October 2009

The Observer

East Valley Astronomy Club

Volume 23 Issue 10

From the Desk of the President
by David Douglass

It is hard to believe that its October already. There are four (4) things that I would like to mention. First, is to remind you that its time for the All Arizona Star Party (AASP). The event will be on October 16th and 17th, at Farnsworth Ranch, as usual. The location is the usual spot, south of Arizona City. For those needing directions, you can find all the details on our web site at http://www.evaconline.org/aasp.htm. I hope to see everyone there.

Second, because the AASP is falling on the third (3rd) Friday weekend, the regular club general membership meeting will be held on the fourth (4th) Friday, or October 23rd. This is also the date that the first session of the four-part lecture series by Howard Isreal will begin. That lecture on Basic Astronomy will begin at 6:10 PM, and the general membership meeting will begin at 7:30 PM, as usual.

Third, since this is October, then it is time to consider the Election of Officers for the 2010 calendar year. All positions are open to nomination. For all elected positions, there is a two year term limit. As a result, we know that we will need two (2) new Board members, a new Treasurer, and a new Vice President. I hope everyone will consider one of these positions. If you might be interested, you can discuss it with any of the existing officers or board members for details. If you want to run for office, but don't have anyone to nominate you, just hold up your hand at the meeting when I open nominations, and say you want to run. Well will find someone to nominate you right away.

And finally, the fourth (4th) item. October means that we are into the new school season, and that means that Schools are asking for outreach programs. Each month,

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Inside this Issue:

The Backyard Astronomer
Newbie Necessities *by Bill Dellinges*

I don't care for the term *Newbie*. Never liked it. To me, it has a slightly disparaging air about it. But it sure made for a great title to this article! Now that it has served its purpose, I shall refrain from its use henceforth.

I will now suggest to the new person to astronomy what basic tools you'll need to enhance your astronomical experiences with that telescope that recently came into your life. Whether it's a computerized unit or old fashioned "find it on your own" telescope, the following suggested accessories apply.

Your scope probably came with one eyepiece (EP). Three are nice to have to provide low, medium, and high power. Figure out what focal lengths you need to give you (more or less) 50x for low power, 100x for medium power, and 150x for high power. You will find that you'll use the lower powers most often. The math is easy: to determine power (magnification), divide the focal length (FL) of an EP into the focal length of your telescope – both in millimeters (mm). The scope's FL will be either on a label on the instrument or in the owner's manual. If you have one EP, see what power it gives you. If you need 2 additional EP's and are wondering what FL's you'll need, try this math trick: After determining what powers you're after, divide the desired power into the FL of your telescope and voila! There are your EP FL's!

Another nifty item to get is a Barlow lens. Most are 2x. That is, they double the power of any EP. It goes between the telescope and the EP. So what-

Continued on page 2

Upcoming Events:

Public Star Party – October 9

Local Star Party – October 10

All-AZ Star Party – October 19

Note: no Deep Sky Star Party this month

Monthly General Meeting – October 23

Note: Meeting date changed to **fourth** Friday to accommodate our annual All-Az Star Party

Check out all of the upcoming club events in the Calendars on page 8

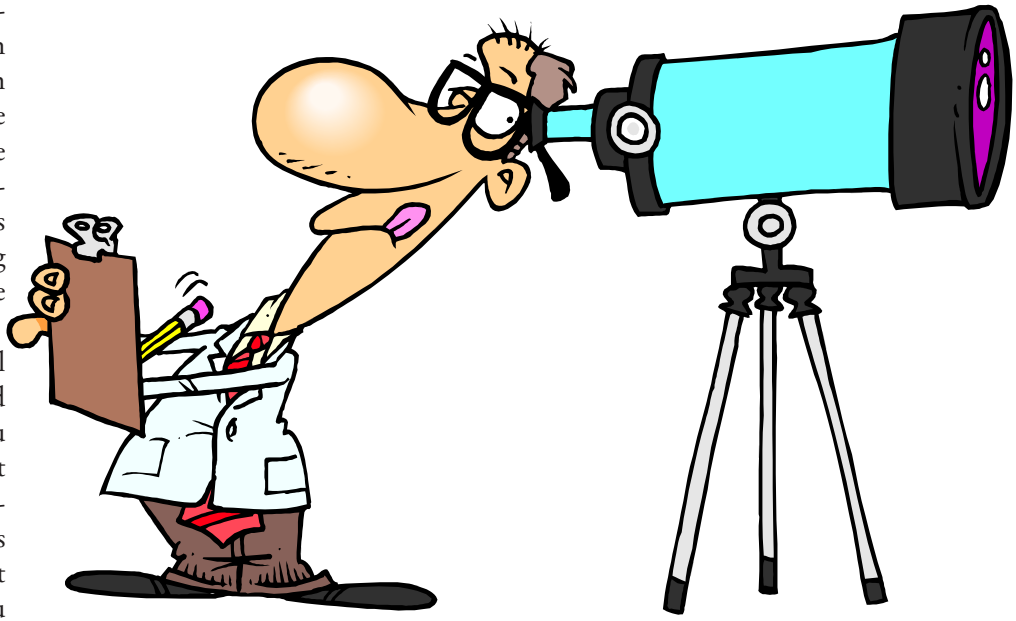
The Backyard Astronomer

Continued from page 1 ever number of EP's you have, with a Barlow, you really have twice that number insomuch as powers now available to you.

Don't forget a moon filter - if your scope is 6 inches or more in aperture, the moon can be annoyingly bright.

It's handy to have an accessory case to store all this stuff and any future accessory acquisitions – and trust me, there will be more! These cases typically come in small, medium, and large sizes. Get the large to allow for adding the inevitable crop of toys you'll buy with your blossoming interest in observing. I like the ones with pluck foam. Save those cubes you've removed as you may want to reconfigure the layout later. These items may be purchased from your local telescope shop or one of the many venders advertised in Sky and Telescope or Astronomy magazines.

Standing while observing can be tiring. Consider using a chair or stool while viewing. Choosing which to use depends on how high off the ground your eyepiece is. There are also special observing chairs available allowing the seat's height to be adjusted.



There are a few vital references you should have to help steer you through the night sky. A simple inexpensive planisphere is a very handy aid. Not only will it show you the constellations out the night you're observing, you can dial in what's out any night of the year by matching the time and date on the device.

