November 2008

The Observer

East Valley Astronomy Club

Volume 22 Issue 11

Inside this Issue:

From the Desk of the President
by Claude Haynes

Nothing like a fifty degree temperature swing to make you feel cold; or a gathering of friends to warm your heart. It was a great All Arizona Star Party, and I am grateful to the support of many people for that; especially to David Hatch and Randy Peterson. Randy's restaurant training was put to good use at the pasta pot; and Dave's big truck was a great help in getting things moved to and from. We also appreciate Ray Farnsworth's hospitality in letting us kick up dust down the road.

Unfortunately I have noticed over the years that the sky glow seems to keep growing in all directions at Farnsworth ranch. To that end Martin and a few volunteers opened the observatory on a Thursday night for the Gilbert environmental committee. It gave us a chance to pitch the benefits of less light pollution to council member Les Presmyk and other committee members. Clear skies are an added benefit to reducing infrastructure and energy costs, and creating less environmental impact. If the current economic concerns have any silver lining, it may be that people will take this opportunity to turn off a few unneeded lights. One can only hope.

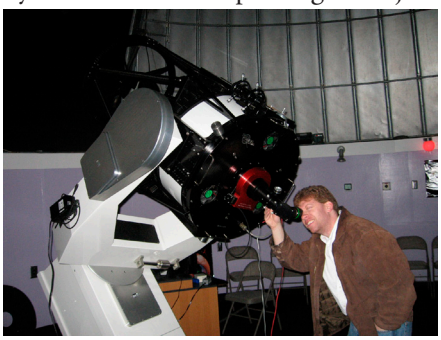
Officer elections are upon us. The current slate is listed below. Thanks to those who have stepped forward to continue the leadership of a great club dedicated to sharing the joys of the heavens with their fellow mortals. There is still an open spot for Secretary, and additional nominations will be accepted from the floor.

2009 Officers

David Douglas – President
Wayne Thomas – Vice President
Open – Secretary
Ray Heinle - Treasurer
Tom Polakis – Board
Howard Israel – Board
Claude Haynes – Board
Joan Thompson - Board
Bill Houston - Board

The Backyard Astronomer
Observing on Mount Lemmon *by Bill Dellinges*

Adam Block, formerly associated with Kitt Peak's public stargazing programs, has recently introduced a similar program with Steward Observatory at Mt. Lemmon in the Catalina Mountains overlooking Tucson, Arizona. On October 23rd of this year my wife Lora and I attended a session. Allow about one hour for the 27 mile scenic drive from town to the summit. The most tedious part of the journey was navigating our way across the entire city of Tucson to get to the Catalina Highway on the eastern end of the range (remember, no freeways in Tucson).



Adam Block at the eyepiece of the 24" RCOS

The price is $48 per person. We arrived at the requested time of 4:20 p.m. at the parking lot adjacent to the observatory site at an elevation of 9,157 feet. The session began before dark with Adam giving a Power Point introduction about the facility's history. A light snack of sandwiches, chips, fruit, and cookies was served. Before heading to the observatory, we stopped off at an old abandoned U.S. Air Force radar tower that operated from 1956 to 1970 to warn us of approaching Rus-

Continued on page 2

Upcoming Events:

Adopt-a-Highway - November 1
Cambridge Academy Star Party - November 5
MCC Planetarium Gala - November 7
Public Star Party - November 14
General Meeting - November 21
Local Star Party - November 22
Deep Sky Star Party - November 29

The Backyard Astronomer

Continued from page 1

sian bombers (ah, the good old days, eh?). We viewed sunset from atop the tower as we watched for the green flash and did indeed see something green as Sol plunged below the western horizon. With the naked eye, I was able to just make out Kitt Peak, the MMT (Mt. Hopkins), and Mt. Graham observatories, the latter 70 miles away.

Lora and Bill on the old radar tower with domes behind in the background.

One of the five domes here was revamped to accept the new 24" RC Optical Systems Ritchey-Chretien telescope (F-7.8, FL 4755mm) for this public program. It's a loaner telescope which will be replaced in 18 months with a 32" RCOS telescope. The same company provided the massive fork mount. This is a setup for which any amateur astronomer would sell his soul to the devil. It is one beautiful looking instrument. We began the night by viewing Venus and Jupiter. Venus showed a distinct gibbous phase even though viewed through a tree. Jupiter was huge displaying many belts and a moon shadow transit. The planet's image was a tad soft, perhaps due to seeing or the telescope and building not having enough time to cool off. Next up was the double star Albireo. We then took what was to be a couple of outdoor looks at the night sky with 7x50 binoculars and a planisphere we where loaned. Adam pointed out numerous constellations and objects which could be spotted with binoculars like M7, 8, 11, 31 and the Double Cluster. There is a bit of light pollution in the southwest from Tucson, but it was only noticeable outside the dome if you looked in that direction.

It should be mentioned that this program is aimed at those with no prior knowledge of astronomy. More experienced stargazers may find this part of the session and the explanations of the nature of telescopic objects viewed somewhat below their skill level. Nevertheless, that doesn't take anything away from viewing a dark night sky or the spectacular objects in the eyepiece. We then went on to observe M11 (Flying Duck cluster), M13 (Hercules Globular), M17 (Swan Nebula), M57 (Ring Nebula), M31 (Andromeda Galaxy), NGC 253 (Sculptor galaxy), 891 (Andromeda edge-on galaxy), 6826 (Blinking Planetary), and 6992 (Veil Nebula). What impressed me most was M17. The swan shape filled the field with more gas going everywhere than I have ever seen before. M13 was close to looking like a photograph with its myriad stars sparkling at me. M57 was large and bright; no need to use averted vision on that image (no sign of the central star). The program wrapped up about 8:30 p.m.

We lucked out on our night there. It was clear, no wind, not nearly as cold as we expected, and only five of us participants rather than the twenty allowed for each session. So we had plenty of time at the eyepiece and elbow room – it's a 30 foot dome. It was strange to see and hear an adjacent dome moving about, remotely controlled form Korea!

I recommend this observing program mainly for beginners. But more advanced observers also might enjoy looking through a 24" telescope at 9,000 feet at some of their favorite deep sky objects. Adam is a most knowledgeable, affable person who has a gift for explaining astronomical concepts in a clear manner with his remarkably mellifluous voice. You may know he is an expert astrophotographer noted for his fine work at Kitt Peak's public programs in past years. As we left, he was installing on the telescope a CCD camera which he said cost as much as a small car! One can partake in an all night session of viewing or imaging by special arrangement.

For more info: http://uanews.org/node/19692 or http://skycenter.arizona.edu/ or (520) 626-8122.

Is this the year you decide to run for an officer's position at EVAC?

