



Saturn's rings cast threadlike shadows on the planet's northern hemisphere. Note the translucent C ring, and thin outermost F ring. The image was taken with the Cassini narrow angle camera in visible light on May 10, 2004, at a distance of 27.2 million kilometers (16.9 million miles) from Saturn. Image scale is 162 kilometers (101 miles) per pixel. Contrast in the image was enhanced to aid visibility. (NASA/JPL/Space Science Institute)

OCA CLUB MEETING

The free and open club meeting will be held Friday, June 11th 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 Keith McInnis, veteran reporter of the US manned space program, who will discuss his 'Insights for Successful Space Exploration'

STAR PARTIES

The Black Star Canyon site will be open this month on June 12th. The Anza site will be open June 19th. 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 June 4th (and next month on July 2nd) at the Centennial Heritage Museum (formerly the Discovery Museum of Orange County) at 3101 West Harvard Street in Santa Ana.

GOTO SIG: June 14th

AstroImagers SIG: June 15th, July 20th

Astrophysics SIG: June 18th, July 16th

EOA SIG: June 28th, July 26th

President's Message

by Barbara Toy

We've had a lot going on this spring! In case you've missed any of it, here are some of the highlights:

Helping Fellow Amateurs in Iran

Those who were at the April meeting will undoubtedly remember the little town that Mike Simmons described, where one teacher has inspired the whole town to become interested in astronomy, to the point that they are now building an observatory, among other astronomical activities. That town is Saadat-shahr, and the teacher is Asghar Kabiri. Mike was acting as Mr. Kabiri's agent to get the town a good set of astronomical binoculars, which he was to deliver during his trip to Iran this May and June for the Venus transit. He and his contact in Tehran, Hassan Mahvelati (who was a longtime OCA member before he moved back to Iran) had decided on Celestron 20x100's as the best of the available alternatives for their purposes, which he could get through contacts for around \$300.

Because several people at our meeting had asked about ways we could help them, Mike emailed me in late April that Mr. Kabiri had not been able to raise the money to pay for the binoculars. I posted the information to our e-mail groups, and Jim Benet turned that into a concrete proposal by suggesting that, if each person gave \$30, we would only need 10 people as donors to raise the \$300.

I'm happy to report that, by the end of that week, we had commitments for more than the \$300 requested. In fact, Mike was able to get a pair of 25x100 Celestron binoculars instead of the 20x100s, which he says will be even better for their needs; besides looking for the new moon, they will be perfect for the public viewing events that are so important to amateur astronomy as currently practiced in Iran. The donors were Jim Benet, Liam Kennedy, Tom Kucharski, John Mifsud, Bob Buchheim, John Sanford and myself. In addition, Arnie Rosner made a very generous donation of a set of Fujinon 10x70 binoculars that presented Mike with a dilemma, as he would have been delighted to keep them for himself.

In addition to the binoculars, we are sending a full set of the DVDs that Liam Kennedy and the OCA-TV group have produced so far from their video work at our meetings. The most recent development in this story is that Liam is now going along on the trip as official videographer for the tour, and he is hoping to produce a documentary with the video footage he gets throughout the trip, which will include the Venus transit as well as a unique look at amateur astronomy in Iran.

It's exciting to think that, even though they are in such different culture from ours, there is this enthusiastic population of amateur astronomers in Iran, and whatever our differences in other areas, we share the same love for and interest in what can be seen in the heavens. And it's also exciting to know that, with comparatively little effort on our part, we can really help our Iranian colleagues pursue our mutual hobby.

Spring Comets

In Chris Butler's April "What's Up," he mentioned that we had the prospect of seeing two comets in the sky together in the coming weeks. Comet Bradfield and Comet Linear were both visible in the predawn sky in last week of April, and Wally Pacholka showed us in the images he shot from Joshua tree that Comet Bradfield developed a long and graceful tail. Linear turned out to be much dimmer, but it was unusual to see two comets close enough together that they could be captured in a single image.

By the end of the following week, Comet NEAT was showing up well in binoculars in the evening sky, and could be seen naked-eye under dark skies – or so I'm told. Some people claimed to see it naked-eye at the star party on May 15, but I wasn't among them. A lot of people got good images of NEAT, as you can see by visiting the photo album on our web site. Some that were of particular interest were one posted by John Sanford, that shows a jet coming out from one side, and one from Mark Huber that captured a nice image of its dual tail on May 9. And Wally showed that he had not used up all of his Comet enthusiasm on Bradfield by taking some equally beautiful shots of NEAT as seen from Joshua tree. Naturally, this comet attracted a lot of attention during the May star parties, and, as I am writing this immediately after the Anza party, I know of two people who put together animations (Russ Sipe and Dave Radosevich), and a lot of other people mentioned that they were shooting it – so I expect we'll have a lot more great images posted by the time you see this.

AstroImagers SIG

And that gives a nice transition to one group I haven't talked about yet in my informal tour of the club's formal Special Interest

Groups, the AstroImagers SIG. This is one of our most active and most visible groups, which is one reason I haven't talked about them so far – compared to some of our other interest groups, it's fairly easy to find out about the AstroImagers, what they do and how to join them. Another reason, which I'd hoped to remedy by this time, is that (I'm somewhat ashamed to admit) I haven't made it to any of their monthly meetings yet... I do talk to people who do go to the meetings regularly, though, and I follow the discussions on the AstroImagers email group, I've been involved with the AstroImage conferences, and I have the monthly incentive of putting together the pre-meeting slide shows for keeping current on what different imagers are posting, so I can claim some personal knowledge of what goes on in the group in spite of this obvious lack on my part... Another lack I should point out is that I'm not an imager myself (due to lack of time, equipment and technical knowledge, not interest), so mine is most definitely a layperson's view of the subject.