You should have a star atlas, the next step up from the planisphere. This usually provides you with not only all the night sky's constellations in both hemispheres but also locations within those star patterns of the so-called "deep sky objects", star clusters, galaxies and nebulae that you'll be observing through the years. Some atlases only show the constellations, others also include columns of data or text pertaining to objects on that page. There are many fine atlases available. For the beginner, I recommend a simple, inexpensive atlas that shows lines connecting the stars. This latter point helps you remember the constellations and provides a reference to find things. Otherwise, it can seem as though you're just looking at a bunch of dots. Unfortunately, most popular atlases don't show the connecting lines. Shame on them. To the rescue is a fine little atlas introduced recently, Sky and Telescope's Pocket Sky Atlas by Roger Sinnott ($20). It's a scaled down version of their Sky Atlas 2000, but with the lines drawn in delineating the constellations. Discover the Stars by Richard Berry ($11) is another fine beginner's book. Though not technically a star atlas, it has rich text along with star maps to help you learn the night sky and track down those deep sky goodies.

A small astronomy handbook is a wonderful resource to take to the field. It's like a portable encyclopedia of astronomy. My favorite is Stars and Planets by Ian Ridpath and Wil Tirion ($20). This book has it all, constellations with lines drawn in and lists of interesting objects to observe therein, moon maps, and general astronomical information. What's not to like? Speaking of moon maps – get one! You'll be spending a lot of time observing the moon. Sky and Telescope offers several fine moon maps.

Buy or fabricate a red flashlight to preserve your dark adapted eyes while using your charts or references. They can be purchased from an astronomy vender. Or just buy a small flashlight and paint the lens red or cover the light end with opaque paper and rubber band.

Sooner or later you'll need to clean your optics. Do not clean your optics until you have learned something about the procedure. www.televue.com has a helpful piece on the subject under "Cleaning Eyepiece and Telescope Optics." Or ask advice from an experienced observer.

Finally, here are two additional tips for the beginning stargazer. 1) If you don't already have binoculars, get a pair. They are indispensable in helping find your way around the night sky. Make sure they're tripod adaptable. Used thusly, they're like having an extra wide field telescope handy. Try a pair of 7x50 or 10x50's for starters (~$100 - $200). 2) Burnham's Celestial Handbook (1978) is a classic three volume set of books popular with amateur astronomers ($20 for each of the 3 books from Dover Publications). I can think of no other primer as concise, informative, and useful to the budding astronomer than the first 97 pages in volume one, "Introducing the Universe" and "Fundamental Knowledge for the Observer." With that information under your belt, you'll be way ahead of the learning curve of astronomy.

There is no need to buy all this stuff at once. Use the equipment you have now to enjoy your stargazing experience. With spousal approval, you'll have the rest of your life to accessorize. You're in for a great ride. Goodnight and good luck.

Gravitational Lensing, Part Two

by Henry De Jonge IV

In this second installment we look at more ways GL, (gravitational lensing), helps us understand the universe. We will see how important GL is in searching out the web of dark matter, (DM), and the influences of dark energy, (DE).

Galaxies & Clusters

As early as 1976 a "filament like structure" was noted in observations of cluster Abell 370 but the connection to GL was not made until a decade later when new instruments could clearly show the images. It was not until the mid 1980s that GL was seriously noticed and searched for in regards to clusters. The HST has imaged some remarkably beautiful GL clusters since.

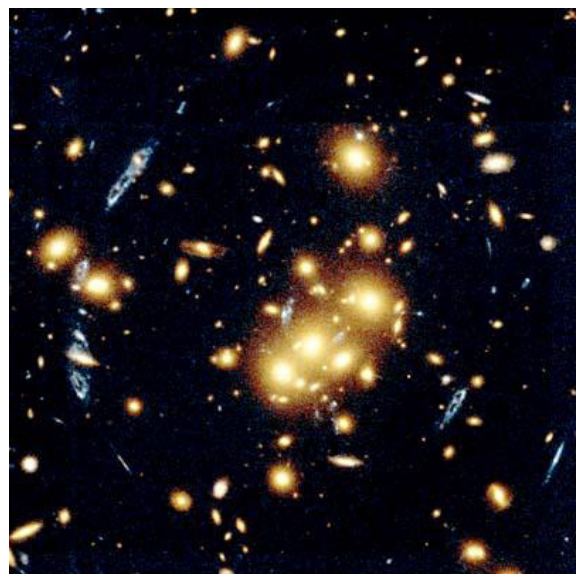
In the dominate galaxy formation theory, galaxies are assembled hierarchically from smaller units into larger units over time, through gravitational attraction. One problem with this theory is that the number of smaller satellite galaxies detected is far less than the number predicted, (missing satellite problem). One explanation is that there may be a large number of small cold dark matter sub halo structures that we are not detecting around the larger galaxies. GL offers us a potential method of detecting these cold dark matter satellite galaxies, (100,000 to 1,000,000,000 solar masses), especially in galaxies outside the Local Group. So far the number of detected DM halos is still not sufficient to satisfy the current galaxy formation models. More information and examples are needed to determine the true story.

The images of a macrolensed light source such as a quasar through a galaxy cluster are subject to different time delays which become detectable when the source exhibits intrinsic temporal variability over observable time scales such as hours or days. These time delays stem from a combination of differences in the relativistic time delays (clocks running slower in deep gravitational fields, also known as Shapiro time delays) and the differences in photon path lengths (due to geometric deflection) among the macro images. Since quasars are both non-transient and known to vary significantly in brightness on time scales of hours and upwards, they are very convenient targets for observing programs aiming to measure such time delays. At the current time, around 20 macrolensed quasars have measured time delays (with typical delays ranging from 0.1–400 days). Time delays of this type have often been used to constrain the Hubble constant, the fine structure constant, and the density profile of the macro lens (i.e. the overall gravitational potential of the lens galaxy cluster and its associated dark halo), but can also potentially be used to probe the CDM sub halos of the lens galaxy.

GL can also help in determining galaxy cluster mass distribution via both weak and strong lensing modeling, (reverse ray tracing). For example both strong and weak GL has been used to trace the mass distribution in galaxy cluster 1E0657-56 (z =.296), using the HST and color images. This GL data was also compared to the cluster x-ray gas components noted by Chandra. The combined modeling has shown that the regular matter trace does not match the DM trace and that the DM component was the dominant one. It was not determined whether or not the dominant DM density maps also correspond to any particular BHs. This would be an interesting follow up study.

It turns out that GL gives us a way to find the total mass of galaxy clusters usually better than that derived from studying their individual motions or the X-rays from the surrounding gas. Each cluster is actually many lenses and not just one big lens while the lensing reflects the matter distribution within the cluster, which is far from uniform. A cluster will lens anything that is behind it for billions of light years, and therefore lenses many things into a complex pattern, (including the CMB). Clusters do not form simple GL events like microlensing MACHOs, as they are so large and far away that the images are essentially frozen in space time. From the lensing we can weigh the cluster, determine the mass profile, look for DM and DE and view even further distant objects.

