

## GET READY FOR RTMC MAY 28-30!!!!



Comet Bradfield & M31 Sunday 4:40AM April 25 over Joshua Tree Using Fuji digital with 50mm lens on unguided tripod, 20 second exposure at F/2.4 and ISO 1600. The tail was spectacular in binoculars and clearly visible to the unaided eye and extended about 15 to 20 degrees in final image. Comet Linear was a dim smudge off frame nearby. (photo courtesy Wally Pacholka). Your images are always welcome in the Sirius Astronomer, so be sure to send them in!!!!

### OCA CLUB MEETING

The free and open club meeting will be held Friday, May 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 Mrs. Charlotte Herschel-Farquharson, who will speak to us about her family's famous members: William, John, and Caroline Herschel (see inset, pg. 3)

### STAR PARTIES

The Black Star Canyon site will be open this month on May 8th. The Anza site will be open May 15th. 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 May 7th (and next month on June 4th) at the Centennial Heritage Museum (formerly the Discovery Museum of Orange County) at 3101 West Harvard Street in Santa Ana.

GOTO SIG: TBA (contact coordinator for details)

Astro-Imagers SIG: May 18th, June 15th

EOA SIG: May 19th, June 16th

Astrophysics SIG: May 21st, June 18th

# President's Message

By Barbara Toy

May – the season of warmer nights and still-mild days out at Anza, wildflowers, weeds, and, of course – RTMC! That, though, is the subject of a separate article...

Besides RTMC, we have JPL's annual Open House coming up on May 15 and 16. After that two year hiatus following the 9/11 disaster, it's great to see it back on its regular schedule. Details are on JPL's Open House website: <http://www.jpl.nasa.gov/pso/oh.cfm>. The only downside is that May 15 is the date for our Anza star party – it'll be an exhausting weekend for those who do both!

On other topics...

## Messier Marathon Revisited

We had a great night for our official Messier Marathon this year – reasonably warm, clear and dark. It was great to see so many people out at Anza, and to have so many come up to visit at the observatory (especially during that "dead period" of the Marathon before Scorpius and Sagittarius rose). A lot of people seemed to be doing the Marathon, and almost all of the Marathon lists I brought out to Anza were taken – but (as of this writing) not very many have been turned in.

To get your official OCA Messier Marathon Certificate, Doug Millar needs your name and the number of objects you found at the time you did your Marathon (you didn't have to do it the night of our official Marathon, and you didn't have to do it at Anza to qualify for the certificate). It's best if you turn in your Marathon list documenting the objects you found; you can do this by mailing it to Doug Millar care of the club's P.O. Box, or by turning it in at the general meeting.

So – get the credit you deserve! Turn in your Messier Marathon list and get your official OCA Messier Marathon 2004 Certificate!

And, for those who didn't do the Marathon – there's always next year!

## We Need Help With the Website

The OCA website is not only an important source of information to the members of the club, it's the way many people first become acquainted with us. Although it's become increasingly useful and interesting over the last few years, it has also become increasingly complicated to service and maintain. At this point, it realistically requires more time than one person can give to keep it going and to keep its information current.

Last year, when Liam Kennedy needed to step away from the webmaster position he filled so capably for several years, Russell Sipe (who had been our webmaster before Liam) generously volunteered to return to the website as Website Editor. He has now taken on other responsibilities that are limiting the time and energy he has available for that role, and, to our regret, has decided that he would like to turn the position over to someone else by the end of the year. We have also lost the two members who volunteered to handle the technical side of the site due to unforeseen changes in their working lives.

So, we're looking for volunteers to help run the website. Per Russ, the skills needed for Website Editor are:

1. Proficiency with HTML (not only through a web editing program such as Dreamweaver, but at the source level);
2. Good editing and writing skills;
3. A good sense of Web layout and graphics;
4. The ability to interpret and modify scripts (such as VBScript, JScript, and Javascript). Please note that this does not mean you have to be a programmer in these scripts, but you do need to know how to find text strings and modify them without breaking the code;
5. The ability to work with our Content Management System (web page interfaced and fully documented).

Per Liam, the skills we need for the "down-and-dirty programming aspects of the site" are knowledge of VBScript, JScript, Javascript, Access Databases, Microsoft IIS (Internet Information Server) and ASP (Active

Server Pages), as well as HTML. In general, whoever gets involved in the programming aspects of the site “needs to understand and be able to code dynamic web sites running under Microsoft IIS developed using ASP and Microsoft Access databases.”

As a club, we need an arrangement that will keep our website healthy and growing, which requires stability as well as knowledge and imagination on the part of the volunteers who take this on. We are exploring the available options, so, if you want to influence how the management of the website is organized and to take part in this highly visible aspect of our club’s activities, and if you have either of the skill sets described by the two people who are currently closest to the website, now is the time to come forward!

If you have questions you need answered before you could make that commitment, the best people to direct them to are Russ Sipe and Liam Kennedy (but they are both very busy, so please be patient if they can’t get back to you immediately). If you would like to volunteer to help with the website, please contact me or one of the two current Board members who have volunteered to help with this project, Craig Bobchin and Tony Obra (contact information for everyone should be on the back of this issue).