Having got the disclaimers out of the way, what are astroimagers? I've been told that the name was coined because "astrophotographer" is a term most people relate to use of film, and our group encompasses all types of imaging. Essentially, this is the group to join if you have any interest in getting a permanent image of any type of astronomical object. The "traditional" split has been between film and CCD, but now a lot of folks are using video and experimenting with standard electronic cameras as well, and a lot of people work with more than one medium. The equipment used runs the gamut from the eminently affordable to the very high precision (aka expensive). Whatever type of imaging work you're interested in doing, it's almost certain there are people in the group who have at least experimented with it, and usually you'll find that there are a number of people who have a lot of expertise in whatever you're interested in and can give you a lot of helpful pointers as well as encouragement.

Certainly, if you want to learn more about improving on how you capture an image, this group is a great resource. Besides their expertise with the camera end of things, these are the people who worry about perfecting the alignment of their telescopes and the accuracy of their tracking – as that directly affects the quality of the images they can get. So, if you need help in fine-tuning your mount or your alignment techniques, this is a great place to get it. This is also where you can get help with processing your images to make the most of what your equipment captures, an area that (from my perspective from outside the process) seems to take at least as much time, energy and expertise as the initial capture of the photons. These are the people who know about the different programs that can help with the process, and this is also where you'll find the expertise on how to use the different programs to best advantage.

So, let's say you're sold on the idea that this group is a great resource that you want to use – how do you do that? The easiest way is to show up for any of the meetings, which are regularly held from 7:00 to 10:00 on the third Tuesday of the month at Source Refrigeration at 800 E. Orangethorpe (just west of S. Raymond/East Street in Anaheim), courtesy of one of the co-chairs of the group, Bill Patterson. As a sample of some of the activities at the meetings, sometimes there are guest speakers, sometimes individual members give presentations or demonstrations on areas of general interest, and sometimes there are activities to help members improve specific skills, such as trying different processing techniques with sample images. The co-chairs are Leon Aslan and Bill Patterson, and I'm sure they would both be happy to tell you what they are planning for upcoming meetings (their contact information is on the back page).

If you have any interest in imaging at all, and if you have an email account, you should join the AstroImagers email group, AstroImagers@yahoogroups.com. This is a great resource in its own right, and is where most of the active imagers give links to anything they've recently posted, and where the people on the list discuss any issue and help answer questions related to astroimaging (this is intended to be a limited issue forum, and "off topic" posts are kept to a minimum. Any that are made usually include an apology for being off topic; the ocastronomers@yahoogroups.com email group is for the wider range of astronomy and club-related discussions). If you don't know anyone in the AstroImagers group, it's a good way to get a feel for some of the people you are likely to see at the meetings.

I've been asked if we have any formal beginners' classes in imaging – right now, the only one we have scheduled is the first session of the AstroImage 2004 Conference, which is on August 27. If you want an overview of the basics, this is a great place to get it. You don't have to wait for the class to get started, though – you'll find, especially as you get to know people in the group, that many of them will be happy to talk to you about approaches that will work best for you to get started with the equipment you have available, or, if you are thinking of buying equipment, discussing various options you should consider. You'll also find that there are people in the group at all experience levels, from novices to very experienced – one of the goals of the group is to help everyone improve their images, whether they are new to this aspect of the hobby, very experienced, or anywhere in between. Regardless of where you fit on that spectrum, you'll be very welcome – the imagers in general are a very warm-hearted, generous bunch, so give yourself a chance to get to know them!

And, of course, please remember to post your own images to the Image Album on our website!

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Virtual Astronomy

by Dave Kodama

The Comet Trilogy Continues

The newcomer Comet Bradfield (C/2004 F4) put on a brief, but nice show in late April and early May, after coming up into the northern hemisphere, outshining the disappointing Comet Linear (Comet C/2002 T7). Check out OCA member Wally Pacholka's shot that captured both comets on April 25th:

<http://www.astropics.com/comets04/4980.htm>

(Wally Pacholka)

Comet Bradfield dramatically dominates the shot while Comet Linear is just a small smudge on the right side of the shot, near the horizon. Nevertheless, this is an exceptional image to capture two comets in a single shot. And in



fact, though it was not visible in Wally's picture, there was actually a third comet in the same field of view. A closeup shot of Comet Bradfield shows Comet Tabur (C/2003 T3) so small that it can only be recognized as a comet by using a sky simulation program:

<http://home.att.net/~stevensmith/comet/bradfield.htm>
(Steven Smith)

With luck we'll be seeing more of Comet Linear (telescopically) when it returns as an evening object. In the mean time, Comet NEAT (C/2001 Q4) emerged from below our southern horizon to put on a decent, though not exceptional show. Our close proximity to the comet allowed for a detailed look of the tail interacting with the solar wind, seen most clearly in the wide field short exposures possible with Schmidt cameras:

<http://www.comet-track.com/q4/q4.html> (Bob Yen)

OCA members have been taking advantage of the comet rich skies and produced a nice variety of shots. I've started gathering them here:

http://www.ocastronomers.org/about_oca/special_interest_groups/AstroImagers/Comets2004/

Let me know if I've missed any images or if you take more images which should be added here.