Currently the GL of clusters shows that the mass distribution is defined by a central core of dense DM which does not often follow the distribution of baryonic matter. The exact mechanism for this discrepancy is still not fully understood.



Above is an image for mapping DM. The galaxies in the center are members of cluster CL 0024+1654. The blue images are multiple images of a single distant galaxy that is not part of the cluster but is billions of light years behind it. The mass of the cluster acts as a GL to distort the original galaxy into 5 blue copies, (with one faint blue image is in the center of the yellow cluster). When the lens is modeled, (as seen in Image 2 on page 4) most of the total mass of the galaxy cluster is found to be DM, basically mountains of DM that surround the central peaks of visible matter. The imaged blue galaxy was found to be a young, active, galaxy with a lot of dust. There are a total of 118 individual galaxy lenses in the cluster and one large lens for the cluster itself to model. It took over 2 million model attempts to reconstruct this lens. The total mass of the lens is about 237 trillion solar masses.

Dark Energy

Currently astronomers in the Dark Energy Task Force are looking to understand DE by observations of the imprint it leaves on matter and DM. By determining the expansion history of the Universe and the growth of cosmic structure, as

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Gravitational Lensing

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in the web of DM, you can track the effects of DE, (if it exists). Methods for studying DE include: a) looking at distant supernovae which was first used to find DE in 1998; b) mapping the distribution of galaxies caused by the CMB ripples or baryonic acoustic oscillations in the early Universe; c) surveying the growth, size, and distribution of galaxy clusters caused by the expansion of the Universe; and d) weak GL mapping of DM on a very large scale which provides data on both structure and growth showing the influence of DE.

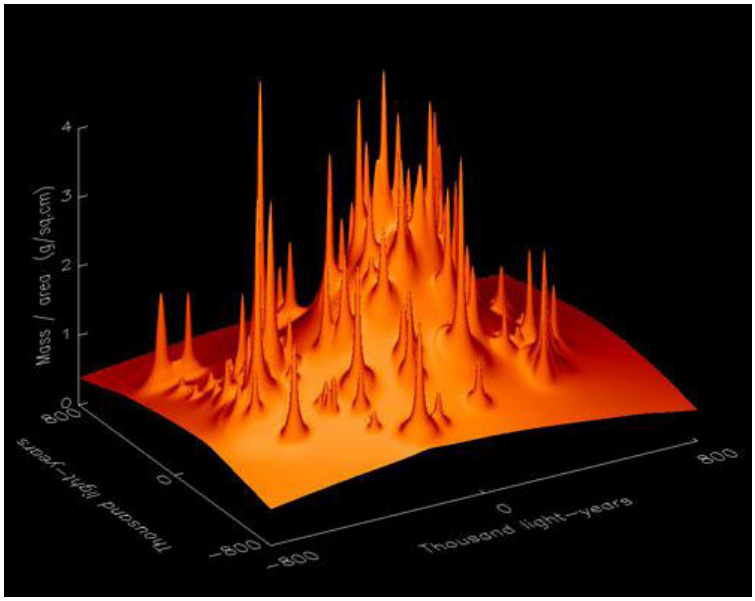
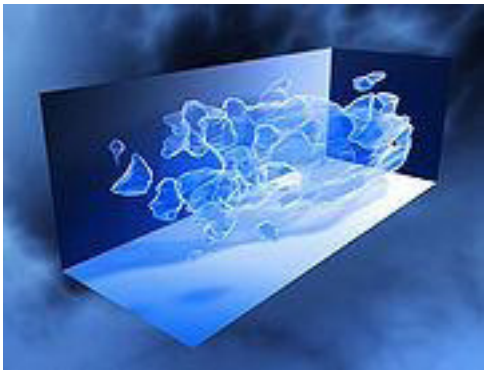


Image 2

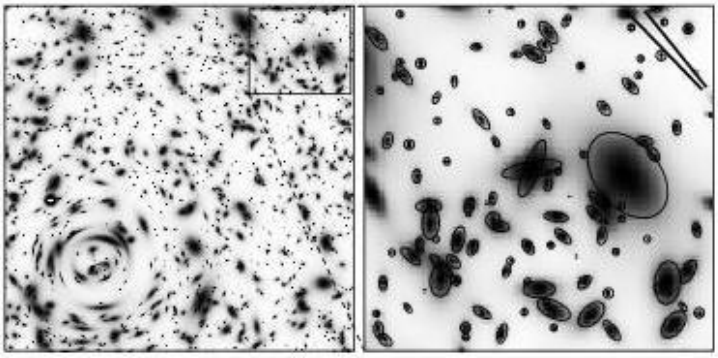
In the weak GL approach we need to have a detailed wealth of data including accurate measurements of the distance of billions of light sources and the ability to determine the morphology of distant galaxies to a great degree, (what does a "normal" galaxy look like?). Since we are seeking changes in galaxies of brightness and morphology of typically less than 1%, we need to use statistical methods for this analysis. This weak GL approach is considered one of the best for providing information on DE and DM. After all the ultimate GL is the one caused by the entire DM web in the Universe.

However this weak GL is not as easily modeled as the other examples. This GL model is 3 dimensional, (in the others the thickness of the GL mass was assumed to be very thin in comparison to the other lens parameters). Also this DM GL is spread over the entire Universe, it is not really noticed by a few points or even a relatively large area of the sky. What astronomers do is to model the weak GL of very, very, large areas of the sky and compare this to the imaged shapes of millions of galaxies that have been averaged over these large areas. The minute changes in galactic structure or position, (patterns) will give away the GL.

This project was first attempted in 2000 and data has been accumulating ever since. Astronomers view the weak GL effects for a known set of distant galaxies and then extend this view to further distant galaxies, as we know that the most pronounced effects from a GL are imposed when the mass of the GL is aligned with, and exactly half way between the source and the viewer. Thus by pushing the observations out each time they can create a 3 dimensional map of the DM web in the Universe, (sort of a CAT scan with the images being combined into a 3 dimensional image from the 2 dimensional slices). This is called lensing tomography.



An image of this tomography, over an area of roughly 9 full moons, (full moon covers about .2 square degrees) with over a half a million galaxies, out to 6.5 billion light years, produced in 2007.



An exaggerated model of the weak GL effects in large numbers of galaxies that are used to determine the locations of DM via weak GL.