## OCA Archive

Another project we want to get underway is the organization of the OCA Archive, so we don’t lose all the information that people might otherwise throw away about the club’s history and the people who have given it its character over the years. For now, I’m the archivist, so if you have any pictures or documents that relate to any aspect of the club’s history that you would like to turn over to a good home, please contact me. If you have pictures from our past that you want to keep but are willing to allow us to scan or duplicate, please let me know – and the same applies to documents.

## ABOUT OUR SPEAKER

Mrs. Charlotte Herschel-Farquharson, a descendant of the Herschel family, will be in town visiting her son on her way home to the U.K. after a speaking tour in Japan. We are very fortunate that she has agreed to speak to us about her family’s famous members, William, John, and Caroline Herschel. Chris Butler, who was originally scheduled as our main speaker, will be our speaker in July.

This is a unique opportunity to learn more about a family that made many important contributions to the field of astronomy. William Herschel discovered Uranus, and astronomical writer Patrick Moore has said of him: “William Herschel was the first man to give a reasonably correct picture of the shape of our star-system or galaxy; he was the best telescope-maker of his time, and possibly the greatest observer who ever lived.” Caroline was his sister, and made many important contributions in her own right, and John was his son. For more information about him, see the William Herschel Museum site, <http://www.bath-preservation-trust.org.uk/museums/herschel/>.

Pictures of particular interest would be of any of the various observing sites the club has used or owned over the years, various meeting places the club has used, any and all club events, group pictures (such as at RTMC or club banquets), OCA’ers in any capacity or context, trips by groups of club members (such as for eclipses or to tour observatories), observing equipment over the years, our Anza site and the area around it – actually, anything having to do with the club or its members at all, even remotely, would be of interest. Documents could include club flyers for different events, newsletters (you never know when we’ll need more duplicates!), minutes and other records of Board and committee meetings, membership lists, records of speakers, personal notes, logs or diaries of club events, newspaper and magazine articles mentioning the club or any of its members, correspondence, records of club purchases and sales, plans for club facilities or equipment, and anything else that might relate to the club in any way.

So, if you’re thinking of doing some spring cleaning, or you have some old club stuff that has just been sitting around gathering dust because you didn’t know what to do with it, turn it over to the Archive, and help preserve our past!

## In Closing...

Well, it’s been a busy winter and a busy spring – and it’s looking like a busy summer, too! Dates to keep in mind – the July Anza star party (July 17, right on the New Moon) will be the annual Starbeque, and Astrolmage 2004 is August 27 and 28. Mark your calendars – you won’t want to miss either one!

# Virtual Astronomy

by Dave Kodama

## Yet Another Bright Comet!

April brought another surprise in the form of the discovery of Comet C/2004 F4 (Bradfield), a visual discovery by a human rather than an automated search system. This is actually the 18<sup>th</sup> discovery for Australian William A. Bradfield, who might still be considered to be a comet searching robot by mere mortal amateur astronomers! A significant item to note is that as of this writing, the comet is at 6<sup>th</sup> magnitude, bringing the number of currently naked-eye visible comets to three! It's just too bad for us that two of them are accessible only to observers in the southern hemisphere. Read more about Comet Bradfield as well as the other currently visible comets here:

<http://cometography.com/lcomets/2004f4.html>

<http://www.skyhound.com/sh/comets.html>

With luck Comet Bradfield will still be visible after perihelion and becoming visible in the northern hemisphere by the time you read this. If so, hurry and check it out as it will be rapidly fading away in May.

## Comet Names and Designations and Confusion

While the tradition of naming comets for the discoverer(s) continues, you may have noticed that not long ago (1995) the numbering system changed. Under the old standard, comets were designated by the year of the discovery, followed by a letter and/or Roman numeral indicating the order of discovery (e.g. 1990a).

The new IAU standard specifies that very long period comets (or single-appearance) comets are designated with a prefix of "C/", followed by a capital letter indicating the "half-month" of the year of discovery, followed by a number indicating the order of discovery during the half-month.

Additional prefixes are assigned to special categories of comets:

- D/ dead (e.g. destroyed by collision with the sun or Jupiter)
- X/ uncertain orbit
- A/ later determined to be an asteroid
- P/ short period

Fragments of comets have suffixes appended to the parent's designation in the form "-A", "-B", etc.

Short period comets (arbitrarily, less than a few hundred years) are additionally assigned a sequential permanent number in the form "nnnP/..." where "nnn" is the sequential number. For example, periodic comet number 1 is Comet Halley, which has the full designation **1P/1682 Q1**. The list of permanent comets is maintained by the Minor Planet Center here:

<http://cfa-www.harvard.edu/iau/lists/PeriodicCodes.html> numeric order

<http://cfa-www.harvard.edu/cfa/ps/lists/PeriodicCodes1.html> alphabetic name order

Occasionally we may see a comet designation change from a "C/" comet to a permanent designation when enough observations establish it to be a periodic comet.