Neglected Gas Giants

Interest in the current crop of comets has left Jupiter and Saturn relatively neglected as they approach the end of the viewing "season" for the year. Nevertheless some amateurs have persisted in following them, getting some great views in the process:

<http://jupiter.cstoneind.com/> (Christopher Go)
<http://www.stargazing.net/david/jupiter/> (David Haworth)
<http://www.stellarproducts.com/imageall/jupiter/jup2004/jup2004.htm> (Don Bruns)
<http://www.ocastronomers.org/astroimages/album.asp?ID=1445> (Bruce Waddington – OCA)
<http://www.ocastronomers.org/astroimages/album.asp?ID=1449> (Brian Norman – OCA)

Don't forget that this season also featured a triple transit which was captured by many amateurs:

<http://www.zianet.com/sbarkes/Astrophotography/SolarSystem/JupiterTripleTransit.html> (Steve Barkes)
<http://www.stellarproducts.com/imageall/jupiter/jup2004/Jup03-27-04.avi> (Don Bruns)
<http://www.ocastronomers.org/astroimages/album.asp?ID=1472> (Dan Schecter – OCA)
<http://www.ocastronomers.org/astroimages/album.asp?ID=1534> (Marc Huber – OCA)

and much, much more out there on the net.

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Update on the OCA Archive...

Last month, I mentioned that we were getting a formal OCA Archive started. We have had a great development on that project – we now have a genuine OCA Archivist. Jon Bearscope is the real thing, a trained archivist whose day job is working with the federal archives. He has generously agreed to use his training and skills our behalf, to help us set up the archive and keep it going. We are working out the details as I write this, and I'm really looking forward to seeing this resource become a reality.

As I said last month, before you throw out anything that's club related, please contact us about whether it would be an appropriate addition to our archives. Even if you think it's not really interesting, please let us know about it – we'd rather err on the side of conservation, even if it means that we might have to weed through a lot more items to determine what should be saved.

In Closing...

It's hard to believe, but next month is the Summer Solstice – which means the warmer nights for observing, and also that the nights will start getting longer again... Happy observing to all of you!

2004 Society for Astronomical Sciences Conference

by Bob Buchheim (OCA)

The annual "Symposium on Telescope Sciences" of the S.A.S. was held on May 26-27, at Big Bear City. Quite a few OCA members attended: Larry Owings, Bob Buckner, John Sanford, Jim Thorpe, John Hoot (who presented two papers), Bob Gill (who is on the conference committee), and me. (I hope I didn't miss anyone...)

This is a fabulous era for amateurs who are interested in doing real science. CCD cameras and spectrographs that are within the financial reach of individuals and clubs are capable of doing real science in a variety of topics, using modest telescopes (8+ inch aperture). Amateurs have a key advantage over the professional in many areas of interest: we can devote as much telescope time as we want to a project, whereas the typical professional only gets a few nights per year of telescope time. Thus, any project that requires many nights of continuous observation of a single object is a potential "amateur" research project. The S.A.S provides a forum for amateur astronomers' research projects, for bringing professional astronomers who need data together with amateurs who are capable of gathering it, and for encouraging collaboration between professional and amateur astronomers.

Papers were presented describing a variety of areas in which amateur astronomers and professionals are effectively collaborating, including: asteroid studies, searching for extra-solar planets, and variable-star studies. Other papers gave specific advice on observational methods and data-reduction. We also received interesting overviews of the progress and plans for two NASA projects: SOFIA (new airborne observatory), and CHANDRA (x-ray space telescope).

A variety of asteroid studies are wide open for participation by disciplined amateurs:

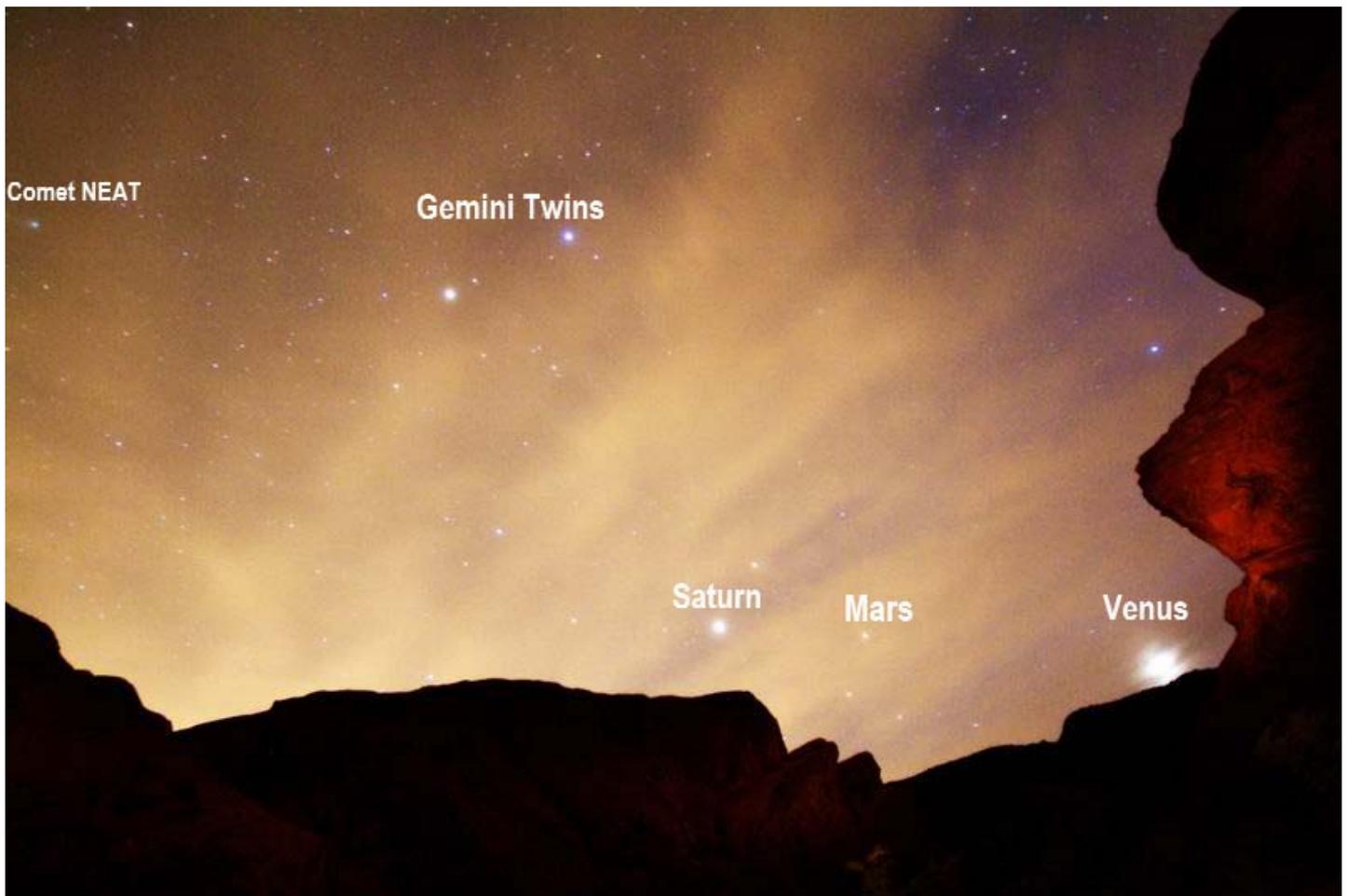
- Using mobile equipment (telescope, a video camera, and a GPS receiver), you can observe asteroid occultations, which provide the best available ground-based data on the size and shape of asteroids (only spacecraft fly-by's, or radar observations of near-Earth objects, can do better).
- With an 8-inch or larger scope and a CCD camera (and some patience), you can measure an asteroid's light curve, which determines its rotational rate and provides some crude information on its shape. There are thousands of asteroids within reach of amateur equipment that are in need of light-curve determination.
- Good-accuracy asteroid light-curves from multiple apparitions ($\pm .05$ magnitude or so) enable professional astronomers to make detailed calculations of the asteroid's shape, rotational pole orientation, and its direction of rotation (prograde vs. retrograde). Only a few hundred asteroids have well-defined pole orientations, and this turns out to be an area of intense interest among professional planetary scientists (there are compelling hints that very subtle radiation-driven forces – called the YORP effect – can alter an asteroid's pole orientation).
- Radar observations (from Arecibo, and Goldstone tracking center) provide exquisite detail on near-Earth asteroid's shape and rotational state, but the radars have very narrow field-of-view, and also require very accurate radial-velocity data to set up the observation. Amateur astronomers can provide the necessary accurate astrometry to increase the probability of successful radar observations.

Variable star studies have long taken advantage of disciplined visual observations by amateur astronomers. With modern CCD's, the amateur can collaborate with professional astronomers on studies requiring higher-accuracy photometry, to better understand these stars. Wide-band filters provide some additional photometric data, and several papers presented amazing progress and results from amateur spectrographs.

Discoveries of extra-solar planets still make headlines, and two projects were described in which amateur astronomers can contribute to these searches.

- The first is to use very-high-accuracy photometry to detect the passage of the planet in front of its parent star. Experience with the planet around HD209458 has proven that it is possible for amateurs to detect the approximately 1% brightness drop when the planet passes front of the star. A list of over 100 potentially detectable extra-solar planet occultations was presented, to tantalize us into meeting this challenge.
- A second approach is to use a spectrograph to measure the radial-velocity effect of the orbiting planet. One presenter described his team's efforts to make the first amateur discovery of an extra-solar planet. Designing and building a sufficiently-accurate spectrograph is not for the faint of heart, but these guys are getting close: they routinely observe the Doppler shift caused by the Earth's orbit around the Sun, and showed data indicating that they have detected the Doppler shift of star HD209458 caused by its (known) planet.

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Nevada's FACE ROCK (far right) keeps a keen eye on Venus, Mars, Saturn, the Gemini Twins and Comet NEAT between the clouds on the night of Comet NEAT's closest approach to the Sun on May 15th at 10PM as seen from the scenic "Valley of Fire" state park near Lake Mead (Wally Pacholka)

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By the time you read this, the briefing charts from the 2004 symposium will probably be posted on the S.A.S. web site (<http://www.socastrosci.org>). Most of the briefings include web links where you can get further, detailed information on the topic you're interested in.