Planets

In 2003 the first microlensing extra solar planet was discovered. In 2006 an extra solar planet with about 5 times the mass of the Earth was discovered via a microlensing event, it was about 3AU from its sun and was 21,000 light years away from Earth towards the center of our galaxy. At least 3 additional extra solar planets have been discovered via microlensing events, all over 9,000 light years distant. One of these planets was discovered by an amateur astronomer through a 10 inch Meade telescope in New Zealand. Thus future discoveries may await us all who view the heavens.

As soon as such a possible planetary microlensing event is detected by international teams such as OGLE they send a message to other international networks of telescopes that then look for microlensing events indicating a planet. These networks such as PLANET, (Probing Lensing Anomalies NETwork) or MicroFUN, (Microlensing Follow-UP Network) will begin taking frequent images, since the microlensing caused by a planet lasts usually only a few hours to a few days and is a one time event. When the lens is caused by both a planet and a star its gravitational geometry becomes very complicated. The light curve is very different from that of a singe stellar lens and often has sharp spikes known as caustics due to the planet which vary in

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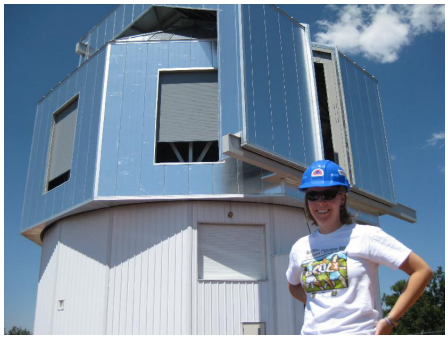
October Guest Speaker: Heather Marshall

Heather Marshall is the Mechanical Engineer for the Discovery Channel Telescope (DCT) project and is responsible for all tasks required to design, procure, and integrate major telescope and observatory components and subsystems. She is also responsible for developing design concepts, specifications, and requirements for all ancillary equipment.

Prior to the DCT project, Heather worked as a Mechanical Engineer in the aerospace packaging and precision mechanisms product lines at Harris Corporation in Palm Bay, Florida. She received her MSME from the Georgia Institute of Technology and her BSME from the Massachusetts Institute of Technology. Her academic research focused on mechanical sensing methods and instrumentation.

Ms. Marshall will provide us with an *insiders* update on the status of the Discovery Channel Telescope located near Happy Jack, Az.



Basic Astronomy Four Part Lecture Series to Begin in October

Howard Israel will be presenting a four part lecture series beginning at the October 2009 EVAC meeting. The Lecture Series will be presented in four separate (monthly) sessions, each beginning at 6:10 PM, lasting for one hour, followed by a break, and then the regular EVAC meeting will begin at 7:30 PM.

Following is a brief outline of the topics that will be covered during the lecture series:

- The terms of astronomy – words you need to know
- Star gazing basics
- Learning the sky – planets, constellations, stars, deep sky objects
- Visual observing – How to see the wonders of the heavens with your own eyes
- How to use a Planisphere
- How to read a star map
- Secrets of deep sky observing
- Where to get free astronomy software
- Choosing a pair of binoculars
- Choosing your first telescope
- Light pollution – what you can do about it

Session 1 (Oct 23rd) covers general basic astronomical terms, (ascension, declination, etc)
Session 2 (Nov 20th) covers the Solar System and how to observe planets.
Session 3 (Dec 18th) covers deep sky observing
Session 4 (Jan 15th) covers binoculars, telescopes, eyepieces, etc.

● Full Moon on October 3 at 23:10

◑ Last Quarter Moon on October 11 at 01:56

○ New Moon on October 17 at 22:33

◐ First Quarter Moon on October 25 at 17:42

18" f4.5 Obsession

18-inch aperture truss tube Dobsonian type telescope. Built in September 2004 with OMI optics. Upgrades include 96% enhanced coatings on OMI primary mirror, Argo Navis digital setting circles w/ wireless hand controller, StellarCat's ServoCat dual-axis drive system, Markless Stalk for DSC support, Powered ground board, Feathertouch dual-speed focuser, custom-fitted Obsession light shroud, Astrocrumb filter slide, mirror fan and Telrad. Obsession Serial No.: 1083. OMI Serial No.: 18-81-032803

Cost new in 2004: $9,920 (includes shipping to Arizona)
Cost new Today: $11,100 (includes shipping to Arizona)
Asking: $9,920 (includes delivery to Phoenix)

Will meet seriously interested parties at dark sky site for demo.

Bill Ferris
928-606-2447
BillFerris@aol.com

Celestron Ultima 8

Celestron 8" SCT. Heavy Duty photographer's scope with Periodic Error Correction that computer duplicates the first two minutes of hand guiding. Includes Sky Wizard computerized setting circles, tripod with bag, foam lined scope and accessories case, Celestron Ultima series eyepieces, in 4mm, 5mm, 7.5mm, 10mm, 18 mm, and 30 mm, motorized RA, Dec and Focus, manuals, star maps, books, planisphere.
$1300.

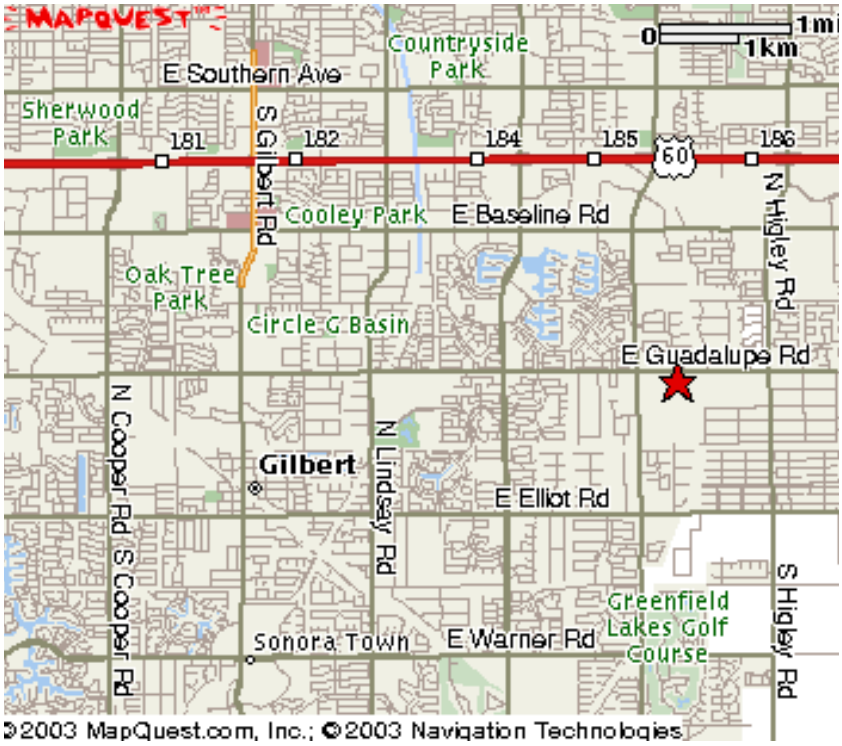
Mike Sargeant 480-839-3209

Accessories for Sale

TeleVue Visual Paracorr: $295
22 mm TeleVue Nagler T4 : $390
17 mm TeleVue Nagler T4: $330
12 mm TeleVue Nagler T4: $300
2 inch Lumicon OIII Filter: $200
2 inch Lumicon UHC Filter: $200
2 inch Lumicon H-beta Filter: $200
Catsperch Adjustable Height Observing Chair: $200