Focusing Masks
by Floyd Blue

One of the most perplexing tasks for the astrophotographer is getting a sharp focus. I know that this can be even more challenging than setting up the scope, camera and mount. Even harder than programming the imaging software to take the exposures!

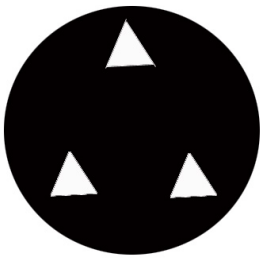
You can spend all evening taking exposures, but if they are not perfectly focused the images are just not what you wanted. So I feel that focusing is perhaps the most important time you'll spend as far as imaging is concerned.

We have all tried many different techniques to get the job done, and many methods promise success, but so often they lead to frustration in the end. So, an easy way to achieve sharp focus was very important to me.

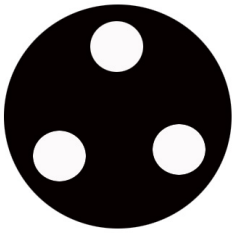
So, I decided to give focusing aids a try, mainly masks of different designs and types. There are many to choose from; and since I didn't have unlimited time and materials, it was not easy to make a choice to make. But I wanted something that would be easy to produce and would last as well as look good. I am a bit vain as far as my equipment is concerned, so looks are an issue to me.

I make hand-made accessories for scopes as a sideline, so I already had certain materials here to use. I figured I might as well take advantage of them. For the first of masks I made I used a sheet of .032" thickness ABS plastic. This material worked fine, but was time consuming to cut.. However, it did allow me to cut the different types of holes in the mask and at the proper spacing for the scopes I use. I glued the faceplate to a ring of ABS with hot glue, to make it simple and fast to build a prototype.

The very first mask was a three-triangle style of mask, with the triangles spaced at 120° around the circle of ABS. I used a template from a program on-line to produce it and this helped a great deal. The triangles were at odd angles to each other as per the computer-generated template, which was suppose to make the plate, which was spikes line up better and with greater contrast. This mask worked well, but the number of spikes it created actually made it harder to figure out just when they were at their sharpest. Though I could readily see the spikes and they came into fine focus easily, I could not really decide when it was at best focus. In fact, several people would come to separate conclusions on this when asked to look at it themselves. There were too many spikes; and also, it seemed that the triangles need to be cut perfectly to make them symmetric.



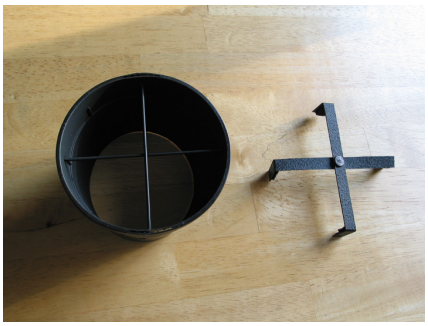
The second type of mask I tried was a typical Hartman Mask with three round holes instead of triangles. These holes were positioned at 120° around the rim of the container. These are available in commercial models for many scopes and were stated to be fast and easy by the manufacturer. So I made the mask with the same template generator, which also gave circles with the triangles in the printed template. Again, this made the holes easier to lay them out properly, and then I had only to cut them with a hole saw. I finished the mask and waited for a good night to give it a try. The first night out I put on the mask and began to focus. The three circles merge when the focus is close, but again it was difficult to judge when the circles were perfectly merged. The atmosphere, my eyes crossing and the sensitivity of the focuser made it very difficult to me. I gave it several tries and let others give it a shot, but in the end it was no easier than the three-triangle mask had been. You could merge the circles, but were the edges of the circles perfectly sharp?



I realized that this would be a bit more difficult than I first thought! So I did some more research on masks and designs before making number three.

I read about a simple cross, made with 1" strips of material. This again sounded easy and simple to make, so I decided to give it a try as number three. Off to the shop I went.

Instead of making a mask, I decided to just make a simple cross of ABS out of 1" strips and bend the ends so that the four ends slipped over the end of the dew shield and held it there. A rivet in the center of the cross was all that was needed to hold the two strips together and it allowed it to be closed like scissors when not in use. It's a nice design and its small size makes it easy to store and transport. I placed the cross on the dew shield and it held securely so I slewed to a bright star for a go at focusing. This configuration did give a quick and easy focus, but once again I was finding it difficult to determine exactly when the double set of spikes merged and were at best focus. Again I had others try but they had the same problem as I. I took a photo with it at what appeared to be best focus, but the stars were not sharp. Another round of failure! This was fast becoming a big production and using up a lot of my time. I started wondering if a mask could actually serve the purpose or not. But I was not going to be beaten by this and dove headlong into the next design. I knew there had to be one that would meet my expectations, but I was beginning to realize that it was going to take a few prototypes to get it right.



This time I used a Cottage Cheese container that would slip inside the refractor's dew shield. I cut the bottom out of it, sanded it smooth, and laid out a series of 4 holes close to the lip of the container. The holes were small spaced at 90° around the circumference. Through these holes I threaded a length of small wire, about the size of a piece of spaghetti. This formed a cross that would serve as the next focus aid, a simple but elegant design. As I had seen something similar before, I can't claim

Continued on page 4

Focusing Masks

Continued from page 3

it as my original idea. On my next trip to the site, and after aligning the scope I slewed to a bright star and started another round of focus mania! Amazingly, this mask seemed to work fairly well. I was able to see the spikes nicely and they seemed sharp too! I did my best to get a perfect focus and took another exposure to try it out. After about 5 minutes I had an exposure and carefully studied it. The stars were close to focus but not quite right. I tried it again; this time eyeing the spikes to the point of my eyes straining. But, after the exposure was finished, the stars were still not quite sharp, but still a bit better than the other mask. So I figured I was on the right track, but what to do?

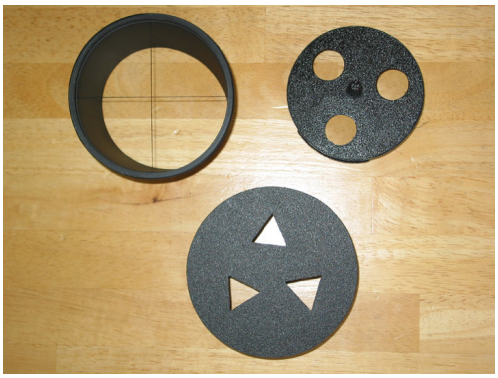
I spent a few days thinking about the results and how the spikes looked and what might make it easier to read the spikes.

Many thoughts went through my mind and I began to think that it was the fact that the wires, though as tight as I could make them with the thin container, were not perfectly straight and had curves and small kinks in them. So I thought about what I could do to make this problem go away. Perhaps it was my choice of materials?

