SEPTEMBER 2009

Volume 23 Issue 9

The Observer

East Valley Astronomy Club

Inside this Issue:

From the Desk of the President
by David Douglass

Wow! It's the end of August, and the schools are starting up again. Word from our events coordinator, Randy Peterson, is that the requests for Outreach Star Parties are pouring in. As I have indicated in the past, these outreaches to schools, and youth groups, are one of the major activities of EVAC that I really enjoy. Ahhhhh, the Oh's and Ahh's, the genuine Wow's, and the smiles on their faces when they look through our telescopes, and actually see something new and exciting. These events really charge my batteries.

EVAC is embarking on a new extension to the school outreach programs. Chuck Dugan of The National Optical Astronomy Observatory (Kitt Peak), made a short presentation at one of our recent meetings about Project Astro, a program developed by the Astronomical Society of the Pacific. Project Astro puts training material in the hands of professional instructors (school teachers), and then seeks to find volunteer astronomers (professional and amateur) to work with the instructors in the classroom environment, to introduce or expand on the science of astronomy, and discovery in our universe.

This year, the two day training for both instructors and astronomers is in Tucson at the University of Arizona, and is being held on September 18-19. The training will include an evening at Kitt Peak. Seven (7) EVAC members are attending this training session as astronomers, and 1 EVAC member is attending as an instructor. Previously, we had two (2) EVAC members train as astronomers, with one (1) of them re-entering the arena as a teacher assistant this year. That makes a total of eight (8) EVAC members that are going to work with school teachers

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The Backyard Astronomer
Robert Burnham, Jr. Memorial *by Bill Dellinges*

For many amateur astronomers who entered the hobby of astronomy in the 1970's and 1980's, Burnham's Celestial Handbook will forever hold a soft spot in their hearts. The three volume 2,138 page tome covered all 88 constellations. Typically, a chapter on any constellation began with its mythological history, followed by descriptions of its primary bright stars, double stars and deep sky objects. But it was more than that. In addition to physical data, there were elements of astronomical history, archaeoastronomy, poetry, and interesting discussions about the nature and sizes of the many objects included in the Handbook. There had never been anything quite like it published before.

Burnham self-published the first edition in 1966. Dover Publications produced the three volume set in 1978. Burnham was employed at Lowell Observatory from 1958 to 1979. Though only an amateur astronomer from nearby Prescott, his discovery of a comet in 1957 caught the eye of the Lowell observatory staff and he was hired to detect proper motion of nearby stars using the 13" Astrograph (which Clyde Tombaugh had used to discover Pluto in 1930). His access to the observatory's resources probably contributed to the wealth of physical data in his Handbook.

Recently there had been movement afoot to place a memorial for Burnham (1931-1993) at Lowell Observatory. Apparently the idea was suggested by Michael Gilmer at the Cloudy Nights forum. A year or so ago, the East Valley

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Upcoming Events:

Public Star Party - September 11

Local Star Party - September 12

Monthly General Meeting - September 18

Deep Sky Star Party - September 19

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

Continued from page 1 Astronomy Club in Mesa, Arizona, agreed to establish a fund to this end. EVAC's Jennifer and Tom Polakis were instrumental in pushing the project to fruition. On August 15th, 2009, the memorial, a plaque mounted on a boulder along the "Pluto Walk" at Lowell, was finally dedicated 16 years after Burnham's passing. My wife, Lora, and I were among the 50 or so people who attended the ceremony. Other EVAC members in attendance were Howard Israel, Michael Collins, Joe Goss, Claude Haynes, Chris Hanrahan (SAC) and of course Jennifer and Tom.