Bill Ferris
928-606-2447 BillFerris@aol.com

www.eastvalleyastronomy.org/grco/obs.asp

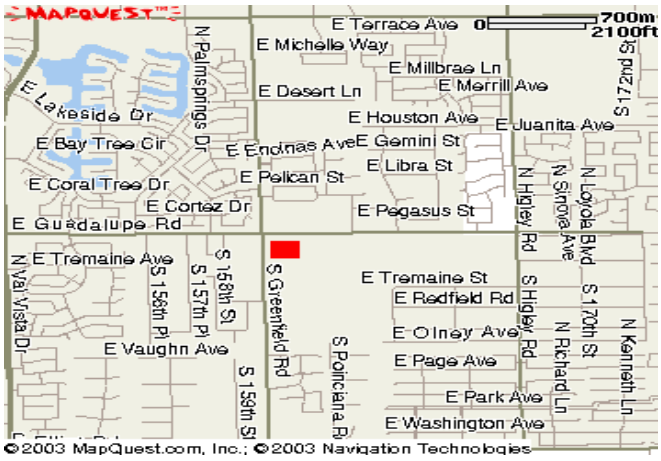


The monthly general meeting is your chance to find out what other club members are up to, learn about upcoming club events and listen to presentations by professional and well-known amateur astronomers.

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

October 23

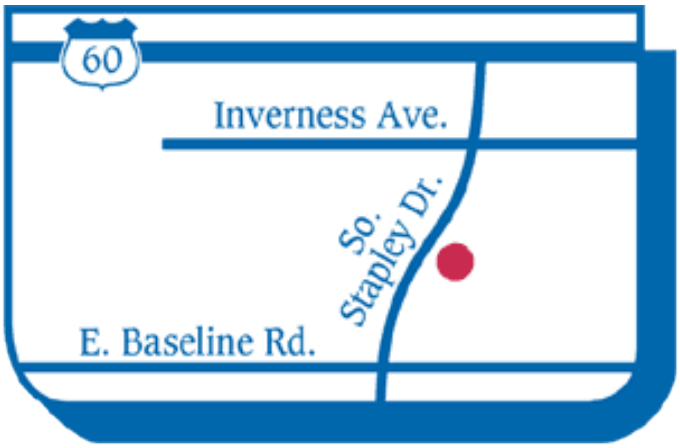
November 21

December 19

January 15

February 19

March 19



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

October 2009

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	31

October 3 - Adopt-A-Highway

October 8 - Florence Community Library Star Party

October 9 - Public Star Party at Riparian Preserve

October 9 - SkyWatch at Southeast Regional Library

October 10 - IYA at Az Science Center

October 10 - Local Star Party at Boyce Thompson Arboretum

October 16 - 17 - All-Arizona Star Party at Farnsworth Ranch

October 21 - Orionids Meteor Shower

October 23 - General Meeting at Southeast Regional Library

October 24 - Chandler Environmental Center Star Party

October 27 - Las Sendas Star Party

October 28 - Cambridge Academy Star Party

November 2009

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 6 - Trinity Christian Star Party

November 13 - Public Star Party at Riparian Preserve

November 13 - SkyWatch at Southeast Regional Library

November 14 - IYA at Az Science Center

November 14 - Deep Sky Star Party at Vekol

November 17 - Leonids Meteor Shower

November 19 - Harris Elemenatry Star Party

November 20 - General Meeting at Southeast Regional

November 21 - Local Star Party at Boyce Thompson Arboretum

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

Spitzer, the Sequel

The Spitzer Space Telescope is getting a second chance at life.

The liquid helium "lifeblood" that flows through the telescope has finally run out, bringing Spitzer's primary mission to an end. But a new phase of this infrared telescope's exploration of the universe is just beginning.

Even without liquid helium, which cooled the telescope to about 2 degrees above absolute zero (-271°C), Spitzer will continue to do important research—some of which couldn't easily be done during its primary mission. For example, scientists will use Spitzer's "second life" to explore the rate of expansion of the universe, study variable stars, and search for near-Earth asteroids that could pose a threat to our planet.

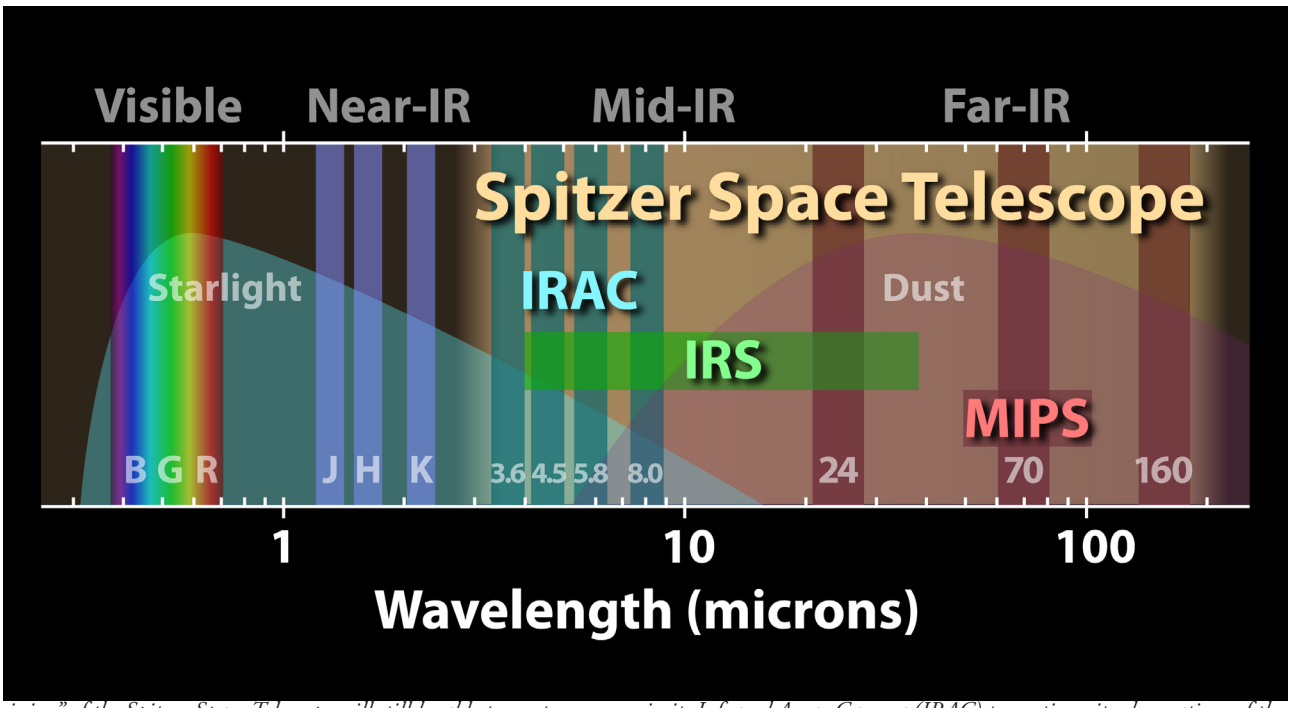
"We always knew that a 'warm phase' of the mission was a possibility, but it became ever more exciting scientifically as we started to plan for it seriously," says JPL's Michael Werner, Project Scientist for Spitzer. "Spitzer is just going on and on like the Energizer bunny."