Once again I took another Cottage Cheese container, and made a fourth mask with a similar design. This time I chose a coat hangar to make the crossed wire, because the wire was solid and straight. I cut the container and made the four holes again, this time inserting two lengths of coat hangar wire though them and bent the ends so they would stay in place. I painted it all in flat black to eliminate any reflections. Ah, this one looked promising, nice and light, strong wires and no reflection! Another trip out to the site and setup went smoothly. Again I slewed to a bright star and began to focus. This time it was a little different! There were the spikes as usual, but when I got very close to focus, a new set of spikes, bright ones, that were sort of diamond shaped appeared on each spike, just past the crossed hair area. As I worked on the focus, these extra spikes became brighter and sharper until I moved too far and then they dimmed and got less defined. Ah, this seems like a break though, some thing that is easy to see as well as sensitive to focus. So I worked on getting these secondary spikes to their brightest and sharpest focus and set up for a test shot. Anxiously I awaited the results; figuring I was getting close on this. After a long five minutes there appeared a picture, with stars that were quite close to perfect focus too! "Yes," I thought, "this might be the one.". I did a few pictures that night using this mask and got good results. But after post processing I still thought there was room for improvement.

Once again I studied the results and thought about how the spikes looked on both sides of focus. I thought that maybe the spikes were still a little too thick. Thus, they wouldn't form a fine enough line to be certain that they were at best focus. So it was back to the bench to try again.

This fifth mask was to be made a little more robust and I wanted it to look professional. So I took a look around for something besides the thin Cottage Cheese container. I found a small plastic pot for indoor plants that seemed just right. Not too thick but not too thin either. I did not want to make it too heavy and cause



a balance issue. This seemed the perfect solution so I used it. Again, I cut the bottom off and sanded the open end to make it smooth and free of any sharp edges or burrs. I made the four holes up near the lip and decided to use a heavy sewing thread for the cross hairs this time. It is the type of thread used for commercial sewing machines doing upholstery, so it was thicker than normal thread but still not too thick. It was strong enough that I was able to stretch it tightly after threading it through the holes. I then tied it securely. The pot - being sturdier than the cottage cheese containers - held the stretched thread with ease. Again, I painted it inside and out with flat black paint, making sure to soak the thread completely with paint to stiffen it. Now this looked great and it was quite strong too. All that was left was to give it a try.

That weekend the weather was good and skies were promising. So off to the site I went with great hopes. I took along all the focus masks just in case I wanted to give anyone of them another try. When it was nice and dark I again set up the focusing test and began. Right off I noticed how well the spikes formed perfect, thin and long spikes with excellent form and sharpness. So I played around for a bit going in and out of focus to see how quickly and easily I could duplicate the resulting fine spikes. It was easy and everyone agreed when they looked their best and sharpest. They also were the brightest when you achieved the finest focus, so that the brightness was a second indicator as well as the spike itself. We also noticed that the stars themselves were brighter with the thin threads than with the thicker wires and that they too showed a rapid change in brightness as you went past focus. This seemed very good indeed.

Now it was time for the acid test, the five-minute exposure! So I set up the software and started the exposure. We nervously awaited the outcome, spending the time discussing what we had seen. Then there it was, an exposure with sharp stars, lots of tiny points all over the field! Yes, this was a grand success.

I decided to again take a series of shots of different objects to see how the mask performed. Each was an improvement over all the previously used masks. It seemed easy enough to achieve the same results in each frame. "Almost perfect" I thought. But I still wondered if I could improve on the focus. I was pretty sure that the mask was doing all that could be expected from a mask.

So I thought, what about focusing with the mask and then zooming in on a few tiny stars and working with them. So that is what I did, first obtaining the best possible spikes and then choosing a set of almost invisible stars in the field. I zoomed in on them with the software and began to make the absolute smallest changes in the focus that I could. First one direction and then the other until something else happened! Suddenly a couple

Continued on page 13

November Guest Speaker: Patrick Burkhart

Patrick J. Burkhart is the founder and president of the Arizona Arts, Sciences and Technology Academy, a nonprofit think tank composed of the state's leading scientists and scholars. He also serves as assistant director for the Department of Human Services for Maricopa County.

Patrick J. Burkhart previously served as the Executive Director for Strategic Initiatives at Arizona State University creating a series of research initiatives that captured large federal awards from such agencies as The National Science Foundation, the Department of Energy, EPA, the U.S. Bureau of Reclamation, DARPA and NASA.

Mr. Burkhart also served as Vice President of the ASU Foundation where he oversaw the successful conclusion of ASU's first capital campaign ($125 million) and directed the planning for a second campaign ($500 million).

Mr. Burkhart joined ASU in 1983 as the first Development Office for the College of Engineering and Applied Sciences. In this role he directed all fundraising efforts for the ASU Engineering Excellence Program as well as coordinated the efforts of the Engineering Advisory Council in securing additional annual funding increases from the Arizona State Legislature.

Mr. Burkhart has held numerous leadership positions on nonprofit boards in both Arizona and Ohio, which led him to provide related consulting services for several years as well as to publish a primer for nonprofit strategic planning.

Prior to joining ASU, Mr. Burkhart launched his development career at The Toledo Hospital, where his reputation for securing regulatory approvals for ambitious capital expansion plans led him to the broader field of grantsmanship and development.

Born in Toledo, Ohio in 1954, Mr. Burkhart earned his B.S. and M.B.A. degrees from the University of Toledo. Mr. Burkhart is married with three children.

Mr. Burkhart will present the topic of dark skies, from the economic impact perspective.

AASTA President Patrick Burkhart and Governor Janet Napolitano discuss AASTA's recent report.

First Quarter Moon on November 5 at 21:04

Full Moon on November 12 at 23:18

Last Quarter Moon on November 19 at 14:31

New Moon on November 27 at 09:56

In accordance with the club's constitution and bylaws, nominations for Officer or Board positions were opened at the October general meeting and publicized prior to the November general meeting. Nominations will be closed at the start of the November general meeting. Officers shall be elected by a simple majority of the General Assembly present at the November general meeting. Is this the year you get involved? The future of EVAC depends on you. Contact a current officer for more information.

Orion 8" F10 SCT & SkyView Pro Equatorial Mount

Standards include: XLT coatings, 24mm Plossl and manual for mount.
Extras include: Pro GoTo Upgrade Kit, v 3.20, firmware upgraded, cable and documentation manual for GoTo upgrade kit, polar axis finder and 12v battery. List price $1999.00

This equipment is 18 months old. Used sparingly because 14.5" Dob gets preference. Reason for sale is to finance an upgrade.