If you are interested in putting your telescope and CCD to work on these, or other, research projects, the annual S.A.S symposium is a great way to get motivated, educated, and join the community of research-oriented amateur astronomers! The 2005 meeting will be held on May 25-26 (the Wednesday and Thursday before Memorial Day), at Big Bear City (convenient to RTMC).

GOTO/ETX meeting update

by Mike Bertin

The next meeting of the ETX-GoTo Group will be on Monday, June 14, at 7:30 PM at the home of Craig Bobchin in Placentia. Craig has a nice back yard that we can use to set up our scopes to try out what we learn during our gathering. Any one with a GoTo Scope or an interest in is welcome to join in from users of ETX's, to more sophisticated Meade, Celestron, and other scopes. Our group members span a wide experience range from novices to expert amateurs. Please feel free to bring your telescope.

We'll share our tips and experiences with our scopes first. The prime focus of our discussion will be "Using the AutoStar". We'll talk about the controllers for Meade telescopes and other makes too. If you have experience using some of the special functions, such as the guided tour, or storing "User Objects" please be prepared to share that experience with the group. Finally we'll go outside to observe.

If you aren't already on the E-mail list contact Mike Bertin at MCB1@aol.com to add your name, and to get directions to Craig's house



A Preview of the AstroImage 2004 Conference

By Barbara Toy (borrowing heavily from material put together by Dave Kodama. Please note that Dave is not responsible for any mistakes that may have crept in.)

A lot of us were really disappointed when the organizing committee at the time decided not to go forward with an astroimaging conference in 2003 – especially after our tremendous AstroImage 2002 conference, which set a whole new standard for imaging conferences! Thanks to the hard work of the members of our current organizing committee, Dave Kodama, Bill Patterson, Garth Buckles and Pat Stoker, we are looking forward to another conference this year that is truly in the same mold as AstroImage 2002. Here's a taste of what you can expect:

Introductory Class: AstroImage 2004 begins with an introductory class on Friday night, August 27. This was a very successful feature of the AstroImage 2002 conference, and it will be presented by the same successful team: Robert Reeves, well-known astrophotographer and author of *Wide Field Astrophotography*, and Greg Pyros, accomplished astroimager and past chair of the OCA AstroImagers Special Interest Group, who has helped many novices become successful imagers.

The class will cover the basics on imaging with film, digital cameras, and astronomical CCD cameras, and there will be time to ask questions and also examples of the hardware they will be discussing on display. One goal of the session is to help give beginners enough background that they will benefit more from the rest of the conference. This is also for people who want a refresher course, or who want basic information about types of imaging they don't usually do. Although the material is geared mainly toward beginners, all imagers are invited to attend and provide tips and encouragement. Last time, this session proved to be an excellent place for people to mix and socialize before the main conference started, and we expect that this will be the case this year, as well.

The Main Conference: The main conference will be all day Saturday, August 28, at the Curtis Theater, City of Brea Civic & Cultural Center, 1 Civic Center Circle, Brea, CA 92821. This is a very comfortable and accessible facility (with free parking!), located west of the Brea Mall, not far from the intersection of Imperial Hwy. and SR57.

The Speakers: Instead of telling you how great our speaker lineup is, I'll let you see for yourself. Here's the current list, with what we expect they will talk about (this isn't the order of the talks, as that hasn't been set yet):

- **Ron Wodaski, "Color Balancing Astroimages"** – a tutorial presentation of techniques for getting the color balance right for your astroimages. Ron's talk includes an overview of basic processing of astroimages using Adobe Photoshop.
- **Larry Arnold, "Getting to Print"** – a discussion of color spaces, printer gamuts, printing technologies, color matching, and upscaling images to insure that your prints do justice to your images.
- **Robert Reeves, "Imaging with Digital Cameras"** – an introduction to the technology in the hottest new area in astroimaging and techniques for getting good results out of your digital camera, whether it is a fixed or removable lens system.
- **Loke Kun Tan, "Crossing Over From Film to Digital"** – an experienced astrophotographer's personal evolution from film to CCD imaging, including a discussion of the advantages and disadvantages of the media, matching media with optics, and special image processing required for CCD images.
- **Wei-Hao Wang, "Ultrawidefield Film Imaging – A New Dimension in Astrophotography"** – A discussion of widefield film imaging with unusually high image quality. Wei-Hao's talk includes a fresh approach to film selection, exposures, and digital processing of astrophotos.

To top all this off, we have a truly incredible evening talk lined up. This is a joint presentation by Robert Reeves and Don Pettit (NASA International Space Station astronaut, whose pictures you may recall seeing on Astronomy Picture of the Day and other places) on **"Amateur Astroimaging from the International Space Station."** They will talk about their long-distance collaborations to develop the techniques that allowed Don to do his own "amateur" imaging from the International Space Station. We will get to see some of Don's images that have never been shown publicly before, and will also get an

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ASTROSPACE UPDATE

June 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.

