trojans to see if more binaries exist to confirm that Trojans are generally icy bodies from the Kuiper Belt.

**Single stars** – Your astronomy textbook probably says that most stars are multiple stars, and single stars are less common. This was based on spectroscopic and other observations, and was repeatedly verified. Unfortunately it is wrong. About 85% of stars are red dwarfs, but they are so dim that they were rarely observed until recent technology allowed such with dimmer stars. A new study of red dwarfs shows that most (3/4) are single stars. The new statistics: 80% of massive stars (much more so than our Sun) are multiple, slightly more than half of Sun-like stars are multiple, and 25% of red dwarfs are multiple. Over 2/3 of all stars are single. Star formation theories will have to be adjusted to cope with the new statistics. Since theoretically planets form more often about single stars, this new finding implies planets are more common than previously thought.

**Hubble Space Telescope** (HST) completed a survey of 22 nearby star systems and found 2 of them have bright debris disks about them that resemble the Kuiper Belt in our own solar system. Although over 100 dust disks have been found by their infrared glow, these are only the 8th and 9th such disks seen in visible light. The newly found disks are both about 60 light-years away, surround stars of roughly the Sun's mass, and are older (300 million and 1 billion years) than any of the previously-known ones. All the debris disks fall into 2 categories: narrow ones about 20-30 AU wide, and wide ones more than 50 AU wide (an AU is the Sun's distance from us). The newly discovered ones represent one of each category. One theory is that a companion star causes the narrow variety, but not enough data exists to support this yet.

**Gamma-ray bursts** (GRBs) – In recently years it was determined that short gamma-ray bursts (less than 2 seconds) are caused by neutron stars or black holes colliding. Space is very large and empty, so chances of such collisions are very small, except for the case of binaries, where the neutron stars and/or black holes are orbiting each other. Then any loss of orbital energy will eventually cause them to collide. A new computer simulation of binary stars in globular clusters shows that binary neutron stars should be more common than thought. This is because in globular clusters, density of stars is great enough that stars often (in cosmic terms) undergo close encounters, which often result in swaps among binary stars. So when a binary containing only one neutron star encounters another neutron star, binary or not, the result is often a binary with 2 neutron stars. This implies that short GRBs should be more common in globular clusters than formerly thought. The simulation showed 10 to 30% of short GRBs should originate in globulars, even though the percentage of stars in globulars (as opposed to those in the main body of galaxies) is much smaller. We haven't yet resolved the locations of short GRBs well enough to determine which originate in a globular, but they tend to come from halos of galaxies (where globulars are) rather than the main bodies. Only about a half dozen short GRBs have so far been located at all.

**Chandra** (X-ray space telescope) has observed the massive spiral galaxy NGC 5746 and found it has a large halo of hot gas surrounding the visible galaxy. The halo extends 60,000 light-years. Halos are known to form from gas thrown out by vigorous star formation or activity in the nucleus of the galaxy, but this galaxy has neither. So the halo is probably left over from the formation of the galaxy. Theory predicts there should be left over material, which eventually would fall toward the galaxy and form a halo, but no such halo had been observed before now. Chandra is probably the first X-ray telescope sensitive enough to detect such a halo.

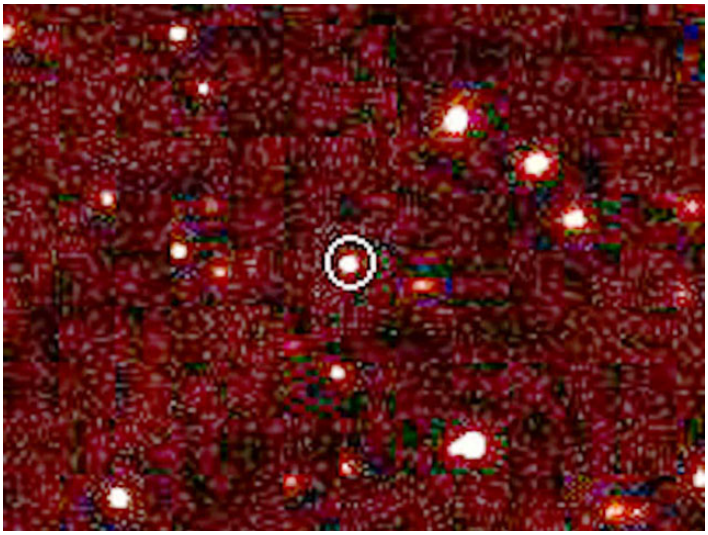
***Chandra image of NGC 5746 (NASA/CXC/Univ. of Copenhagen/K. Pedersen, et.al.***