By now, we should all be confused. To help us out, CBAT/MPC/Harvard have created an interactive tool to cross-reference between names, old, and new designations:

<http://cfa-www.harvard.edu/cfa/ps/CometDes.html>

In addition to being helpful when referencing pre-1995 publications, this tool is also nice for simple comet database searches. Try searching for "Bradfield", "Shoemaker", or NEAT to see all of the comets found by these prolific comet hunters (human and robot). Or try typing a year in to list all of the comets discovered during that year. Lots of fun for a rainy evening, but if the sky is clear, be sure to go out and find your own comet!



NGC 4013 (NASA)

# The 2004 RTMC Astronomy Expo Is Almost Here!

By Barbara Toy

Memorial Day weekend is memorable to the local astronomical community – and to many visitors – as RTMC time. This year, the dates are Friday, May 28, through Sunday, May 30.

The event now known as the RTMC Astronomy Expo started life as the Riverside Telescope Makers Conference. Telescope making is still important, and RTMC is still a great place for buying telescope-making equipment and supplies as well as showing off what you've built yourself and seeing what others have done. But this annual event has become much more than a conference of people interested mainly in telescope building... if you've never gone, you should go at least once, to see what it's all about. To do it justice, you need to stay awhile – there'll plenty going on to make your time there interesting!

Friday is the biggest day of the swap meet part of the event, but you'll find people selling off their unwanted equipment of all sorts on Saturday and Sunday, too, especially early in the morning, when they can tempt the folks waiting in line for breakfast. There are a lot of commercial vendors, of course, and some of them use RTMC as a good place to unload things that have been piling up in their warehouses or that may be a bit shopworn. And there are club booths selling things, too – like ours. RTMC is known as a great astronomical shopping event, and a lot of conversation you hear between attendees is about the wonderful bargains they found, or that were snapped up by someone else. (Tales about bargains don't end when RTMC is over for the year, and it's remarkable how some bargains improve with age...)

You'll also see a number of distinctive telescopes that return each year, most of them large or (in the case of one refractor of note) very long – if you're there for the star parties on Friday and Saturday nights (by Sunday night many have left), you can check out the views through them, as most are available for public viewing. The star parties give you a chance to look through a lot of different telescopes, and, in addition to the array in the Telescope Field and other areas, there are two telescopes in the observatory on the site that should be running, courtesy of OCA member Bill Hall and his team of volunteers.

If you look carefully, you'll find, dotted around the site, a number of "home made" telescopes that are competing for awards in various categories – reassurance that telescope making is alive and well! Check them out, and talk to their justifiably proud makers, especially if you've never thought about making a telescope yourself. You'll be amazed at what you can learn from them, and you may get some ideas you'll want to try out on your own equipment.

There are talks on a lot of different topics all day on both Saturday and Sunday, with schedules of speakers and topics posted. As I write this (in mid-April), the only confirmed speaker I know of is one of our club members, Wally Pacholka (Sunday, 1:45 p.m.), so, if you missed his talk at our general meeting in January, here's another chance to see him in action. There may be other members speaking, and there's almost certain to be topics that'll interest you, so be sure to check the schedule when you get there!

Other regular events include a tour of a scale model of the solar system, to help give people a better idea of just how big and how empty it really is, tours of the Big Bear Solar Observatory, family activities such as archery and swimming, and, of course, speeches and awards after dinner on Saturday and Sunday, followed by the famous RTMC raffle. It's one ticket per person (children get different tickets), given out after dinner, and things become quite competitive between the people in front, the people in back and the people inside, with everyone hoping to win something, but most particularly the Grand Prize (usually a very nice telescope both nights – last year, Saturday's Grand Prize was a Meade 14" LX200, which was won by OCA member Roger Cotton). So, bring a lawn chair and join the truly cool OCA members in FRONT of the Dining Hall and prepare to cheer on the winners from "in Front"! You could be one of them!

Ultimately, though, the most important part of RTMC is the people. The weekend is always rich in opportunities to catch up with old friends and meet an incredible array of new people. It's a great chance to expand your circle of astronomical friends and acquaintances – and it's close enough to be an easy trip yet far enough away to take it out of the realm of ordinary experience.

If you're anywhere in the vicinity at 1:00 p.m. on Saturday, don't forget to gather with the rest of the members who remember or who we can round up for the annual OCA group picture – that's in front of the Dining Hall, the building where the talks, the meals and the hot chocolate are all located. And, if you spot any other members on your way over, bring them along!

There's a lot more planned for RTMC this year than I can talk about here. For the "nuts and bolts" of the event (directions, price, accommodations, etc.) as well as general information, check the RTMC website: <http://www.rtmcastronomyexpo.org/>. We're should have brochures available at the May general meeting, for those who

*(continued on page 11)*

# The Kuhn's New CCD System is Ready For Action

By Barbara Toy and John Hoot

As part of the recent work on the club's beloved Kuhn telescope, John Hoot has done a lot of work to make the CCD camera that he generously donated to the club and its associated equipment into a functional system. It turned out that the CCD camera needed repairs, and he added a filter wheel and a telecompressor. He recently made his final adjustments and tested the system, and he sent me the following report on March 16, and asked that I share it with the Board. We are very happy to share this with all of you, as well, because it's always fun to share good news, and we also hope that many of you will be using the Kuhn for general astrophotography or for astronomical research in the months and years ahead.