Launched in August 2003 as the last of NASA's four Great Observatories, Spitzer specializes in observing infrared light, which is invisible to normal, optical telescopes.

That gives Spitzer the power to see relatively dark, cool objects such as planet-forming discs or nearby asteroids. These objects are too cold to emit light at visible wavelengths, but they're still warm enough to emit infrared light.

In fact, all warm objects "glow" with infrared light—even telescopes. That's why Spitzer had to be cooled with liquid helium to such a low temperature. Otherwise, it would be blinded by its own infrared glow.

As the helium expires, Spitzer will warm to about 30 degrees above absolute zero (–243°C). At that temperature, the telescope will begin emitting long-wavelength infrared light, but two of its short-wavelength sensors will still work perfectly.



The "warm mission" of the Spitzer Space Telescope will still be able to use two sensors in its Infrared Array Camera (IRAC) to continue its observations of the infrared universe.

And with more telescope time available for the remaining sensors, mission managers can more easily schedule new research proposals designed for those sensors. For example, scientists have recently realized how to use infrared observations to improve our measurements of the rate of expansion of the universe. And interest in tracking near-Earth objects has grown in recent years—a task for which Spitzer is well suited.

"Science has progressed, and people always have new ideas," Werner says. In its second life, Spitzer will help turn those ideas into new discoveries.

For kids, The Space Place Web site has a fun typing game using Spitzer and infrared astronomy words. Check it out at spaceplace.nasa.gov/en/kids/spitzer/signs.

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If It's Clear...

by Fulton Wright, Jr.
Prescott Astronomy Club

October 2009

Celestial events customized (from Sky & Telescope magazine, Astronomy magazine, and anywhere else I can find information) for Prescott, Arizona. All times are Mountain Standard Time.

On Saturday, October 3, at 5:40 PM (30 minutes before sunset), the full Moon rises spoiling any chance of observing faint fuzzies for the whole night.

On Sunday, October 4, you can see several events with Jupiter's moons. Here is the schedule:

6:09 PM Sunset
7:00 PM Io appears from behind Jupiter.
7:11 PM Europa goes in front of Io, (almost completely covering it).
7:24 PM Europa goes in front of Jupiter.
9:35 PM Europa's shadow falls on Jupiter.
10:15 PM Europa moves from in front of Jupiter.
11:34 PM Europa moves in front of Ganymede (Europa too small to completely cover it).
12:23 AM Europa's shadow leaves Jupiter.
1:14 AM Ganymede goes behind Jupiter.

On Thursday, October 8, about 5:45 AM, you can see two planets near each other. Look low in the east for Mercury (magnitude -0.7) and, a little less than half a degree to the upper left, Saturn (magnitude 1.1).

On Friday, October 9, about 4:30 AM, you might be able to see the results of an object hitting the Moon. With a large (12 inch) telescope look nearly overhead for the waning gibbous Moon. NASA has a mission called LCROSS to crash a rocket stage into a crater near the south pole of the Moon to see if it can detect water in the explosion plume. Unfortunately, this is the kind of short duration event which makes it difficult to share a telescope with others. Also, plans are not completely set, so check the internet, as the time for the event approaches, for schedule changes and observing hints. This probably won't be an easy observation. Good Luck.

On Sunday, October 11, the third quarter Moon doesn't rise till 12:24 AM (Monday, the 12th), giving you till then to observe faint fuzzies.

On Monday, October 12, between 2:00 and 5:00 AM, you can see some objects line up. Castor, Pollux, Mars, and the Moon form a rough line 15 degrees long in the east.

On Tuesday, October 13, about 5:45 AM, you can see two planets near each other. Look low in the east for Venus (magnitude -3.9), and, half a degree to the left, Saturn (magnitude 1.1). Three days later, the Moon joins the group, but the planets have moved to 3 degrees apart.

On Saturday, October 17, it is new Moon and you can observe faint fuzzies all night.

On Wednesday, October 21, from midnight till dawn, you might see some Orionid meteors. Not the greatest shower, but if you are up, give it a look.

On Sunday, October 25, the first quarter Moon sets at 11:50 PM.

On Thursday, October 29, you can observe some events with Jupiter's moons. Here is the schedule:

6:41 PM Europa's shadow falls on Jupiter
6:54 PM Europa moves from in front of Jupiter
7:06 PM Io moves partially behind Ganymede
9:32 PM Europa's shadow leaves Jupiter

On Friday, October 30, at 8:59 PM, Europa goes behind Ganymede, but isn't completely hidden by the larger Jupiter moon.

On Saturday, October 31, at 8:39 PM, Europa goes behind Io, but again, isn't completely hidden.

From the Desk of the President

Continued from page 1

our Events Coordinator, Randy Peterson, publishes the list of schools, and asks for volunteers to come and bring their telescopes to let the children (and their parents) get a look at the evening skies. This activity is truly rewarding, and I encourage all of our members to try and make several of these events. You can check the calendar on the website at: http://www.calendar31.com/?org=EA5463 (or just go to the website, and click on "Calendar of Events" in the left column). Randy puts his request for help out on the EVACONLINE list server as each of them come up.