Exoplanet - Last month this column reported how astronomers were looking for exoplanets (those outside our Solar system) by monitoring millions of stars for gravitational micro-lensing events. Statistically they were expecting to find 4-6 planets per year. The first has been found: a planet about 1.5 times as big as Jupiter orbiting a red dwarf star in Sagittarius about 17,000 light years away, orbiting its star at 3 times the distance that Earth orbits its Sun.

More Exoplanets - Searching for exoplanets by looking for the slight darkening when they happen to pass in front of (transit) their star has yielded 2 new planets. Along with further data from watching the wobble of the star as its planet gravitationally tugs on it, the planets' sizes, masses, distances from their stars, and temperatures were calculated. The result is that they are extremely close to their stars, orbiting in less than 2 (Earth) days, and are extremely hot from being so close. They represent a new class of planets, which are being called "very hot Jupiters". There was already a class called "hot Jupiters", and these are far hotter. The transits of the planets were originally seen by the OGLE survey, which is monitoring over 150,000 stars to detect gravitational lensing brightening, but it was found the survey could also detect the darkening of planetary transits. Since other explanations exist for darkenings, such as eclipsing binary stars, the candidates found by OGLE had to be verified by other means, such as checking for the stars' wobbles.

Mars Rover Opportunity probed with its spectrographs a rock named "Bounce" (because the spacecraft bounced off it during the airbag landing) and found that its composition closely matches that of the shergottite Martian meteorites. The Martian meteorites (there are now about 30 of them) have been shown to be pieces of Mars that were blasted into space when asteroids hit Mars, and then those pieces of Mars eventually fell to Earth as meteorites. Bounce is the first rock examined by any of the 5 Mars landers that match in composition any of the Martian meteorites. Bounce appears to have been thrown to its present location millions or even billions of years ago by the impact that formed a huge crater about 30 miles from the rover. Because Bounce has a slightly different amount of pyroxene than even the best matching shergottite, it is thought that probably Bounce rock and the shergottites were not products of the same impact.

In late April **Opportunity** completed all of its primary mission goals, and as NASA puts it, is now tackling extra-credit assignments. Like Spirit, funding was extended to continue operating the highly successful mission until September. During its first 90 Martian days, Opportunity drove 887 yards and sent back 15 gigabytes of data, including 12,429 pictures.

Opportunity reached Endurance, the largest crater near its landing point. The first views inside it show large areas of exposed bedrock to much greater depths than seen in Eagle Crater, its landing spot. The greater depth allows reading back farther into the history of the rocks' formation. Endurance is the size of a football stadium, and is about 22 yards deep. Portions of the crater's sides appear almost paved with smooth rock, while others have steep walls of exposed rock. The plan is to examine 3 spots on the rim over the next few weeks, taking as much imaging as possible of the interior, in order to plan how to safely reach the most scientifically valuable areas within the crater. If no safe exit from the crater can be found, it is possible that Opportunity will not be commanded to enter, or that entry will be postponed until nearby interesting objects outside the crater are all examined.

Mars Rover Spirit is proceeding toward the Columbia Hills, less than a mile away as I write this, stopping to take measurements at various rocks and craters of interest on the way. It is expected to reach the hills in June, unless too many interesting rocks are found on the way. A plan is being developed to determine what sites in the hills to visit, using images taken from orbit of the hills. It is possible that the rover can climb right up the highest ridges if slopes are not too steep, but the exact route will depend on where the scientifically interesting rocks are found. The hills appear geologically older than the cratered plains explored so far. The condition of both rovers is excellent, and if they continue that way through September, the missions will probably be extended again, as they were in April.

Martian meteorite - 8 years ago scientists announced possible fossils of Martian microscopic life found in a Martian meteorite that was found in the Allan Hills of Antarctica in 1984. The debate has continued ever since over whether non-life explanations were possible for the objects in the meteorite. One strong piece of evidence for life was that the magnetite grains in the meteorite were of the kind made by certain magnetic bacteria here on Earth. A new study claims to have duplicated the magnetite grains by a non-life process that would occur when iron-bearing carbonates decompose under high heat, such as atmospheric entry. The debate will undoubtedly continue.

Chandra (X-ray observatory) found an unusually bright X-ray source in a star cluster called MGG11 in the galaxy M82. This cluster has also been observed with high-resolution images from the Hubble Space Telescope and several ground-based large telescopes. The cluster's properties are best explained by a black hole with a mass of about 1000 times that of our Sun. While many black holes have been found with masses of a large star, and many with masses millions of times that of a star, the intermediate size (like the one in MGG11) has been hard to find. Computer simulations of clusters like MGG11 show that they should produce a black hole in the range of 800 to 3000 times the Sun's mass, and it takes only about 4 million years to occur during the early life of such clusters. When the cluster is young and dense, stars often collide and merge, creating single stars with far more mass (up to thousands of Sun's masses) than normal star formation processes produce. When such a super star uses all its hydrogen fuel a few million years later, it collapses into an intermediate mass black hole.

Sedna (farthest Solar system object) - The only reasonable explanation for Sedna's slow rotation (40 days) is that it was tidally locked to rotate with the same period as a moon in orbit about it. Images taken with the Hubble Space Telescope were unable to find any such moon, however. Apparently the only Solar system objects that rotate slower than Sedna are Mercury and Venus, which are so close to the Sun that tidal influences from the Sun have slowed them. So astronomers are unable to explain Sedna's rotation.