To use the Kuhn, you need to be a Star Member and to go through the Star Member training. To use the CCD system, you will also need to be trained on that equipment. John is setting up sessions to train the trainers on the CCD system, so we hope to begin providing the CCD training to interested Star Members in the next couple months. I'm doing general Star Member training before most Anza star parties, and at other times when I know in advance that I'll be out at Anza. Chuck Ladoza has also offered to help with training, and, depending on demand, he may be setting up additional training sessions.

This is John's report on the new CCD system for the Kuhn:

Last night I went out and ran final engineering tests on the CCD camera on the Kuhn and am happy to report that it is ready for business.

I was able to take exposures up 60 seconds without objectionable guiding error. Seeing last night was marginal, about 4". This is plenty good for science and pretty pictures by stacking images.

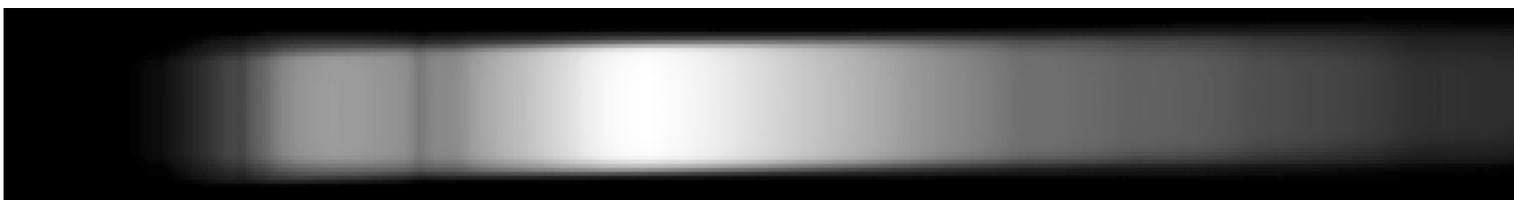
Here are some engineering test images:



First light - M1 (6 minutes red, 6 minutes green, 6 minutes blue). Focus is poor in green and blue as telescope was cooling rapidly.

## TECHNICAL SPECIFICATIONS

Camera: Meade 416XTE  
768 x 512 pixels  
0.9um x 0.9 um pixels  
Front illuminated  
No anti-blooming  
Temperature controlled +/- 0.1 degrees C  
16 bits/ pixel  
Full well capacity 80,000 electrons (approx)  
Filter Wheel: Meade 6 Position wheel.  
Filter Positions are as follows:  
1 - Empty/None  
2 - Clear Parafoal with Color Filters  
3 - Red 95% Transmission Interference Filter  
4 - Green 95% Transmission Interference Filter  
5 - Blue 92% Transmission Interference Filter  
6 - 500 Line/mm Diffraction Grating for Slitless Spectroscopy  
Field of View ( approx 11' x 7')  
Telecompressor: Celestron f0.63  
Yields approximate f5 on the Kuhn.  
Image Acquisition Software PictorView Vers 7.15h  
Image Processing Autostar IP

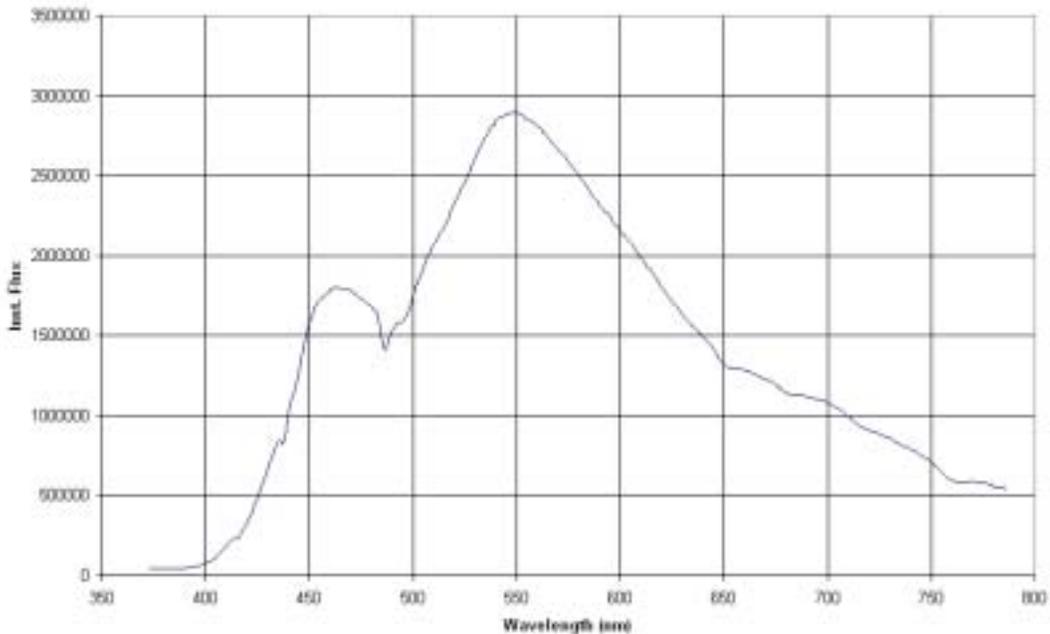


Vertically stretched 4 second spectra of Gamma Geminoris. The diffraction grating allows spectroscopy at approximately R500.