**Spitzer** (infrared space telescope) has discovered that 2 very massive stars are surrounded by huge disks of what might be planet-forming dust. It was thought that planet forming would be disrupted by the heat and strong winds of massive stars, so this discovery was surprising. The stars, designated R66 and R126, are located the Large Magellanic Cloud, a small galaxy neighbor to our Milky Way. They are 30 and 70 times the mass of the Sun. The disks are huge, about 60 times the diameter of Pluto's orbit. They contain about 10 times the mass of the Kuiper Belt surrounding our solar system. Silicates (similar to sand) were found in the huge disks. Clumping of silicates occurs during planet formation, so this may indicate it is going on in the 2 huge disks. However, such massive stars have short lives, so if planets formed about them, those planets' lives would probably end early when their star goes supernova.

Spitzer has also observed **colliding galaxies** and found many of them wrapped in silicate crystals. This is the first observation of silicate crystals outside our own galaxy. The violence of colliding galaxies was expected to destroy silicate crystals, even though massive stars are known to produce such crystals, so it was a surprise to find these. Apparently the massive stars are creating them faster than the violence can destroy them. Spitzer observed 77 colliding galaxy systems, and 21 of them had silicate crystals. It is surmised that the other colliding systems had not undergone enough recent formation of massive stars to accumulate silicate crystals faster than the violence destroys them.

**Asteroid broke up** – A team of scientists announced that they found a spike in the abundance of the isotope helium 3 in core samples of ocean sediment that show that the Earth was struck by large amounts of asteroid dust starting 8.2 million years ago. They attribute this to an asteroid of approximately 100 mile size breaking up at that time. The layer of sediment represented that largest dusting event of the 80 million years of sediment examined. Computer simulations of an asteroid collision 8.2 million years ago produced exactly the amounts of asteroid dust found in the sediment samples.

**Smallest exoplanet** – Using microlensing, a planet only 5.5 times the mass of the Earth has been found orbiting a star 20,000 light-years away. This is a much smaller planet at a much greater distance than other methods of planet finding have produced. Microlensing is the bending of light according to the laws of General Relativity by the mass of the planet. The planet's star was found by the OGLE survey, which scans most of the Milky Way every night to find microlensing events. OGLE finds about 500 microlensing events caused by stars every year. Immediate follow-up observations by the PLANET survey found the planet with that star. The PLANET survey uses telescopes around the world so that observations can be continuous for any period of time. Since microlensing events caused by planets may last only a day, this capability was crucial. The star is tiny, only 1/5 the mass of the Sun, and the planet is 3 times as far from its star as the Earth is from the Sun. This makes the newly-found planet quite cold, probably about -364 degrees F. More important than the discovery of the planet is the proof that the microlensing technique works and exceeds capabilities of other methods. It is hoped this will lead to discovery of planets of Earth size at distances from their stars that will support liquid water, and would therefore be suitable for life. Because microlensing found a low-mass planet before it found a Jupiter or larger planet, the smaller ones may be more common. The most common planet-finding techniques have found only Jupiter-sized (or nearly so) planets, because they are most sensitive to massive planets. So the abundance of smaller planets is completely unknown.



***2003 UB313 discovery photo (Caltech/Gemini Obs./Yale Univ./NSF/NASA)***

**Martian glaciers** – Features visible today on Mars indicate the past existence of Martian glaciers, but when and how they existed is the subject of debate. A new climate simulation program predicts water ice glaciers at most of the locations where glacial evidence exists, that formed when the tilt of the planet's axis was 45 degrees. The tilt is now about 25 degrees, but it is known to vary, and was 45 degrees just 5.5 million years ago. One major area of glacial evidence (Deuterolinus) remains unexplained by the simulation, so further work is needed. One theory is that hydrothermal activity created those glaciers.