Double pulsar - A double star thought to consist of a pulsar and a non-pulsing neutron star has now been shown to be 2 pulsars, the only such pair known. One pulsar gives off radio pulses only at 2 certain places in its orbit about the other. A new theoretical model shows that the pulses of the one pulsar hit the occasional pulsar at those places in its orbit, so must energize the other star to pulse. If the model is right, then the pair should evolve to gradually shift where in its orbit the occasional pulsar pulses. Stay tuned.

Cosmic Rays - Scientists have proposed a new theory to explain cosmic rays, those charged particles arriving from space at enormous energies. According to this, the rays are created when the magnetic field lines of radio galaxies reconnect. Reconnection is the process where the lines of a magnetic field connect and vanish. The energy in disappearing part of the magnetic field is converted to that of the rays. In studying radio galaxies, the scientists had found sufficient magnetic energy, but inadequate shocks from supernovas, which was the best competing theory of the source of cosmic rays.

Comet vaporizes - Evidence that a comet-like object at least 60 miles across fell into a very young star about 3200 light-years away has been obtained by a team of astronomers using the 9-meter Hobby-Eberly Telescope in Texas. This is the youngest star (only about 100,000 years old) ever found to have swallowed a comet, so is proof that comets this big can form this quickly about a star. The evidence was a spectrum showing a cloud of hydrogen, helium, and sodium appearing temporarily in front of the star. From the temperature and distance of the cloud and the time it persisted, it was calculated how large the comet had to be. The team will monitor similar stars to find out how common this kind of event is.

Very Large Telescope (VLT) Interferometer has imaged the immediate surroundings of a black hole at the center of a galaxy other than our own in great detail for the first time. Maximum resolution achieved was 0.013 arc seconds, about 4 times better than the Hubble Space Telescope can achieve. The galaxy, NGC 1068, is about 50 million light-years away. The center was found to be surrounded by a large area of warm dust and a smaller area of somewhat hotter dust. An infrared spectrum of the dust was taken, indicating it is probably of alumino-silicate composition.

Universe's dark ages - A new method has been proposed to probe the Universe's dark ages, that time after the Big Bang before stars and galaxies formed. Astronomers calculated that the dark material out of which the stars were going to form should have absorbed light from the Cosmic Microwave Background (CMB). This should have occurred only between 20 and 100 million years after the Big Bang, because the temperatures were not correct other times. The CMB is the glow remaining from the time about 370,000 years after the Big Bang when the temperature of the Universe had cooled enough to become transparent, releasing all the light from the Big Bang that had been trapped by the opaqueness. To see this absorption will probably require more sensitive microwave detectors, but 2 such systems are planned in the next few years, one called LOFAR and the other the Square Kilometer Array.

Titan - The best images ever taken of surface details on Saturn's moon Titan were made with one of the 8-meter VLT telescopes in Chile, using adaptive optics to sharpen the image and multiple infrared filters. The images in infrared wavelengths that picked up the haze most strongly were subtracted from the wavelengths that penetrated best to remove atmospheric effects, leaving only the surface features. These images will not remain the best for long, because the Cassini spacecraft is already seeing the larger surface features of Titan as it approaches. Cassini will flyby Titan in July. Meanwhile the Keck 10-meter Telescope in Hawaii, also using adaptive optics in infrared, has been taking images that are intentionally picking up the obscuring effects of Titan's atmosphere. The idea is to use different wavelengths to image the clouds at different heights in the atmosphere, so that scientists landing the Huygens spacecraft on Titan early next year know what cloud layers the probe will pass through.

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Jupiter's storms - A recent study shows that the weather on Jupiter goes through a cycle about every 70 years where most of the storms disappear (except the Red Spot), which causes shifts in temperature in the various bands, which forms a set of new storms to start the cycle over. The storms tend to circulate heat from the equator to the poles, and when they disappear, the equatorial regions get about 10 degrees hotter, while the poles get colder. The temperature difference tends to put waves into the jet streams that then spawn new storms. There are currently few storms on Jupiter, and they are getting fewer, principally by merging, so we may be heading into this cycle.

Instant AstroSpace Updates:

The first of two 8.4-meter mirrors was installed into the **Large Binocular Telescope** atop Mount Graham in Arizona. First light for the first mirror is expected later this year, and completion with both mirrors is scheduled for next year, becoming the largest single optical telescope then.

The **Arecibo** radiotelescope, the largest in the world, is getting an upgrade. In place of the one receiver at its focus is now an array of 7, each more sensitive than the old receiver, giving it in effect a 7-pixel image in place of single readings.

The **Cryogenic Dark Matter Search** has begun operations more than 2400 feet underground in a Minnesota mine, trying to detect WIMPS, theoretical massive particles that barely interact with ordinary matter. The lack of detection so far has established an upper limit on how reactive WIMPS can be. If WIMPS are detected, it will boost supersymmetry theory of matter, and may explain what much of the dark matter of the Universe is.

Galileo stated that all bodies fall at the same rate, ignoring friction. A **new test** of this to extreme accuracy is being planned by bouncing lasers off the reflectors left on the Moon by Apollo astronauts, with new equipment so accurate it will tell where the moon is within about a millimeter. If the Moon falls toward the Earth and Sun at a slightly different rate than the Earth falls toward the Sun, it may show up.