NGC 2392 - Eskimo Nebula (recently politically corrected to Clown Face nebula, at least until they organize). This is a much better indication of what the system can achieve. Exposures 2.5 min Red, 2.5 min Green, and 2.5 min Blue. This image only been contrast stretched, no sharpening or enhancement. You can see the defraction spikes on the brightest star indicating that we are getting near the scope performance limits.

Gamma Gem Spectra (Class A0)



Gamma Geminoris data in Excel. It shows clearly the H-alpha( 656nm), H-beta(486nm), H-gamma(434nm) and H-delta(410nm) lines that are visible in early A0 stars.

# ASTROSPACE UPDATE

May 2004

Gathered by Don Lynn from NASA and other sources

To find out more on these topics, or those of past months' columns, through the World Wide Web, send your Web browser to our OCA Web site (<http://www.ocastronomers.org>), select Space Update Online, and the topics are there to click on.

**Mars Rover Opportunity** has determined that the spherules, nicknamed blueberries, found littering the Martian landscape are composed of hematite, giving further evidence that the Meridiani Planum area was once drenched with liquid water. The spherules are the size of BBs, and so were too small to measure with the spectrometers, but they managed to measure a whole pile of them found in an area called the Blueberry Bowl. Close-up pictures of layers of sedimentary rock and measurements of chlorine and bromine in rocks were presented as evidence that the area Opportunity is exploring was once covered by gently lapping salty water, probably near the edge of a lake or sea. It is not known how long the water lasted, nor how long ago it dried up. The crater that the rover landed in has been named Eagle Crater. Opportunity drove out of Eagle Crater in late March, on its second try — the first slipped on a sandy steep slope. Outside the crater, the scene is quite flat, covered in wind-blown sand ripples, with almost no rocks visible. The rover examined a large crack in the ground, several feet deep, which has been named Anatolia. There should not be fault activity there which would create such a crack. Next major stop is Endurance Crater, which is much larger and deeper than Eagle Crater, so should reveal rocks considerably farther beneath the surface. Opportunity set a Martian distance record by rolling over 100 meters in a day, about the same distance that the previous rover Sojourner made in its entire exploration.

**Mars Rover Spirit** has completed examining rocks about Bonneville Crater and found that the rocks are volcanic that were thrown out of the crater when it formed by an asteroid impact. One rock showed evidence of having been in water multiple times in the past. The decision was made that the rocks inside the crater were of no greater scientific value than those around the rim, so Spirit did not venture in. Then it headed for the Columbia Hills, more than a mile distant. With stops at all the interesting rocks on the way, it is expected to take a couple of months. It is hoped to find evidence of a shoreline on the Columbia Hills. Spirit exceeded its design life of 90 Martian days early in April, and its and Opportunity's missions were both extended until September, if they function that long, which appears probable. The extension is expected to more than double the rover science for a 2% increase in budget. Spirit had achieved every science goal of its mission in its first 90 days. The 2 rovers have returned over 20,000 pictures so far. The rover teams at JPL switched back to regular work hours. Since the rover landings they had been working on Martian time, working 39.6 minutes later each Earth day, but that schedule was exhausting them.

**Mars Express** has measured large quantities of water ice in Mars' south polar cap. Water ice was previously found in the north polar cap, but measurements of the southern one generally showed dry ice (frozen carbon dioxide). The southern water ice is mostly under and mixed in with the dry ice and a thin layer of soil, so had escaped detection before. The scarps, or steep cliffs, of the cap were found to have the most exposed water ice.

Small quantities of **methane** in Mars' atmosphere were detected by Earth-based telescopes and by **Mars Express**. The amount measured would be destroyed by ultraviolet in sunlight within 300 years, so whatever created the methane did so in the last few hundred years. On Earth, only life (mostly swamp slime and cattle) and volcanoes produce this much methane. Either life or currently active volcanoes on Mars would be a huge discovery. Further measurements are being made over various parts of Mars to locate the source of the methane.

**Mars polar cap troughs** - Since they were first imaged in 1976, the spiral troughs in Mars' polar ice caps have defied explanation. They are hundreds of miles long and very deep. A new computer study shows that heating on the sunny side of a crack and cooling on the shady side will cause ice to vaporize and refreeze on the other side, forming troughs of the size, shape and spacing seen. These troughs are seen nowhere else in the Solar System because they form only over a narrow range of temperatures, found only at Mars' ice caps.

**Milky Way Center** - Radio astronomers using the Very Long Baseline Array (VLBA) have measured the object that surrounds the supermassive black hole at the center of our Milky Way galaxy, and it is about the size of the Earth's orbit. This object, known as Sagittarius A\*, has been known for 30 years, but has never been measured. It is obscured by gas and dust, so it can't be seen in visible light. While radio waves can penetrate from there, they are scattered by turbulent charged plasma along the line of sight to us. This scattering was removed mathematically from the new observations. Next they will try to measure its shape to see if it is jets, a disk, or a spherical cloud. The black hole at the center of this object is calculated to have the mass of 4 million Suns and be 14 million miles across. The VLBA consists of 10 large dish antennas spread from Hawaii to the Caribbean.