**10th planet size** – A precise measurement of the size was made of the object 2003 UB313, and as estimated earlier, it is indeed larger than Pluto, and so might be accepted as the 10th planet (the IAU is expected to take a long time to decide on the definition of a planet). It is more than 400 miles larger than Pluto, which is a little over 1400 miles in diameter. Observations were made in millimeter waves (between radio and infrared), which depend only on the size and temperature of the body, so that the size can be calculated. From this and the measured visible-light brightness, the body's reflectivity of visible light was also calculated (about 60%). UB313 was already determined to be the farthest known object in the Kuiper Belt, and is now confirmed to be the largest.

**Stardust** (comet sample mission) – As mentioned here last month, Stardust landed in Utah with samples taken of comet material. Initial inspection showed the samples exceeded expectations. One particle was about a millimeter in size, dozens were obvious to the naked eye, and about a million particles down to microscopic size are estimated to be in the collector. Tiny carrot-shaped tracks were left by the particles as they plowed into the aerogel collector. Tracks and particles have been removed and are being sent to about 150 scientists worldwide for analysis. The first conference to announce results is scheduled this month. Stardust also collected interstellar dust, but only a couple of hundred particles are expected. Scientists have set up an internet system for volunteers to microscopically examine the particle

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collectors remotely using home computers to help locate all the particles embedded in the aerogel. The spacecraft, minus the sample container that was dropped on Earth, remains in orbit about the Sun, and was put into hibernation mode, with only the solar panels and receiver operating. Barring any catastrophic failures, the spacecraft should last for decades in hibernation, and could be retargeted for a future mission.

**FUSE** (ultraviolet space telescope) – made the first direct measurement of ionizing radiation leaking from a dwarf galaxy undergoing a burst of star formation. Dwarf galaxies are thought to be "fossils" left from the period early in the history of the Universe when the first galaxies were forming. Most gas in the Universe today is ionized – that is, radiation has stripped electrons loose from the gas. It has not been established what radiation sources caused this, nor exactly when, though it is thought to be between 0.7 and 1.2 billion years after the Big Bang, when the early galaxies were forming. The measurement by FUSE shows that between 4 and 10 percent of the radiation produced by hot stars escapes into intergalactic space. This will help determine how much hot stars contributed to the early ionization. The other chief contributor is thought to be radiation from material falling into the giant black holes at the centers of galaxies.

**Missing stars** – In our neighborhood and in most star clusters, low mass stars far outnumber stars the size of our Sun and larger. But a study of the globular cluster M12 shows it lacking these large numbers of low mass stars. Assuming it formed stars like other clusters, it must have lost most of the low mass stars, amounting to 4 times as many stars as it now has. It now has 200,000 stars, so must have started with a million. It is believed that passage of a globular through a dense area of the Milky Way will strip lower mass stars out of the globular and fling them into the galaxy's halo. This is probably what happened to M12. Globular clusters orbit about the galaxy, not in the same plane as the galaxy's spiral arms, so pass through the galaxy's arms on each orbit. M12 must have hit a very dense part of the galaxy on one of these passages.

**Natural particle accelerator** – 6 NASA and European space weather spacecraft have observed a huge jet of electrically charged particles in the solar wind between the Sun and Earth. The particles are accelerated by magnetic reconnection, a process where magnetic field lines break and reform in a new configuration. The jet is at least 200 times as wide as the Earth. Magnetic reconnection was already known to accelerate particles in the Earth's magnetic field, but this is the first time it was observed in the magnetic field carried from the Sun by the solar wind.

**Square Kilometre Array** – A consortium of European nations has funded the first work on designing and building the proposed Square Kilometre Array of radiotelescopes, to be the largest and most sensitive of its kind. It will be sensitive enough to pick up television programs from nearby stars, not that they expect to find such. Full operation is scheduled for 2020. Planned observations are of hydrogen gas in distant galaxies, mapping gas in the Universe, pulsars, black holes, and more. Mapping gas should reveal where dark matter is, and shed light on dark energy changing the expansion rate of the Universe and on how and when galaxies formed. Pulsar observations should allow the most precise confirmations of General Relativity.