Sale price $1600.00

If you are interested in seeing this telescope contact AJ Crayon at 602-938-3277 or e-mail at acrayon@cox.net

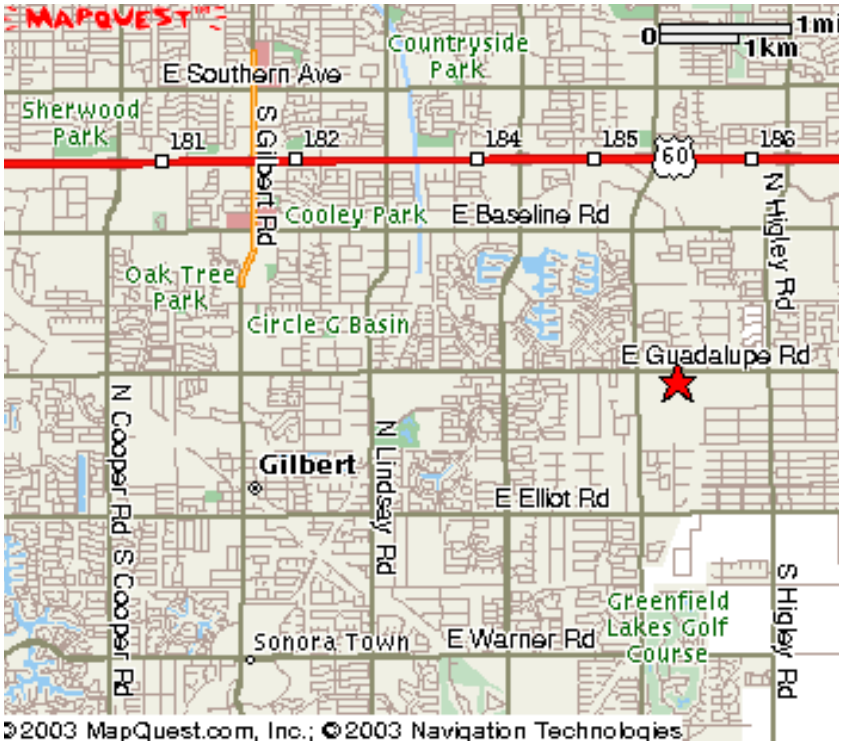
Also, if you are thinking of a telescope for Christmas this is an ideal time to start looking and this is an ideal telescope to give.

TeleVue Panoramic Alt-Az Mount

TelePod head is mated with a Panoramic tripod with Ash legs and central tray. This sells new for about $600. I'll sell this one for $235. Also have a Stellarvue 2" enhanced diagonal (with 1¼" adapter) for $100.

Peter Argenziano
news@evaconline.org

www.eastvalleyastronomy.org/grco/obs.asp

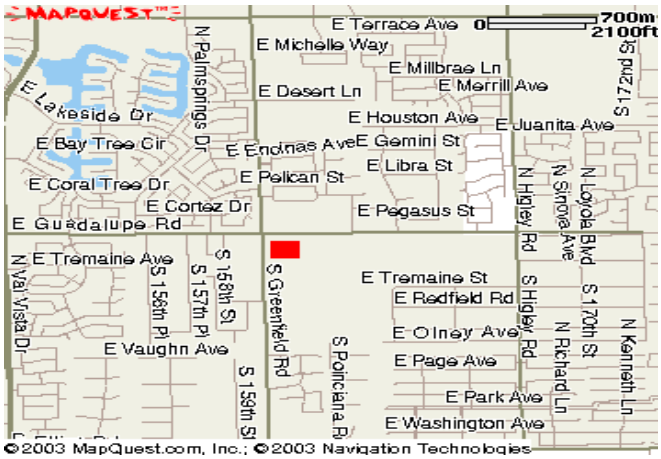


The monthly general meeting is your chance to find out what other club members are up to, learn about upcoming club events and listen to presentations by professional and well-known amateur astronomers.

Our meetings are held on the third Friday of each month at the Southeast Regional Library in Gilbert. The library is located at 775 N. Greenfield Road; on the southeast corner of Greenfield and Guadalupe Roads.

Meetings begin at 7:30 pm.

Visitors are always welcome!



Upcoming Meetings

November 21

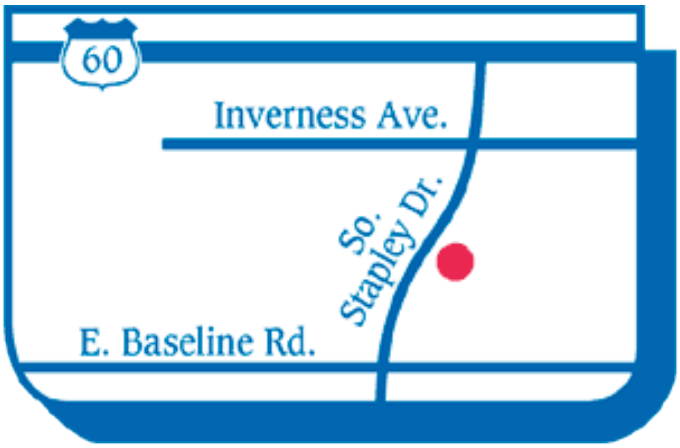
Holiday Party TBD

January 16

February 20

March 20

April 17



Southeast Regional Library
775 N. Greenfield Road
Gilbert, Az. 85234

All are welcome to attend the pre-meeting dinner at 5:30 pm. We meet at Old Country Buffet, located at 1855 S. Stapley Drive in Mesa. The restaurant is in the plaza on the northeast corner of Stapley and Baseline Roads, just south of US60.

Old Country Buffet
1855 S. Stapley Drive
Mesa, Az. 85204

Likewise, all are invited to meet for coffee and more astro talk after the meeting at Denny's on Cooper (Stapley), between Baseline and Guadalupe Roads.

Denny's
1368 N. Cooper
Gilbert, Az. 85233

November 2008

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

November 1 - Adopt-a-Highway

November 5 - Cambridge Academy Star Party

November 7 - MCC Planetarium Gala

November 14 - Public Star Party at Riparian Preserve in Gilbert

November 21 - General Meeting at Southeast Regional Library in Gilbert

November 22 - Local Star Party at Boyce Thompson Arboretum

November 29 - Deep Sky Star Party at Vekol

IC 1805 - The Heart Nebula in Cassiopeia

Image printed courtesy of Jon Christensen
Photographed in September 2008 at Vekol Road site using a Takahashi Epsilon 210 Astrograph equipped with a SBIG STL11000M Camera.
Luminance: 195 Minutes Color: R 30, G 30, B45

East Valley Astronomy Club -- 2009 Membership Form

Please complete this form and return it to the club Treasurer at the next meeting or mail it to EVAC, PO Box 2202, Mesa, Az, 85214-2202. Please include a check or money order made payable to EVAC for the appropriate amount.

IMPORTANT: All memberships expire on December 31 of each year.