The event was a one hour dedication to the famous author followed by an unveiling of the memorial. Entering the dedication room, I was pleasantly surprised to find a nicely printed program produced by EVAC's Peter Argenziano. It listed the guest speakers which included the Observatory's Director Dr. Eileen Friel, Donna Courtney (Burnham's niece), Jennifer and Tom Polakis, Tony Ortega (Burnham's biographer), Norm Thomas (who worked with Burnham on the proper motion project), Norm's son Bruce who, as a young boy befriended Burnham, and Dr. Nat White. Norm Thomas and Dr. White reminisced about their reclusive friend with interesting and funny anecdotes while Norm's son, Bruce, spoke of the many field trips he and his friends took with Burnham.

Ms. Courtney read her uncle's poem found on page three in volume one of the Handbook. Her mother Viola (Burnham's sister) was in attendance but never spoke during the memorial. The guest speakers presented a most interesting, insightful - and at times emotional - look into the life of Robert Burnham Jr.

We then adjourned outside for the unveiling of the memorial after which the guest speakers stood behind the monument for a brief photo session. The plaque on the boulder is in the form of a likeness of an open book with a brief text about Burnham on one side and a photograph of him at the 13" Astrograph on the other. Viola and Donna Courtney must have been very proud and moved by the celebration. If you ask me, I think this was a fabulous idea.

For more information about the life of Robert Burnham Jr., see Burnham's self interview in Astronomy magazine, March 1982, page 24; Tony Ortega's in depth piece in the Phoenix New Times, September 25, 1997; and a shorter version of his article in Astronomy magazine, January 1998, page 51. (The last two articles are interesting stories of how Mr. Ortega tracked down the whereabouts and sad fate of Burnham following his work at Lowell Observatory).

Gravitational Lensing (Part One)

by Henry De Jonge IV

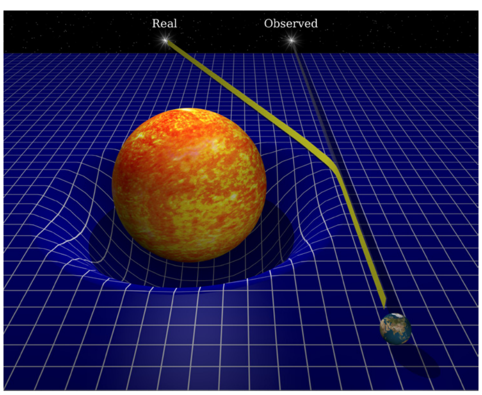
In the next two articles we will briefly examine the extremely interesting phenomena of gravitational lensing, (GL) or as some call it Einstein's telescope. GL was predicted by Einstein shortly after he developed his GR theory and remains one of the primary examples of its success. It is truly a magnificent tool for astronomers and has helped us image the most distant galaxies, to find otherwise undetectable planets outside the solar system, has discovered black holes, can help us find DM and DE, and help determine cosmic structure by looking into space where no light can be found.

Space-time

Gravity is not a force! This is an important theme in studying General Relativity, (GR). This basically means that the force we know as gravity can be expressed or interpreted as geometry in 4 dimensional spacetime. The gravitational field produced by all energy and matter can be visualized as a flexible manifold, (woven carpet of sorts) of spacetime and this analogy is often demonstrated by the use of a flexible rubber sheet in 2 dimensions. In GR the effects of all matter and energy are to deform a perfectly flat sheet of this rubber, with the greater mass or energy deforming or stretching the rubber sheet ever more.

A world line is the path taken by any particle in spacetime whether a small mass or photon. Another important point in GR is that all world lines follow geodesics-that is a path similar to idea that the shortest distance between two points is a straight line, (or a great circle around the Earth for example). In other words, the elliptical orbits of the planets we see in 3 dimensions are actually 4 dimensional geodesics to the planets in space-time.

These ides can be summarized in the famous thoughts of John A. Wheeler that matter causes space to curve and curved space tells matter how to move.



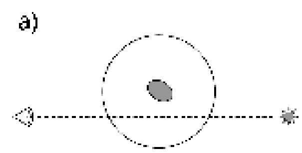
Here we see the bending of light by the sun during an eclipse, as predicted by Einstein.