**Instant AstroSpace Updates:**

**IMAGE** (fields and particles spacecraft) has suffered a power supply failure, and so ended its mission, after completing the planned 2-year mission and 3 bonus years of observation of the Earth's magnetosphere and its response to solar wind.

**Deep Impact** (comet collision mission) found 3 small areas on the surface of Comet Tempel 1 that were water ice, representing .02% of the surface. This is the first detection of ice on the surface, though it has long been known ice occurs inside comets and is thrown off by them.

**Landsat 5** (Earth environment observer) suffered a failure in its solar array positioning mechanism, but controllers reprogrammed it to avoid problem areas, and it resumed its Earth observation. Originally scheduled for a 3-year mission, it has completed almost 22 years of observations.

I can't believe that no major discoveries were made at Saturn (Cassini spacecraft) or Mars (rovers Spirit and Opportunity and orbiters Mars Express, Global Surveyor and Odyssey). This hasn't happened in the last 28 issues. ■

# THE BLACK HOLE AT THE CENTER OF OUR GALAXY

A Book Review by Gordon Pattison

The Black Hole at the Center of Our Galaxy (2003) by Fulvio Mela, Professor of Physics and Astronomy at the University of Arizona. This exciting book is filled with superb color photographs that literally bring to life the very dynamic astrophysical laboratory that is at work in the very heart of the Milky Way. The author generally tells you the area covered by each photo and the distance in light years to the subject. This helps provide the reader with a good grasp of the scale of the subject under discussion.

Our sun is 28 light years from the center of our galaxy and the black hole there has the mass of 2.6 million suns! Its immense gravity has drawn 10 million stars to within 1 light year of the central black hole. This is the only black hole in the universe that is large enough and close enough that it is expected to be seen by telescopes currently under development. Its girth (that is, the girth of its event horizon) is no bigger than the orbit of Mars. At a distance of 28 light years, this would require a telescope with a resolution of 30 microseconds. Astronomers are busy trying to develop such instruments. Hopefully this will happen within the next 10 years.

The Milky Way's central black hole is surrounded by a shell of very bright expanding gas, indicating an immense explosion within the last 100,000 years. This was probably caused by a star plunging into the black hole. The initial blast would have been the equivalent of 100 supernovas!

The final chapter of the book discusses the latest information about quasars with excellent color photos. This very readable book is available at the Orange County Library.

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of the computer system controlling the Kuhn. Doing the Marathon without that kind of assistance is definitely more difficult and deserves special recognition – so, when people fill in their forms, we would also like them to tell us what kind of finding system they are using as well as what they were using for viewing.

We'll have the form posted on the website, so you can download it, and we'll also have copies of the forms available at Anza House and the club observatory at the star party. I'll try to bring some to the March general meeting, as well. The forms set out a suggested order for viewing the objects, which is most important at the beginning and end of the Marathon, when you have to catch objects just before they set or just after they rise, fighting to see them in twilight skies. There are a lot of resources on the Internet if you want more information about what to do and how to do it – a couple of sites where you can get more information and variations on the forms are at http://www.messiermarathon.com/ and http://www.seds.org/messier/xtra/marathon/marathon.html.

Doug Millar, who has coordinated the Messier Marathon for the past few years, won't be able to do it this year. If any of you would like to act as coordinator for this event, please let me know – that would help for getting the forms distributed and for arranging for the certificates for those who participate, but we'll be going through with the event, whether or not we have a formal coordinator. You don't need to be at Anza to participate – so, whether you can be out at Anza or not for the March star party, get a copy of the Marathon form and do the Marathon wherever you are! You can give the forms whoever our coordinator is or to me, or send them to the club's address, P.O. Box 1762, Costa Mesa, CA 92628.

**In Closing**

It looks like we're off and running with another interesting year at the OCA – it certainly should be an eventful one, with AstroImage 2006 coming up in August in addition to all of our regular events. Here's hoping that 2006 features a lot more clear nights near the dark of the moon than we've seen in the last few years!



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**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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