Select one of the following:

☐ New Member ☐ Renewal ☐ Change of Address

New Member Dues (dues are prorated, select according to the month you are joining the club):

☐ **$30.00 Individual** January through March

☐ **$35.00 Family** January through March

☐ **$15.00 Individual** July through September

☐ **$17.50 Family** July through September

☐ **$22.50 Individual** April through June

☐ **$26.25 Family** April through June

☐ **$37.50 Individual** October through December

☐ **$43.75 Family** October through December

Includes dues for the following year

Renewal (current members only):

☐ **$30.00 Individual** ☐ **$35.00 Family**

Magazine Subscriptions (include renewal notices):

☐ **$34.00** Astronomy ☐ **$33.00** Sky & Telescope

Name Badges:

☐ **$10.00** Each (including postage) Quantity: _____

Name to imprint: _____

Total amount enclosed: _____

Please make check or money order payable to EVAC

☐ Payment was remitted separately using PayPal ☐ Payment was remitted separately using my financial institution's online bill payment feature

Name: _____ Phone: _____

Address: _____ Email: _____

☐ Publish email address on website

City, State, Zip: _____ URL: _____

How would you like to receive your monthly newsletter? (choose one option):

☐ Electronic delivery (PDF) *Included with membership* ☐ US Mail **Please add $10 to the total payment**

Areas of Interest (check all that apply):

☐ General Observing ☐ Cosmology

☐ Lunar Observing ☐ Telescope Making

☐ Planetary Observing ☐ Astrophotography

☐ Deep Sky Observing ☐ Other

Please describe your astronomy equipment:

Would you be interested in attending a beginner's workshop? ☐ Yes ☐ No

How did you discover East Valley Astronomy Club? _____

PO Box 2202
Mesa, AZ 85214-2202
www.eastvalleyastronomy.org

All members are required to have a liability release form (waiver) on file. Please complete one and forward to the Treasurer with your membership application or renewal.

Liability Release Form

In consideration of attending any publicized Star Party hosted by the East Valley Astronomy Club (hereinafter referred to as "EVAC") I hereby affirm that I and my family agree to hold EVAC harmless from any claims, liabilities, losses, demands, causes of action, suits and expenses (including attorney fees), which may directly or indirectly be connected to EVAC and/or my presence on the premises of any EVAC Star Party and related areas.

I further agree to indemnify any party indicated above should such party suffer any claims, liabilities, losses, demands, causes of action, suits and expenses (including attorney fees), caused directly or indirectly by my negligent or intentional acts, or failure to act, or if such acts or failures to act are directly or indirectly caused by any person in my family or associates while participating in an EVAC Star Party.

My signature upon this form also indicates agreement and acceptance on behalf of all minor children (under 18 years of age) under my care in attendance.

EVAC only recognizes those who are members or invitees and who also have a signed Liability Release Form on file as participants at an EVAC Star Party.

Please print name here ***Date***

Please sign name here

PO Box 2202
Mesa, AZ 85214-2202
www.eastvalleyastronomy.org

NASA's Space Place

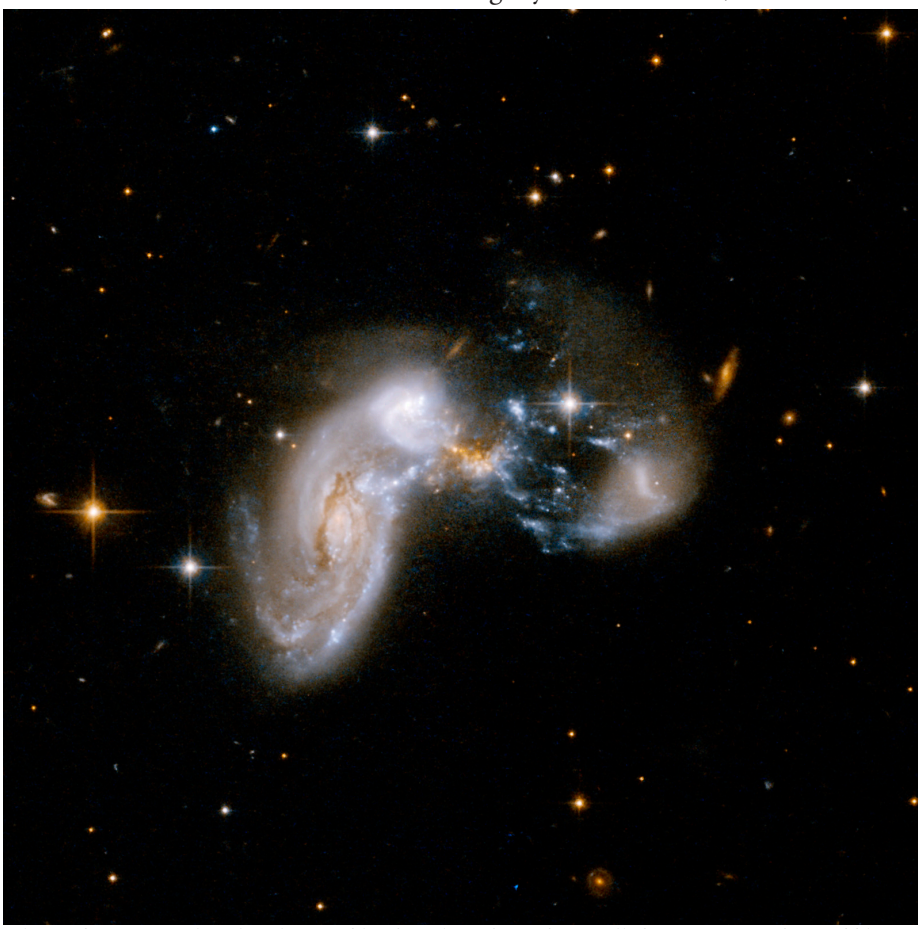
Extreme Starburst

by Dr. Tony Phillips

A star is born. A star is born. A star is born.

Repeat that phrase 4000 times and you start to get an idea what life is like in distant galaxy J100054+023436.

AstronomersusingNASA's Spitzer Space Telescope and ground-based observatories have found that the galaxy gives birth to as many as 4000 stars a year. For comparison, in the same period of time the Milky Way produces only about 10. This makes J100054+023436 an extreme starburst galaxy.



The "Baby Boom" galaxy loosely resembles the galaxy shown here, called Zw II 96, in this Hubble Space Telescope image. This galaxy is only 500 million light-years away, while the Baby Boom galaxy is 12.3 billion light-years away.

"We call it the 'Baby Boom galaxy," says Peter Capak of NASA's Spitzer Science Center at the California Institute of Technology in Pasadena, CA. "It is undergoing a major baby boom, producing most of its stars all at once. If our human population was produced in a similar boom, then almost all people alive today would be the same age."