A group of researchers has been granted over 2 million hours of supercomputer time to simulate exactly how a **supernova** occurs. Maybe we will finally understand the details.

Gennady Padalka and Mike Fincke, the next crew of the **International Space Station** (ISS), were launched there in a Russian Soyuz TMA spacecraft, the only way to get to ISS until the Space Shuttles are flying again. With them was Dutch astronaut Andre Kuipers, who performed many scientific experiments before returning 11 days later with the previous station crew.

The crew ending their 6-month ISS stay (Alexander Kaleri and Mike Foale) returned safely in their Soyuz craft. Foale has spent 374.5 days in space (during 6 missions), the most of any American.

Black Star Canyon star parties mailing list update

by Bob Buchheim

I maintain a mailing list of people interested in the Black Star Canyon star parties, and send a reminder to the list a couple of days before each scheduled star party. My computer has been refusing to accept new addresses or changes for the past few months, but I've now solved the problem. If you sent me your address within the last 2-3 months (or if you didn't receive an update before the May star party), please re-send and I'll add you to the list — rbuchheim@compuserve.com. Thanks!

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.

ASTROIMAGE 2004

August 27-28, 2004 • Curtis Theater, Brea, CA



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

- Special Presentation: Amateur Astroimaging from the International Space Station by Don Pettit (NASA astronaut) & Robert Reeves
- Tutorial session for beginners
- Presentations by well-known astroimagers
- Print and electronic image galleries
- Imaging Equipment Setups
- Exhibitor displays

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

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inside view of astronaut life. Unfortunately, we can't guarantee that Don will be able to attend in person, as his presence is subject to NASA scheduling, but Robert Reeves will have his materials and is well-equipped to give us an entertaining and informative talk even if Don ultimately can't come.

Of course, we'll also have another great lineup of vendors – we'll be telling you more about them later.

For more information about the conference, our speakers, etc., check out the conference website (courtesy of Dave Kodama): <http://www.ocastronomers.org/astroimage/2004/>. This should show any changes that may occur, so check back frequently, especially in the last couple weeks before the conference.

For Sale (all in like new condition)

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

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All for \$3000.00, Please serious inquiries only.

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TO OUR READERS

My sincere apologies should this issue arrive at your mailbox late. I have been in the process of moving for the past few weeks and did not start putting the newsletter together until much later than usual. Any delay in your receipt of the newsletter is entirely my responsibility. If you were expecting your article or picture to appear in this issue, rest assured that it has not been neglected or forgotten and will appear in the July issue. -- Ed.

FOR SALE

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

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HANDY CONTACT LIST

CLUB OFFICERS

President	Barbara Toy	btoy@cox.net	714-606-1825
Vice-President	David Radosevich	Dave.Radosevich@ngc.com	310-813-9021
Treasurer	Charlie Oostdyk	charlie@ccd.edu	714-751-5381
Secretary	Bruce Crowe	bcrowe12@pacbell.net	714-971-8427
Trustee	Bob Buchheim	rbuchheim@compuserve.com	949-459-7622
Trustee	Craig Bobchin	ETX_Astro_Boy@sbcglobal.net	714-374-7054
Trustee	Stephen Eubanks	SSEubanks@earthlink.net	714-776-6361
Trustee	Joel Harris	eclipse125@earthlink.net	818-575-9580
Trustee	Tom Kucharski	TomRigel@aol.com	949-348-0230
Trustee	Tony Obra	tonykathyodieseldr@comcast.net	714-952-8779
Trustee	Gary Schones	gary378@pacbell.net	714-556-8729

COMMITTEES, SUBGROUPS, AND OTHER CLUB VOLUNTEERS

Webmaster/Press Contact	Russell Sipe	russell@sipe.com	714-281-0651
Sirius Astronomer Editor	Steve Condrey	SiriusAstronomer@OCAstronomers.org	562-983-8894
Observatory Custodian	John Hoot	jhoot@ssccorp.com	949-498-5784
Anza Site Maintenance	Don Lynn	donald.lynn@office.xerox.com	714-775-7238
Astrophysics SIG	Chris Buchen	buchen@cox.net	949-854-3089
Librarian	Karen Schnabel	karen@schnabel.net	949-887-9517
Membership, Pad Coordinator	Charlie Oostdyk	charlie@ccd.edu	714-751-5381
Beginner's Astronomy Class	Antonio Miro	tycmiro@aol.com	714-898-9677
Astrolmagers SIG (co-chair)	Leon Aslan	laslan@earthlink.net	562-433-2922
	Bill Patterson	bill@laastro.com	714-578-2419
Explore the Stars Coordinator	Richard Cranston	rcransto@ix.netcom.com	714-893-8659
Silverado Star Parties	Bob Buchheim	rbuchheim@compuserve.com	949-459-7622
Star Member Training	Barbara Toy	btoy@cox.net	714-606-1825
OCA Outreach Coordinator	Jim Benet	jimbenet@pacbell.net	714-693-1639
Telescope Loaner Program	Bob Bell	liamcelt@earthlink.net	714-808-9233
EOA Liaison	Del Christiansen	DelmarChris@earthlink.net	714-895-2215
Anza House Coordinator	Larry Carr	LarryCarr@sbcglobal.net	714-306-6584
GoTo SIG (formerly ETX SIG)	Mike Bertin	MCB1@aol.com	949-786-9450