Gravitational Lensing

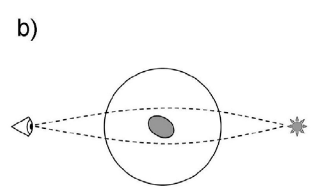
The basis for all GL is that light follows the "shortest" path, (geodesic) in space-time around an object. Gravitational lensing effects can be divided into two categories, strong and weak lensing, depending on the alignment of the lens and source. Strong lensing occurs when the line of sight from the observer to source is very close to the lens. This gives rise to relatively high magnifications, multiple images, and arcs and rings in the lens plane. Weak lensing occurs when the lens is located further away from the line of sight, which results in generally small magnifications and mild image distortions. Overall weak lensing is very common in the cosmos (at some level every single light source is affected) but is inconspicuous, and can only be detected statistically by studying a large number of lensed light sources. Strong lensing effects are rarer but more dramatic, and can readily be spotted in individual sources. Both lensing categories are important for astronomers. Strong lensing can be further subdivided, depending on the typical angular separation of the multiple images produced: macrolensing (>0.1 arc seconds), millilensing (1/1000 arc seconds), microlensing, (1/1,000,000 arc seconds), nanolensing (1/1,000,000,000 arc seconds) and so on.

When large galaxies or clusters are responsible for the lensing, the image separation typically falls in the macrolensing range, and can be seen with modern telescopes. When individual solar-mass stars give image separations in the microlensing regime, these are usually only detectable through brightness variations over time due to the relative motion between the lens and the source. Since all objects with resolved multiple images due to gravitational lensing have image separations of about 0.1 arc seconds or larger, the term strong lensing is often used synonymously with macrolensing.

a) ***Weak lensing*** occurs when the lens (shown here by a gray elliptical galaxy surrounded by a dark matter halo) lies relatively far from the line of sight between the observer and the background light source (star). In this case only a single image is produced with mild magnification and distortion. The signatures of this are so small that they are only detectable in a statistical sense, by studying the weak lensing effects on large numbers of background light sources. Weak lensing occurs around every piece of matter in the universe and has become a powerful GL tool.



b) ***Strong lensing*** occurs when the dense central region of the lens is well-aligned with the line of sight. The light from the background light source may then reach the observer along different paths, which produce separate images. This rarer type of lensing is also associated with high magnifications and strong image distortions.



The mass and its distribution determine the geometry of the lens. The shape and brightness of an object can be changed by GL. Images are elongated and distorted by the different path lengths taken and the brightness is altered due to the amount of light captured by the lens, (the solid angle cone) and bent towards the observer. GL are most sensitive to the distance of the influencing mass and most efficient when that mass is exactly half way between the source and the observer. GL are also linearly sensitive to the mass of the lens.

The lens position is independent of the frequency of the light, thus GL are achromatic. The strength of the gravitational field plays the part of refractive index, however

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Gravitational Lensing (Part One)

Continued from page 3

light does not slow down in a GL. They appear in visible and radio frequencies. In 1987 GL was observed in radio wavelengths while studying quasars.

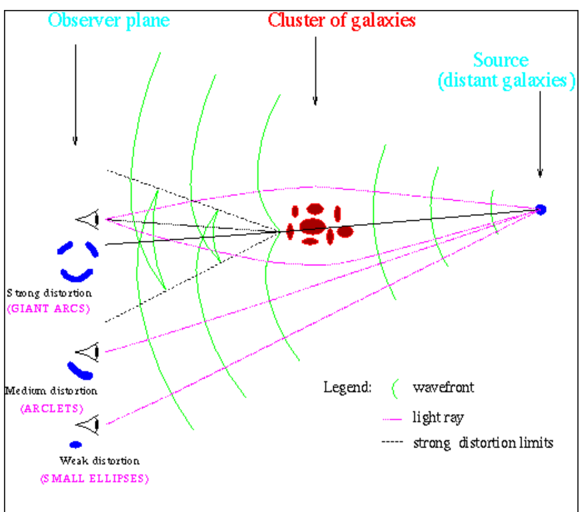
If we know the angles between the positions of the lens and the positions of the images we can calculate the Einstein angle, (the angle that sets the unique angular scale of the GL) and if we know the distances to the lens and the source, (usually estimates) then the mass of the lens can be calculated, whether it is visible or not.