**Constant is constant** - The fine structure constant, a ratio involving the speed of light, Planck's constant, and the electrical charge of an electron, determines the size of atoms. In turn the size of atoms determines the energy levels of electrons in the atoms, and those determine the frequencies of spectral lines of those atoms. By measuring the wavelengths of spectral lines from very distant objects in the universe, whose light left those objects many billions of years ago, we can measure if the fine structure constant has changed since then. Some recent measurements have been interpreted to show that this constant is increasing very slightly over billions of years, so a new study was done with the 8-meter Very Large Telescope (VLT) in Chile to confirm this. The result is that no variation in the fine structure constant could be found in light as old as 11 billion years. This rules out some cosmological theories that predict a change in this constant. The new measurement was done by observing very distant quasars with a spectrograph and measuring the wavelengths of dark spectral lines impressed on that light by the various clouds of gas that

the light passed through on the way to us. The study used 18 quasars and 50 gas clouds that lie on the lines of sight to the quasars. The same team has now begun spectroscopically measuring the ratio of the mass of the proton to the electron in very old light to see if this has remained constant. When the radial velocity spectrometer for the VLT is completed soon, the experiments will be repeated to even greater precision.

**Sedna** - Astronomers using the Palomar 48 inch telescope have discovered the most distant object orbiting the Sun, which appears to be a Kuiper Belt object, one of those icy asteroids found beyond Neptune, but it is farther than the Kuiper Belt was supposed to extend. The object, named Sedna after an Inuit (Eskimo) goddess of the ocean, is now almost 3 times the distance of Pluto, but is near the closest point of its extremely elongated orbit. Even at its farthest point, about 10 times its present distance, Sedna will be much closer than the Oort cloud is thought to be. It will take about 10,500 years to complete one orbit. It is the reddest object in the Solar System, other than Mars. It is probably 3/4 the diameter of Pluto. So Sedna does not fit any of the classifications of Solar System objects: not planet, satellite, asteroid, Kuiper Belt object, Oort Cloud object.

**Integral** (European gamma-ray observatory) has resolved the diffuse glow of gamma rays, known for about 30 years to be emanating from the heart of our Milky Way galaxy, into hundreds of individual objects. The best theory is that they are double stars in which one star is a black hole or neutron star. The previous theory was that gamma rays were being emitted by clouds of gas, which was supposed to explain why it was a diffuse glow. But it turned out that previous gamma ray telescopes simply did not have the resolution to see the individual objects. Integral will continue by observing the rest of the Milky Way, other than the center, to see how common these newly resolved objects are outside the center.

**Mini-galaxies** - A new survey made with an Australian telescope has revealed dozens of miniature galaxies in the nearby Fornax galaxy cluster. They belong to a class of galaxies called ultra-compact dwarfs (UCDs), which were discovered only about 4 years ago. The UCDs outnumber the conventional elliptical and spiral galaxies in the central region of the Fornax cluster. They are probably either leftover primordial galaxy building blocks or the cores of galaxies whose outer parts have been stripped away. It is likely that UCDs are very common, but have been overlooked because they resemble nearby stars when imaged. UCDs were discovered when a galaxy cluster was imaged through a spectrograph, and many objects thought to be nearby stars were found to be redshifted the same as the galaxy cluster. UCDs have tens of millions of stars in a region only about 120 light years across. The first quick look for UCDs in the Virgo galaxy cluster also found some there.

**PLANET** (exoplanet search) - Two different programs (OGLE and MOA) have been monitoring the brightness of millions of stars daily to detect microlensing events. These events are when a star appears brighter for roughly a month because a dimmer unseen object passes in front of the star, and its gravity bends the starlight. These programs are detecting 500-700 microlensing events per year. A group of astronomers has organized a search called PLANET that will take other telescopes and monitor stars that have just been discovered to have undergone a microlensing event caused by an intervening star, and look for a following faster microlensing event caused by a planet orbiting that intervening star. They have calculated that they should find 10-15 giant (Jupiter-like) planets and 1-2 Earth-like planets every 3 years with this technique. No other technique of searching for exoplanets (planets outside our Solar System) is sensitive enough to detect Earth-like planets.

**Gravity Probe B** should be launched by the time you read this. It will use 4 ultra-precise gyroscopes to measure 2 effects predicted by General Relativity to much greater precision than before. The first effect is how much the Earth's gravity warps space-time, and the second effect is how much Earth's rotation drags space-time with it. It is expected to take 17 months to gather the data and another year to analyze it.

**Andromeda survey** - Astronomers using the 2.5-meter Isaac Newton Telescope in the Canary Islands have completed the most detailed mapping of the area around the Andromeda Galaxy (M31). It shows the first clear evidence that M31 is pulling one of its bright satellite galaxies apart, NGC 205, as indicated by a large stream of stars stretching for 50,000 light years. Also it showed 14 previously unknown globular clusters orbiting far from the center, as much as 250,000 light years, which could have been left behind when M31 swallowed other galaxies. The M31 halo was found to have a wealth of structure, indicating that it has ripped apart smaller galaxies that came too close.