The weather is finally looking better for observing, and a lot of people are getting out to enjoy the night skies. Lets all "Keep Looking Up"!

Gravitational Lensing

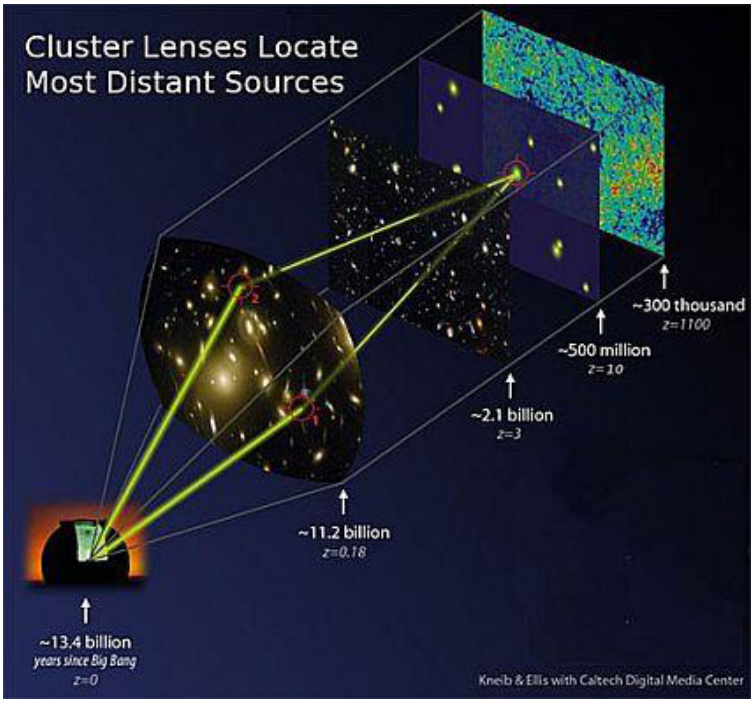
Continued from page 4 position depending upon what part of the lens we are looking through.

Black Holes

By aiming telescopes into the central bulge of our galaxy in 1999 a lone BH, (MACHO) was detected triggering the longest known microlensing event to date. It lasted a bit over 3 years and brightened the star up to 32x its original brightness. Estimates of the mass of the lensing BH range from 4-100 solar masses. This is the only known example of a solitary BH undetected by any other means. It is estimated that our galaxy alone contains several million of these solitary wanderers.

CMB

The web of DM acts as filter for the CMB radiation and causes weak GL to distort the CMB profile and therefore hide some of its detailed information. By better understanding the web of DM and GL we can "filter" out this interference and obtain more intimate knowledge of the early Universe from the CMB. This is especially true if we wish to analyze the CMB for polarization effects and to separate the polarization of matter density fluctuations, (CMB temperature variations) from those of gravity waves. Seeing the imprint of gravity waves would enable us to probe even further past the CMB photon generating events in the very early Universe.



An image of how everything behind a galaxy cluster lens including the CMB is lensed by that galaxy cluster as seen from Earth.

Conclusions

Observationally, the future for the study of strong gravitational lensing is looking bright. As of 2009, around 200 macrolensed systems have been detected with galaxies acting as the main lens. Planned observational facilities such as the Square Kilometer Array (SKA) and the LOw Frequency ARray for radio astronomy (LOFAR) at radio wavelengths and JDEM & LSST in the optical, will have the power to boost this number by orders of magnitude in the coming decade. The spatial resolution by which GL systems can be studied is also likely to become significantly better, approaching < 10 milli arc seconds in the optical and < 0.1 milli arc seconds at radio wavelengths.

The Space Interferometry Mission, (SIM) is a proposed NASA mission that will carry two telescopes into space and separate them by about 9 million miles a year to further investigate parallax and GL events. It is hoped that this mission will detect many more stellar sized BHs as well as extra solar planets via GL.

With the upcoming generation of high spatial resolution telescopes like the Large Synoptic Survey Telescope (LSST), the Joint Dark Energy Mission (JDEM) and the Atacama Large Millimeter Array (ALMA), an increase in the number a high-resolution lenses is expected which will allow more in-depth use of GL to study galaxy halo and galaxy cluster structure and details.

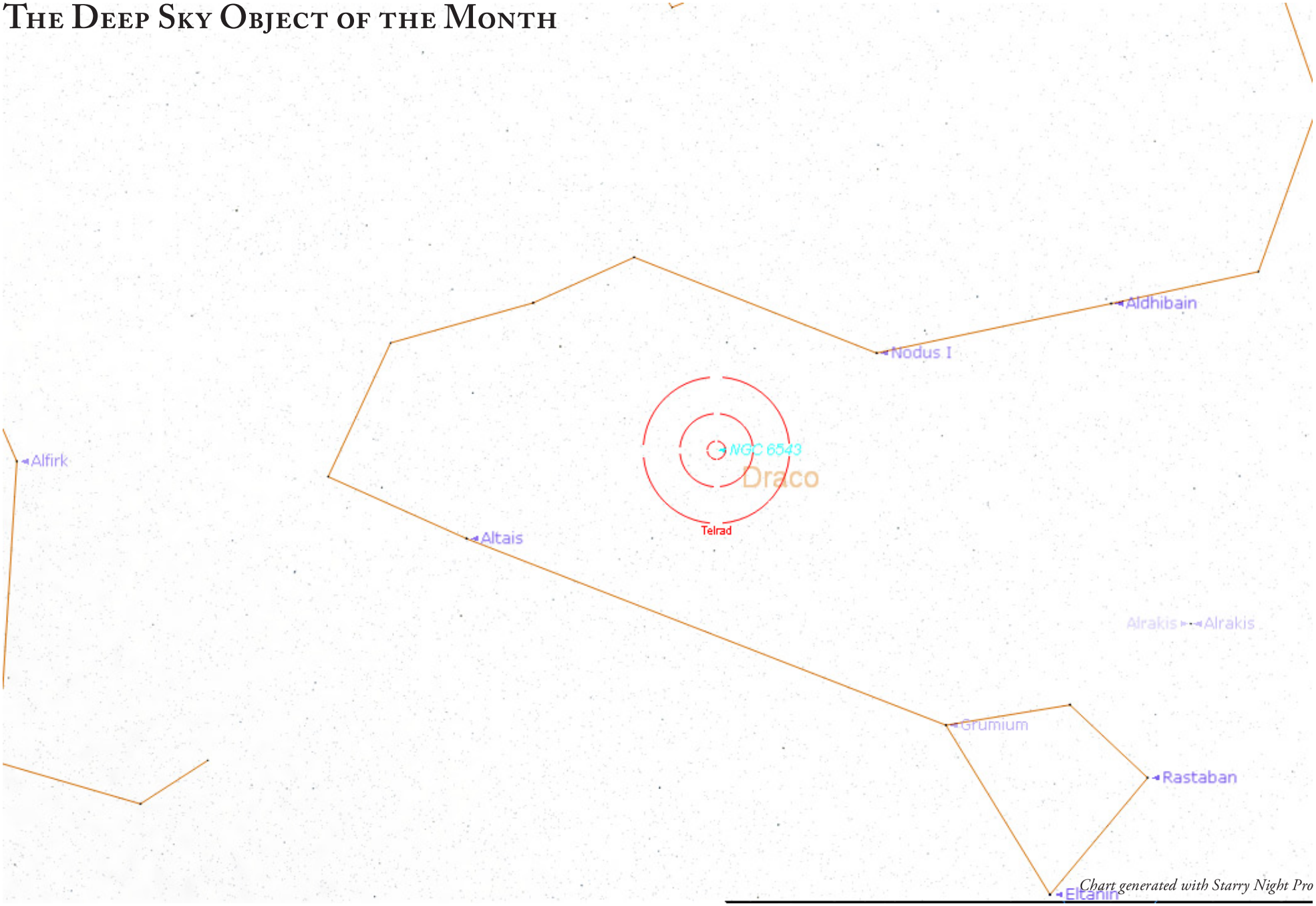
We have learned from using GL that DM is not manly composed up of MACHOS, that the web of DM contained in clusters is distributed more like a rounded mountain top rather than a sharp peak that current models predict, that we can use GL to probe both DM and DE, that we can use it to help determine modifications, (if any) to GR, find planets and wandering BHs, and weigh and map galaxy clusters.