Capak is lead author of a paper entitled "Spectroscopic Confirmation of an Extreme Starburst at Redshift 4.547" detailing the discovery in the July 10th issue of Astrophysical Journal Letters.

The galaxy appears to be a merger, a "train wreck" of two or more galaxies crashing together. The crash is what produces the baby boom. Clouds of interstellar gas within the two galaxies press against one another and collapse to form stars, dozens to hundreds at a time.

This isn't the first time astronomers have witnessed a galaxy producing so many stars. "There are some other extreme starburst galaxies in the local universe," says Capek. But the Baby Boom galaxy is special because it is not local. It lies about 12.3 billion light years from Earth, which means we are seeing it as it was 12.3 billion years ago. The universe itself is no older than 14 billion years, so this galaxy is just a youngster (Capak likens it to a 6-year-old human) previously thought to be incapable of such rapid-fire star production.

The Baby Boom galaxy poses a challenge to the Hierarchical Model of galaxy evolution favored by many astronomers. According to the Hierarchical Model, galaxies grow by merging; Add two small galaxies together, and you get a bigger galaxy. In the early years of the universe, all galaxies were small, and they produced correspondingly small bursts of star formation when they merged. "Yet in J100054+023436, we see an extreme starburst. The merging galaxies must be pretty large."

Capak and colleagues are busy looking for more Baby Boomers "to see if this is a one-off case or a common occurrence." The theory of evolution of galaxies hangs in the balance.

Meanwhile… A star is born. A star is born. A star is born.

If It's Clear...
by Fulton Wright, Jr.
Prescott Astronomy Club

November 2008

Shamelessly stolen information from Sky & Telescope magazine, Astronomy magazine, and anywhere else I can find info. When gauging distances, remember that the Moon is 1/2 a degree or 30 arc minutes in diameter. All times are Mountain Standard Time.

This month is a good time to find Vesta, the brightest of the asteroids (mag 6.4). It is at opposition on October 29 and should be visible all November in binoculars. See Astronomy magazine, October 2008, p. 63 or Sky & Telescope, November 2008, p. 67 for a finder chart.

If you are out late in the evening observing any time in November (November 5, before dawn is the center of the broad peak of activity), you might catch a slow moving Taurid meteor. There aren't a lot of them (maybe 4 an hour) but they are often bright.

On Tuesday, November 4, at 5:00 AM, you might be able to see Rhea (mag 10) emerge from behind Saturn (mag 1), just south of the nearly edge on rings, on the celestial east side of the planet. With a large (12 inch) telescope look 30 degrees above the east horizon for Saturn. Use high power after you find the planet. It will take about 3 minutes for the satellite to emerge. At 5:18 AM Dione (mag 10.5) moves from in front of Saturn, just north of the rings, on the celestial west side of the planet. Because of the big difference in brightness between the planet and its moons, these events may not be observable.

On Tuesday, November 4, in the early evening, you can observe some events with Jupiter's moons. (These should be much easier to see than this morning's events with Saturn.) We are getting down to your last chance to catch Jupiter events for a few months because the planet is getting close to the sun and isn't visible for long each night. Here is the schedule:

5:33 PM Sun sets, Europa is in front of Jupiter
7:18 PM Europa's shadow falls on Jupiter
7:39 PM Callisto goes behind Jupiter
7:43 PM Europa moves from in front of Jupiter
9:40 PM Jupiter sets with Europa's shadow still on it.

On Wednesday, November 5, at 9:58 PM, you can see the Moon occult Theta Capricorni (mag 4). The star reappears near the southern end of the terminator at 10:18 PM. These times will vary a bit depending on your location around Prescott. The Moon, which is at first quarter phase, sets at 11:51 PM.

On Wednesday, November 12, at 4:49 PM (37 minutes before sunset) the full Moon rises, spoiling any chance of deep sky observing for the whole night. Sky & Telescope magazine, November 2008. p. 64 has a good article on checking out the Moon at this phase. The article points out that libration tips the southern part of the Moon toward us at this time. I particularly recommend looking with a telescope for the large crater, Bailly, at the southern end of the terminator on November 10 and 11, just before the full phase.

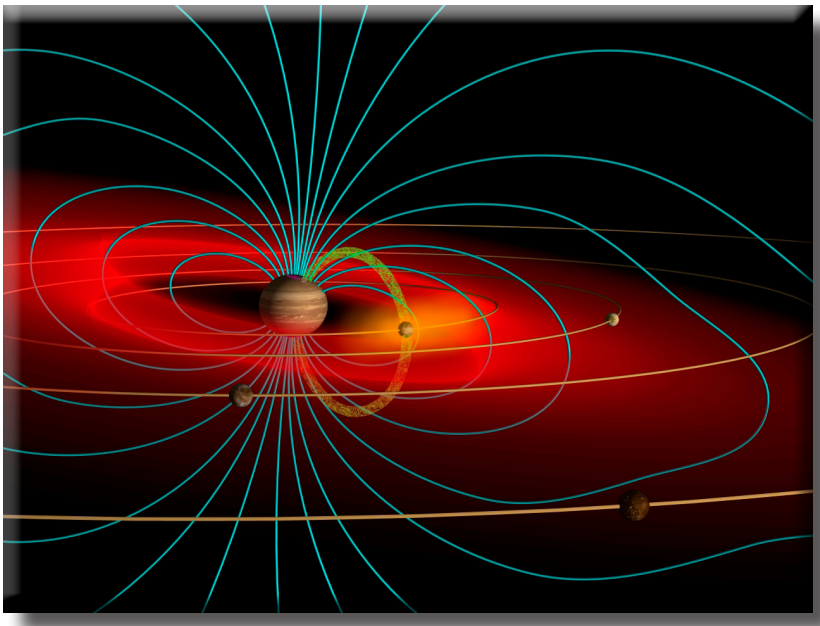
On Saturday, November 15, as soon as it's dark, you can see Io's shadow on Jupiter. At 7:08 PM Io itself moves from in front of the planet, and the shadow leaves at 8:12 PM.

On Wednesday, November 19, the Moon is at last quarter phase and doesn't rise till 12:27 AM (Nov 20). You should be able to get in lots of deep sky observing.

On Saturday, November 22, at 6:53 PM, you can see Io move in front of Jupiter. At 7:51 PM Io's shadow falls on Jupiter. The planet sets at 8:44 PM.

On Thursday, November 27, it is new Moon and you can hunt for faint fuzzies all night.

On Saturday, November 29, about 6:00 PM, you can see Venus and Jupiter pass near each other. With your unaided eye look 20 degrees above the southwest horizon. Venus is the brighter one. They are near each other for a few days. The Moon joins the pair on December 1.