**Local star survey** - Results were announced of a 15-year project to observe all Sun-like stars in our neighborhood of the Milky Way galaxy. We now have the distances, ages, chemical analysis, space velocities and orbits about the Milky Way of 14,000 of our neighbor stars. About 1/3 of them were found to be double or multiple stars. The initial analysis shows that the motion of stars has been much more stirred up than thought, probably by molecular clouds, spiral arms, black holes, and possibly a central galactic bar. It appears that the evolution of the Milky Way was more complex and chaotic than assumed.

**Magnetic field reversal** - It has long been known that the Earth's magnetic field reverses itself several times every million years. If compasses had been invented before the last reversal, they would have pointed south instead of north. Attempts at measuring how long the reversal actually takes have given wildly different results. A new study of the magnetic fields contained in cores drilled from the ocean bottom have revealed that the time for the field to fade, reverse, and rise to usual value averages about 7000 years, but occurs twice as fast near the equator compared to mid and high latitude locations.

**XMM-Newton** (X-ray observatory) - Astronomers using XMM-Newton have devised a new way to find black holes, and have used the technique to find 10 probable black holes in the Andromeda Galaxy. Objects called Low Mass X-ray Binaries (LMXBs) are easily identified by X-ray telescopes, although they are somewhat rare, but LMXBs can be caused by a binary (double) star containing

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either a neutron star or a black hole. Astronomers now believe they can distinguish between these 2 cases by the pattern of variability of X-rays given off, and that is how the new black hole search technique works.

**Chandra** (X-ray observatory) observed Saturn's moon **Titan** as it passed in front of the Crab Nebula. This allowed the X-rays emitted by the Crab Nebula to probe the atmosphere of Titan. This is a rare event, and won't happen again until 2267. The result found a layer in Titan's atmosphere that absorbs X-rays, which lies about 550 miles above the surface. This is 10-15% higher than the level that absorbed radio, infrared, and ultraviolet light in experiments carried out by Voyager I in 1980. It is not clear whether the X-ray absorbing layer is higher or the atmosphere is warmer and therefore expanded higher than 1980.

**Chandra** has also detected very large amounts of **magnesium** in the remnant left by a supernova that happened about 10,000 years ago. It did not find large amounts of oxygen, which have been found in previous supernova remnants that had large amounts of magnesium. The total amount of magnesium is about 1000 times what is present in the whole Solar System, so would indicate a very large star was involved in that supernova.

**Supernova** - The Very Large Telescope (VLT) in Chile has obtained the first detailed information of how a Type Ia supernova explodes by measuring it in polarized light. It exploded inside a clumpy disk of dust and gas that had been previously thrown off from the companion star of the supernova star. Unfortunately this may not be a typical Type Ia supernova, since it had hydrogen lines in its spectrum that usually are not there.

**Sloan Data** - In March the Sloan Digital Sky Survey released onto its web site another batch of data, containing information on 88 million celestial objects, and detailed spectra of 350,000 objects. The survey is being done with a 2.5 meter (100-inch) telescope in New Mexico. The goal is to map 1/4 of the sky in five colors, to beyond magnitude 22, including several hundred million objects, and take spectra of one million stars, galaxies and quasars.

#### **Instant AstroSpace Updates:**

The **closest asteroid** ever seen to pass by Earth (not counting ones that hit) was discovered by the LINEAR asteroid survey. It was about 30 meters across and missed by 1/9 the distance to the Moon.

Scientists have proposed a space mission called **LATOR** composed of 2 laser beacon spacecraft to be launched into the Earth's orbit, but on the opposite side of the Sun, to measure the bending of light by gravity 30,000 times more accurately than ever done before. This would be done by an interferometer on the space station. The idea is to distinguish between General Relativity and various competing theories, which predict slightly different amounts.

The **X-43A** scramjet was successfully tested at 7 times the speed of sound, the fastest any jet engine has operated. Since jets do not need to carry oxygen as rockets do, this could develop into a lower stage of a satellite launch vehicle far more capable than current rockets.

**Genesis** (solar wind sample return) has completed its collection of solar wind particles, closed the collector, and is returning to Earth, to land in Utah on September 8. This will beat the comet sample return mission Stardust, also on its way back to Earth, to be the first samples from space since the last Soviet lunar sample in 1976. The Genesis sample will allow us to determine the composition of the Sun to far greater precision.

**SOHO** (solar observatory) has observed its 750th comet. Before SOHO's launch in 1995, astronomers had no idea that small comets grazed the Sun every few days. Like most SOHO comets, this one was found by an amateur watching live images on the SOHO web site.

I spoke too soon in last month's column when I said that **Messenger** (Mercury orbiter) is on schedule to launch May 11. It was declared not ready, but is expected to make its backup-plan launch date near July 30. The downside is an extra gravity slingshot needed, and so will arrive at Mercury almost 2 years late, in March 2011.