In the future we will need more than GL to determine the true structure and properties of our Universe. However we have seen what a powerful and versatile tool GL can be for helping us in this quest on a variety of physical scales, not to mention that it can produce some of the most strangely beautiful and strikingly rich images in the cosmos.

New EVAC Members in September

Tony Christofolo - Gilbert

Steven G. Smith - Chandler



NGC 6543 (Cat's Eye Nebula) Planetary Nebula in Draco

RA 171h 58m 33.4s DEC +66° 37' 59" Magnitude: 8.3 Size: 22"

School Kids Track LCROSS
by Dauna Coulter

Using a colossal radio telescope in the Mojave Desert, school kids around the world are helping NASA track the LCROSS spacecraft as it heads for a crash landing on the Moon. On Oct. 9th, LCROSS will smash into the inky-dark shadows of a crater near the Moon's south pole in search of water. Eager youngsters are locked on to LCROSS's signal as intently as they've ever viewed a video game, and they're feeding NASA valuable data about the spacecraft's health and status.

Students attending 283 schools world-wide are participating in the Goldstone Apple Valley Radio Telescope Project, or GAVRT - a joint project between NASA's Jet Propulsion Laboratory and the Lewis Center for Educational Research. Boys and girls control the behemoth telescope via the internet and they have been learning how to do radio astronomy just like real mission scientists.

Brian Day of NASA Ames Research Center explains how the students "adopted" LCROSS. "Because LCROSS has a very steeply inclined orbit, we have only a 2-hour window once every 3 days when we can check out the spacecraft using the Deep Space Network. So we decided to ask GAVRT for help. These kids help us get extra listening time for our spacecraft, and they get an incredible educational experience in return." Lewis Center founder Rick Piercy is the visionary who sparked GAVRT's creation, making this extraordinary hookup possible.

"In 1994, I heard that NASA was decommissioning a fully functional radio telescope," says Piercy. "I knew that this particular telescope had been used to communicate with the Apollo spacecraft and realized that it was something special. I wanted it for the students at our school, the Academy for Academic Excellence. I figured we could load it up in a couple of pickup trucks and bring it to the school if we could get permission." He called California Congressman Jerry Lewis, who put him in touch with then-NASA Administrator Daniel Goldin. Piercy convinced Goldin and NASA to give the telescope to the school and make the instrument available to students nationwide.

"I contacted Dr. Michael Klein, who was a foremost authority on Jupiter radio astronomy but has since passed away. When I told him that I wanted to go load up the telescope in a truck to bring to the school, he got very quiet and then said, 'The scope is 110 feet wide, weighs almost a million pounds, and is 9 stories tall.'" Piercy's response? "Oh."

The telescope stayed where it was, but that didn't stall Piercy's plans. "Our school became the first to take over a NASA telescope," he says. To date, 38,000 students, including boys and girls at Department of Defense schools across the globe, have run the telescope. NASA scientists and Lewis Center staff train teachers. In turn, the teachers train groups of students. "Best of all, the scientists mentor the students – answering questions and offering guidance as needed." According to Piercy, one mother was a little worried at first, saying, "I don't even let my daughter run the washing machine - and she's going to operate a 15 million dollar piece of NASA equipment?"

No worries, mom. It's all done remotely. Piercy never had to test his pickup truck. Students access the massive radio telescope, which resides at the Goldstone Tracking Station in California's Mojave Desert, via the Internet in their classrooms.

"Dr. Klein used to say that looking at a radio signal on a screen was about as thrilling as watching the grass grow," says Piercy. "But the kids love it because they're participating in real space missions and learning from NASA scientists what those signals mean." If a problem occurs with LCROSS while NASA isn't able to listen, students at one or more of the participating schools may know it first and can alert the space agency. "The kids realize how important they are to the mission's success," says Piercy. "Besides, it's fun." "I'm really excited about being able to do this," says Anthony Cole, a ninth grader at the Academy for Academic Excellence. "It's a once in a lifetime opportunity to be able to track a spacecraft looking to find water on the Moon."

"Kids learn best by participating - using all their senses," explains Piercy. "The proof's in the puddin'. The students at our school have had the highest standardized high school test scores in the county for several years now. Results for this year aren't out yet, but we expect similar success." Students, including homeschoolers, who want to join in the fun can sign up at LewisLearning.org. There's room for everyone - the Lewis Center is equipped to handle more than 60 million students from anywhere in the world. All you need is a speaker phone and a computer connected to the Internet.

And how's this for thrilling? There are plans in the works for GAVRT students to help listen for communications from extraterrestrials. "Is there anybody out there?" Yes. 38,000 clever kids hearing you loud and clear! Wassup?

Article courtesy of Science@NASA, Editor Dr. Tony Phillips.

GAVRT students attend the launch of LCROSS with Brian Day (center) at the Kennedy Space Center.

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Keep Looking Up!

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