Schematic of the Jovian magnetosphere showing the Io Plasma Torus (in red), the Neutral Sodium immediately surrounding Io (in yellow), the Io flux tube (in green), and magnetic field lines (in blue).

Graphic created by John Spencer. This image appeared on the cover of Mercury magazine, Nov/Dec 2000. It's a slightly updated version of the one custom-made for the fourth edition of The New Solar System, by Beatty, Peterson, and Chaikin.

Focusing Masks

Continued from page 4 of new extremely faint stars appeared in the field. The slightest movement of the focuser and they would fade away. Return the focuser to the previous position and they would reappear. Now that was a definitive result if I ever saw one! This had to be perfect focus.

I set up for another five-minute exposure and began the long wait. We talked about this new revelation and were pretty excited about it. After the long wait, the picture popped onto the monitor and there it was. A star field filled with stars of every size, down to the small points that I had been trying to achieve. Probably as good as it could ever be with the atmosphere and conditions. This was the best result I had ever gotten with the Meade DSI camera. It looked like what you expected to see, a good solid field with fine focus and nice color.

All of these masks did work, but some better than others. The size of the holes in the masks seemed to have an effect as well as their placement in the face of the mask. The string types were the easiest to make and took less time and materials too. They gave the best results for me and I tend to think that they were the most useful of the entire group. The availability of pots at the local home improvement center makes them a perfect medium for making of any one of these masks.

To summarize, it seems that the heavy thread was the best size for the mask. It gave easily recognized spikes with very sharp edges. There was also the addition of the brightness indicator, which was very helpful. The thicker wires and strips were harder to judge and they also seemed to hamper the quick change in brightness that we observed. Having the thread stretch to give a straight and fine line is also very important, as any deviation from straight seems to confuse the issue. A sturdy pot for the body of the mask was also a good idea, because it helped to keep the thread stretched taut.

However, to achieve the absolute finest focus it seems that the stars themselves give the final clue. The extinction of the dim stars when passing focus and the reappearance when reaching focus is a final step to perfect focus.

Anyone can make one of these masks with the simplest of tools and supplies. It takes maybe an hour to complete and the cost is under $1.

Floyd Blue who lives in Bakersfield,California, is a regular contributor to the Meade-DSI-Advanced Yahoo Forum, and has been involved with the hobby of astronomy for over 10 years. He is very fond of astrophotography and one of his recent images, a DSI Pro III Image Of The Horsehead and Flame Nebulae, has been selected as their 2007/2008 Image Of The Year. It can be seen on the welcoming page at http://tech.groups.yahoo.com/group/Meade-DSI-Advanced/. In February of 2008, he submitted the following article to the electronic web magazine, AstroPoint Insight. It is reprinted here with his permission.

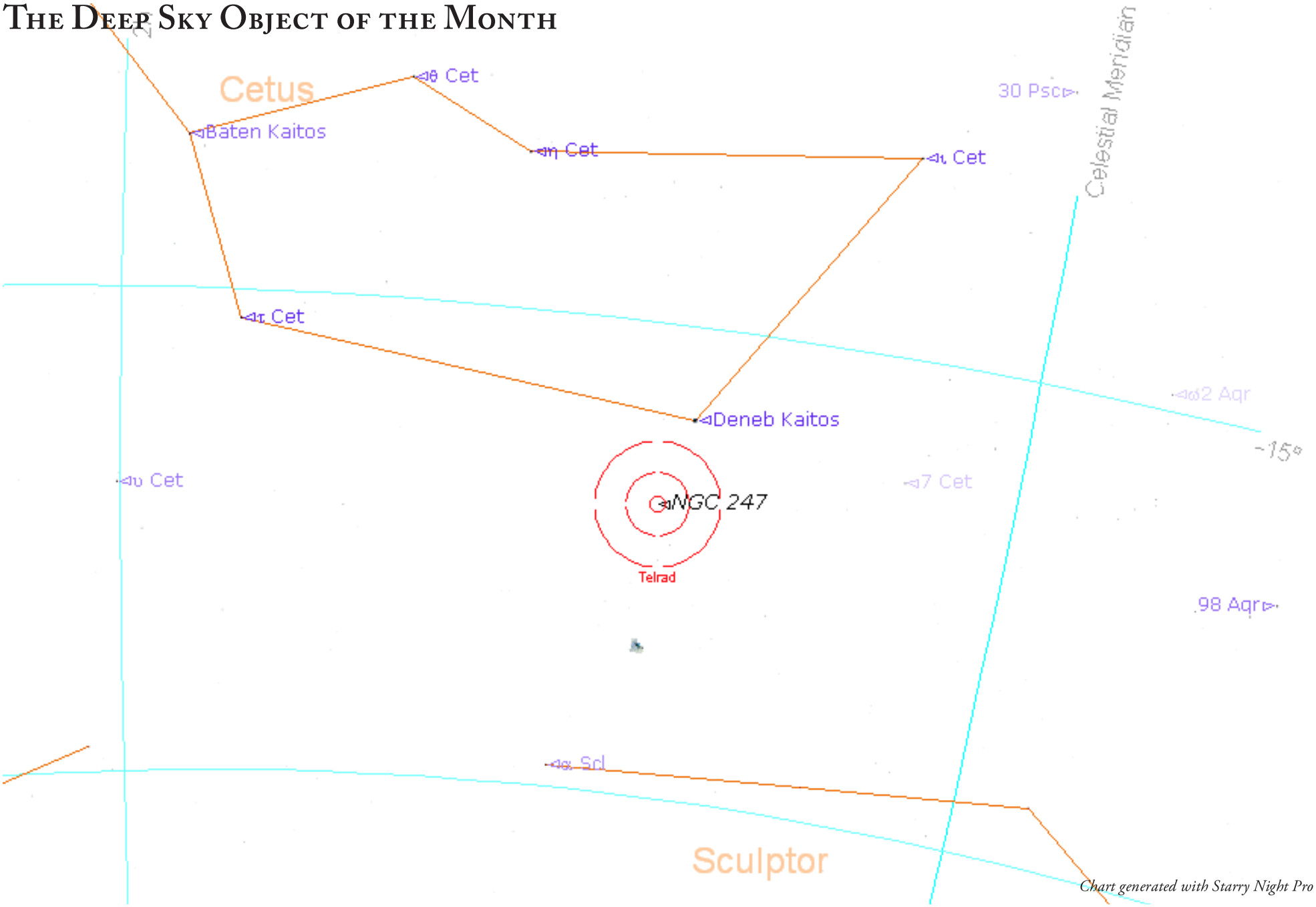


Chart generated with Starry Night Pro

NGC 247 (member of Sculptor Group) Dwarf Galaxy in Cetus

RA 00h 47m 8.7s DEC -20° 45' 38" Diameter: 21.4' x 6.0' Magnitude: 9.1

Liquid Mirror Telescopes on the Moon

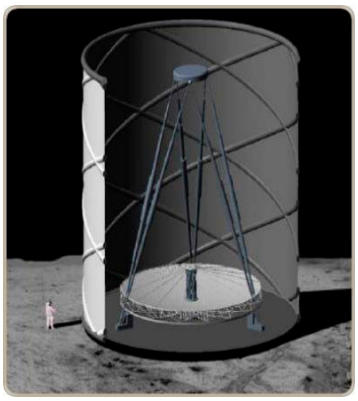
by Trudy E. Bell

A team of internationally renowned astronomers and opticians may have found a way to make "unbelievably large" telescopes on the Moon.