When we see a microlensing event the only data we normally have is the time of the lensing. All the information about the lens, including its mass, exact location, and speed is tied up in this time of the length of the event. Usually by using statistics we can get approximations to these numbers and then deduce the mass of the lensing object.

If the source stars motion affects the light curve its impact on the light curve is called xallarap and can sometimes become important when doing detailed calculations that take into account the motion of the lensing object, the Earth, and the lensed star. If the lensing event lasts for several months then the motion of the Earth, (parallax) must also be taken into account. If parallax is detected this can also be used to help determine the distance to the lensing object and thus more accurately determine it's mass. In practice usually both weak and strong lensing data and models are used together whenever possible.

Dark Matter

GL has become a most valuable tool in mapping out the mass structures in our own galaxy, other galaxies, and in galaxy clusters. In the 1980s astronomers began to outline experiments that could use microlensing to detect MACHOs, (massive compact halo objects) a form of DM that consists of many different types of objects, typically in the form of dim stars, (brown dwarfs) BHs, neutron stars, white dwarfs, and large to small sized planets. Due to their relatively large mass MACHOs will cause slight GL to occur, albeit in much, much smaller amounts than what a distant quasar would produce. The size of the lens, (Einstein radius) is determined by the mass of the MACHO, which can in turn help tell us what it is.



The 3 gravitational distortion regimes

When a MACHO travels between us and say the LMC and occults a star, it produces a microlensing effect that causes a change in brightness that can be measured. Typically this brightness variation time is measured in months for a MACHO a few tenths of the mass of the sun. Since the chance alignment of an individual star and MACHO are very small, modern instruments and programs are used to detect hundreds of thousands of stars over hundreds of days looking for this brightness variation.

MACHOs in our galactic halo were first detected in 1993 by teams of astronomers looking at light variations in the LMC and SMC. In fact watching about 45 million stars for about 6 years gave only 13 definite GL results. It is estimated that only about 20% or less of the mass of the galactic halo was composed up of MACHOs. The average estimate of mass was about ½ solar masses. The exact composition of these MACHO events is still undecided. We see that by using gravity we can map out and probe the shape and composition of DM around the Milky Way.

Currently three major collaborations MACHO, OGLE, (Optical Gravitational Lensing Experiment) and MAO, (Microlensing Observations in Astrophysics) are now detecting hundreds of microlensing events per year.

By looking at both strong and weak GL with the HST and surveys such as COSMOS, (Cosmic Evolution Survey) we are also able to map out the distribution of DM for other galaxies and galaxy clusters. We find a filamentary structure over the large scale which intersects in massive structures at the locations of these clusters of galaxies. These observations are also consistent with many theories in which DM collapses into filaments and then clusters to form the framework for ordinary matter to accumulate and form the structures we see today. In one observation the shapes of over half a million galaxies were observed to reconstruct, (using both strong and weak GL models) the intervening mass along the line of sight.

The first weak GL events in clusters were made in 1996 and confirmed that the halos of galaxies and clusters were much larger, (typically by an order of magnitude) than what we see in visible light, thus confirming the presence of DM. When using GL as a tool for cluster mass analysis, all matter is influencing the lensed image, both MACHOs and WIMPS. WIMPS, (weakly interacting massive particle) are a form of DM that barely interacts with normal matter and they are suspected to exist in the form of exotic particles. However they still have mass and interact gravitationally, (albeit weakly).