The FAA has issued its first license, good for one year, to a commercial company to launch a **manned space vehicle**, for a suborbital flight. The company, Scaled Composites, is apparently trying to win the X-prize, \$10 million to be awarded to the first company to launch 3 people into space twice in 2 weeks in the same vehicle.

**REMINDER:** Articles and other submissions are due on the 15th of each month. Send all material to SiriusAstronomer@OCAstronomers.org in PDF, MS Word, or plain text format. Non-members may submit material, but priority for publication will be given to OCA members. No more than one page of commercial ad space will be included in any given issue on a first-come, first-served basis (private party want-ads are free for members). Inquiries regarding rates for ad space should be addressed to Charlie Oostdyk, OCA Treasurer, at the contact listed on the back page. Reviews of equipment, books, vendors, etc. represent the views and experiences of the reviewer and should not be construed as an endorsement by OCA or the Sirius Astronomer.

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may not have been able to get the information by other means, or you can contact Robert Stephens, 8300 Utica Avenue, Suite 105, Rancho Cucamonga, CA 91730, (909) 948-2205, registrar@rtmcastronomyexpo.org. And, for more general information about what goes on and what to expect, you can always ask those of us who've been there before – some club members have gone pretty much every year since it started, 36 years ago.

RTMC comes but once a year, so if you want to join those whose conversation in the coming months will be enriched with references to who and what they saw and what they did (and what they bought) at RTMC – here's your only chance for 2004! And – while you're there – remember to stop by the OCA booth and say "hi" to the volunteers who are running it. If you've got any spare time, we can generally use some help, so don't be shy about volunteering (it's a great way to feel at home there and to meet people, too!). I hope to see you out there!

## JPL Open House

The Jet Propulsion Laboratory will once again open its doors to the public during its annual Open House to be held on **Saturday and Sunday, May 15 and 16, 2004, from 9 a.m. to 5 p.m. both days.**

This popular event will celebrate JPL's accomplishments with exhibits and demonstrations about the Laboratory's ongoing research and space exploration. Many of the Lab's scientists and engineers will be on hand to answer questions about how spacecraft are sent to other planets, how scientists utilize space technologies to explore Earth and how researchers are now searching for planets beyond the solar system. Visitors will see exhibits, displays, demonstrations and presentations about new technologies, solar system exploration, spacecraft communication and much more.

The Open House is a fun and educational experience for children too, with special hands-on activities designed for kids. Food and beverages will be available, along with space souvenirs and NASA and JPL merchandise.

Admission is free. No backpacks or ice chests are allowed, with the exception of small purses and diaper bags. Visitors, vehicles and personal belongings are subject to inspection. JPL is located at 4800 Oak Grove Drive in Pasadena, off the 210 (Foothill) Freeway at the Berkshire Avenue/Oak Grove Drive exit. Parking is available near the Oak Grove main gate and on the eastern boundary of JPL, accessible from Windsor Avenue via the Arroyo Boulevard exit off the 210 Freeway. Air-conditioned buses will run non-stop between all lots and JPL's main gate. Buses and tour guides will move people between different locations around the facility. Walking is required to some locations. So make plans now to visit JPL and experience the thrill of space exploration!

For more information, please call (818) 354-0112 and visit the JPL Open House web site for details, maps, and video highlights of last year's open house at <http://www.jpl.nasa.gov/ps/oh.cfm>.

<p><b>For Sale (all in like new condition)</b></p> <p>Meade LX 200 8" SC Telescope with Telrad and spotter scope.          Televue 16mm Nagler type II eyepiece          Televue 22mm Panoptic eyepiece          Meade Series 4000 26mm eyepiece          Meade Series 4000 9mm Illuminated Reticle eyepiece          Parks GS-5 15mm eyepiece          Meade 4000 #140 Achromatic Barlow 1.25"          Meade Off axis guider          Meade 4000 f 6.3 Focal Reducer / Flatteners          Meade Variable Proj. Tele-Extender          Parks ALP SC rear cell Broadband filter          Lumicon UHC 1.25" filter          Lumicon Oxigen III 1.25" filter          All for \$3000.00, Please serious inquiries only.          (909) 924-6652</p>	<p><b>Desert Sunset Star Party - May 13-16, 2004</b></p> <p>The 2004 Desert Sunset Star Party will be held at the Caballo Loco Ranch, about 11.5 miles south of Three Points, AZ, on Rt. 286, and then east for 8 miles. This RV ranch is in a secluded area of Arizona with dark skies. The Sierrita Mountains block the light dome of Tucson. The domes of Kitt Peak are in clear view to the west. The DSSP begins on Thursday night and runs through Saturday night. We will have a speaker on both Friday and Saturday evenings along with door prize giveaways. Registration information is posted on the DSSP website:  <a href="http://chartmarker.tripod.com/sunset.htm">http://chartmarker.tripod.com/sunset.htm</a></p> <p>Just wanted to let anyone here interested know that I am selling my CCD and filter wheel - at 40% off current discounted Anacortes prices!!!  <a href="http://www.astromart.com/viewad.asp?cid=265154">http://www.astromart.com/viewad.asp?cid=265154</a>          For a local buyer, I will be happy to help set it up and show you how to use it. Greg Pyros</p>
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### FOR SALE

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

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