"It's so simple," says Ermanno F. Borra, physics professor at the Optics Laboratory of Laval University in Quebec, Canada. "Isaac Newton knew that any liquid, if put into a shallow container and set spinning, naturally assumes a parabolic shape - the same shape needed by a telescope mirror to bring starlight to a focus. This could be the key to making a giant lunar observatory."

Borra, who has been studying liquid-mirror telescopes since 1992, and Simon P. "Pete" Worden, now director of NASA Ames Research Center, are members of a team taking the idea for a spin.

On Earth, a liquid mirror can be made quite smooth and perfect if it its container is kept exactly horizontal and rests on a low-vibration low-friction air bearing that is spun by a synchronous motor having one stable speed. "It doesn't need to spin very fast," says Borra. "The rim of a 4-meter–diameter mirror - the largest I've made in my lab - travels only 3 miles per hour, about the speed of a brisk walk. In the low gravity of the Moon, it would spin even slower."

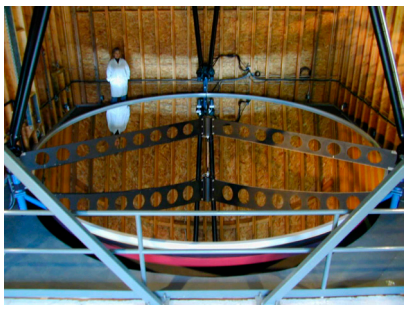


An artist's concept of a spinning liquid mirror telescope on the Moon. Credit: Univ. of British Columbia.

Most liquid-mirror telescopes on Earth have used mercury. Mercury remains molten at room temperature, and it reflects about 75 percent of incoming light, almost as good as silver. The biggest liquid-mirror telescope on Earth, the Large Zenith Telescope operated by the University of British Columbia in Canada, is 6 meters across - a diameter 20 percent larger than the famous 200-inch mirror of the Hale telescope at Palomar Observatory in California. Yet when completed in 2005, the Canadian Palomar-class liquid-mirror telescope cost less than $1 million to build - only a few percent the cost of a solid-mirror telescope of the same diameter--and, for that matter, only a sixth of Palomar's original cost in 1948.

"Our study [with Borra] started when I was still an astronomy professor at the University of Arizona before I came to NASA in 2006," Worden recalls. "The real appeal of this approach is that we could get an unbelievably large telescope on the Moon."

Mercury is unworkable on the Moon: it's very dense and thus heavy to launch, it's very expensive, and it would evaporate quickly when exposed to the lunar vacuum. In recent years, however, Borra and his colleagues have been experimenting with a class of organic compounds known as ionic liquids. "Ionic liquids are basically molten salts," Borra explains. "Their evaporation rate is almost zero, so they would not vaporize in the lunar vacuum. They can also remain liquid at very low temperatures." He and his colleagues are now seeking to synthesize ionic liquids that remain molten even at liquid-nitrogen temperatures.



The University of British Columbia's 6-meter Large Zenith Telescope uses a liquid mirror to scan the heavens.

Much less dense than mercury, ionic liquids are only slightly denser than water. Although not highly reflective themselves, a spinning mirror of an ionic liquid can be coated with an ultrathin layer of silver just as if it were a solid mirror. Weirdest of all, the silver layer is so thin - only 50 to 100 nanometers - that it actually solidifies. In the vacuum of space, a liquid mirror coated with a thin solid layer of silver would neither evaporate nor tarnish.

A liquid mirror can't be tilted away from the horizontal because the fluid would pour out, destroying the mirror. But that does not mean a liquid mirror telescope cannot be pointed. Optical designers are now experimenting with ways of electromechanically warping secondary mirrors suspended above a liquid mirror - or even slightly warping the liquid mirror itself - to aim at angles away from the vertical. Similar techniques are used to point the great Arecibo radio telescope in Puerto Rico.

Furthermore, says Borra, "if the telescope is located anywhere other than exactly at the poles, with each rotation of Earth or Moon it would scan a circular strip of sky. And the rotational axis of the Moon wobbles with a period of 18.6 years; so over a period of 18.6 years, the telescope would actually look at a good-sized region of the sky."

Locating a major liquid-mirror telescope near the lunar poles is appealing. The telescope itself could reside near the bottom of a permanently shadowed crater where it would stay at cryogenic temperatures, desirable for the best infrared astronomy. Yet solar panels could be erected on nearby permanently illuminated mountain peaks to generate power to keep the mirror spinning.

The fact that a liquid-mirror telescope always looks straight up vastly simplifies its construction and reduces mass by eliminating heavy mounts, gearing, and pointing-control systems needed for a steerable telescope. "All you'd need is the liquid-mirror container, which might be an umbrella-like device that self-deploys, plus a nearly frictionless superconducting bearing and its drive motor," Borra says. Worden estimates that all the materials for an entire lunar telescope 20 meters across would be "only a few tons, which could be boosted to the Moon in a single Ares 5 mission in the 2020s." Future telescopes might have mirrors as large as 100 meters in diameter - larger than a football field.

"A mirror that large could peer back in time to when the universe was very young, only half a billion years old, when the first generation of stars and galaxies were forming," Borra exclaimed. "Potentially more exciting is pure serendipity: new things we might discover that we just don't expect."

Says Worden: "Putting a giant telescope on the Moon has always been an idea of science fiction, but it soon could become fact."

The Observer is the official publication of the East Valley Astronomy Club. It is published monthly and made available electronically as an Adobe PDF document the first week of the month. Printed copies are available at the monthly meeting. Mailed copies are available to members for a slight surcharge to offset printing and mailing expenses.

Please send your contributions, tips, suggestions and comments to the Editor at: news@evaconline.org
Contributions may be edited. The views and opinions expressed in this newsletter do not necessarily represent those of the publisher or editor.

The East Valley Astronomy Club is a 501(c)(3) nonprofit charitable organization.

www.evaconline.org
www.eastvalleyastronomy.org

Keep Looking Up!

East Valley Astronomy Club
PO Box 2202
Mesa, Az. 85214-2202