Summary

Here we have examined the basics of GR and have seen that by changing our understanding of space-time we have derived reasonable explanations for the beautiful images and effects of GL. We have seen the value of this amazing effect in helping to understand the structure of the universe on different scales and especially with respect to DM, (by lens reconstruction). Continued mapping and understanding of DM via GL will help determine any future GR and DM modifications and/or alternative theories, as well as help in making the right experiments to verify these future theories. Remember that gravity (in all models so far) always traces the mass. Thus the value of GL.

In the next part we will examine GL in relation to many other interesting phenomena.

September Guest Speaker: Henry De Jonge IV

Henry De Jonge is currently a semiconductor equipment sales director, having been in the high tech industry since 1980 where he started as a semiconductor engineer. He has a BS in Mathematics, an MBA, and an MS in Astronomy from Swinburne University of Technology.

Henry has been interested in astronomy since childhood and has also studied astronomy as both an undergraduate and a graduate student at ASU. He particularly enjoys studying galaxies, black holes, cosmology, and archeoastronomy.

He is an avid Arizona and Grand Canyon hiker. He gazes at the heavens with the naked eye and binoculars, and is currently saving up for a telescope.

Henry is a member of the Gilbert Rotary Centennial Observatory staff and is a regular contributor to The Observer.

Henry will discuss gravitational lensing, (or Einstein's Telescope). This will look what a gravitational lens is and its role in helping us to understand dark matter, dark energy, black holes, cosmology, and extra solar planets.

Basic Astronomy Four Part Lecture Series to Begin in September

Howard Israel will be presenting a four part lecture series beginning at the September 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 (Sep 18th) covers general basic astronomical terms, (Ascension, declination, etc)
Session 2 (Oct 23rd) covers the Solar System and how to observe planets.
Session 3 (Nov 20th) covers deep sky observing
Session 4 (Jan 15th) covers binoculars, telescopes, eyepieces, etc.

● FULL MOON ON SEPTEMBER 4 AT 09:03

◑ LAST QUARTER MOON ON SEPTEMBER 11 AT 19:16

○ NEW MOON ON SEPTEMBER 18 AT 11:44

◐ FIRST QUARTER MOON ON SEPTEMBER 25 AT 21:49

Classified Ads

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

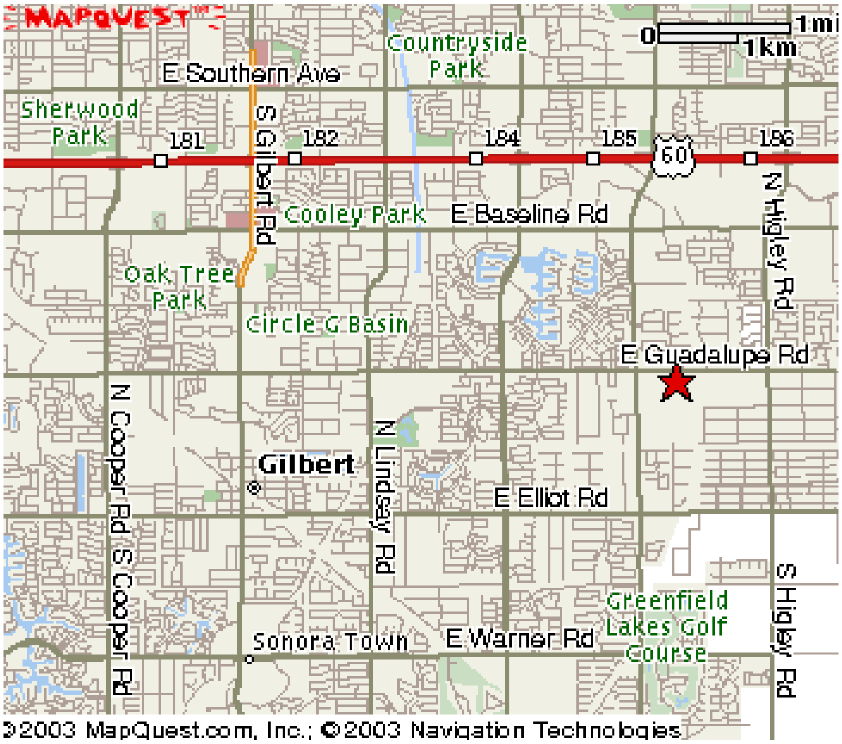
TeleVue Visual Paracorr: $295
22 mm TeleVue Nagler T4 : $390
17 mm TeleVue Nagler T4: $330
12 mm TeleVue Nagler T4: $300
2 inch Lumicon OIII Filter: $200
2 inch Lumicon UHC Filter: $200
2 inch Lumicon H-beta Filter: $200
Catsperch Adjustable Height Observing Chair: $200

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

www.eastvalleyastronomy.org/grco/obs.asp

SUPPORT YOUR LOCAL TELESCOPE DEALER

Nexstar 4 computerized go-to telescope by Celestron. An f/13 Maxsutov-Cassegrain design, it makes a nice planetary scope, but also includes a tour of the best objects for the current month with its almost 40,000 object database. Includes alt-az tripod with built-in adjustable equatorial wedge, original 25mm 1.25” eyepiece, Starpointer finderscope (red dot), 115v transformer, and a few books on astronomy. You can see it if you travel to Show Low, but the owner can bring it to the Valley in October. New cost for the scope was over $600; asking price for all is $295 or make offer. Note- I have seen the telescope, it appears to be in very good condition, but I have not used it. -Randy Peterson 480-251-0658

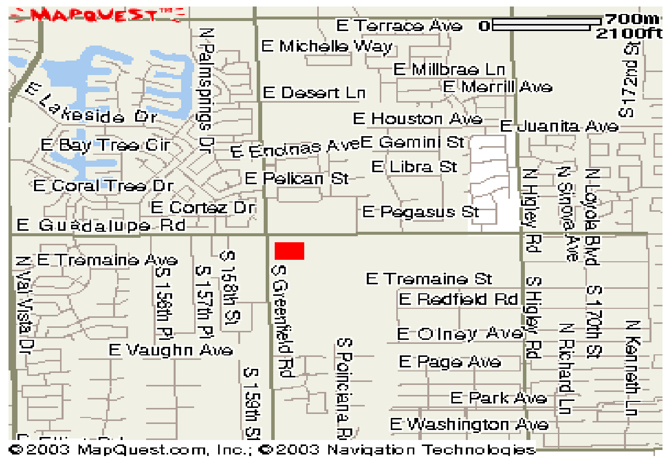


The monthly general meeting is your chance to find out what other club members are up to, learn about upcoming club events and listen to presentations by professional and well-known amateur astronomers.

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!

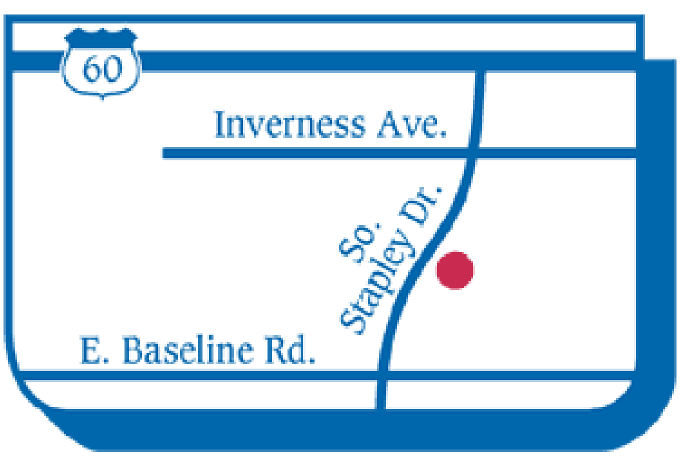


Upcoming Meetings

September 18
October 23
November 21
December 19
January 15
February 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

September 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			

Spetember 11 - Public Star Party at Riparian Preserve in Gilbert

Spetember 12 - Local Star Party at Boyce Thompson Arboretum

Spetember 12 - IYA at Az Science Center

Spetember 18 - General Meeting at SE Regional Library in Gilbert

Spetember 19 - Deep Sky Star Party at Vekol

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 10 - IYA at Az Science Center

October 10 - Public Star Party at Riparian Preserve in Gilbert

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

October 23 - General Meeting at Southeast Regional Library in Gilbert

October 24 - Chandler Environmental Center Star Party

October 22 - Cambridge Academy Star Party

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

☐ **$22.50 Individual** April through June

☐ **$26.25 Family** April through June

☐ **$15.00 Individual** July through September

☐ **$17.50 Family** July through September

☐ **$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

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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

A Planet Named Easterbunny?

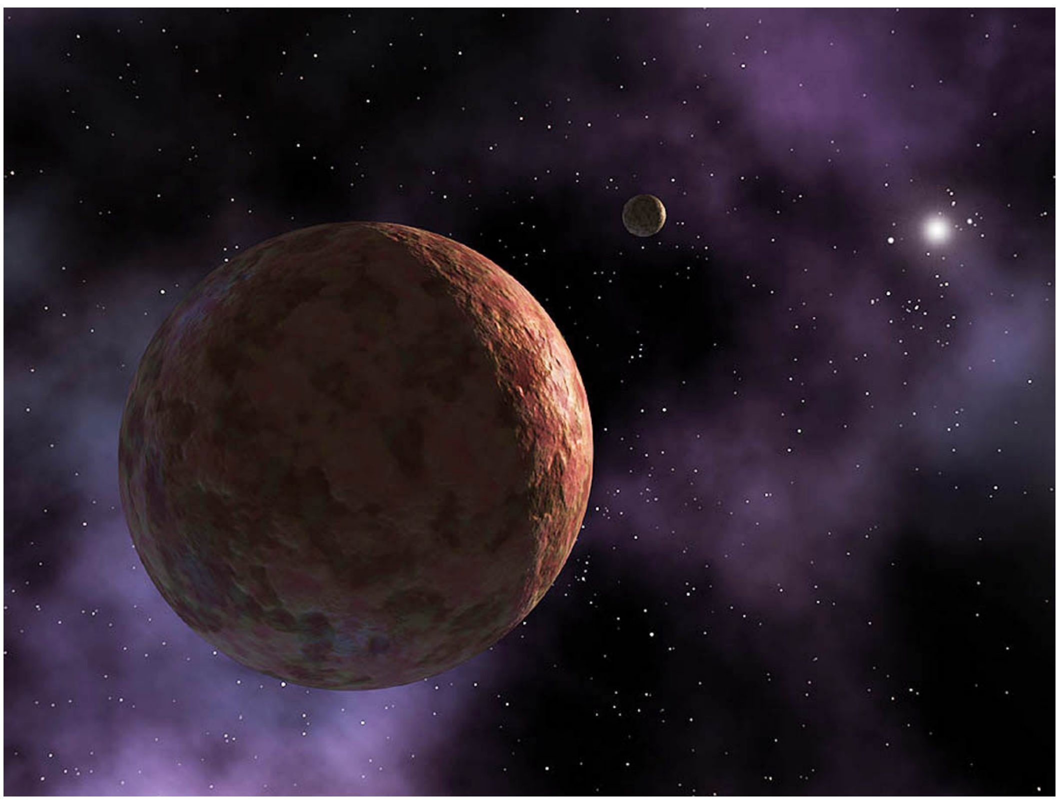
You know Uranus, Neptune, and Pluto. But how about their smaller cousins Eris, Ceres, Orcus, and Makemake? How about Easterbunny?

These are all names given to relatively large "planet-like" objects recently found in the outer reaches of our solar system. Some were just temporary nicknames, others are now official and permanent. Each has a unique story.

"The names we chose are important," says Caltech astronomer Mike Brown, who had a hand in many of the discoveries. "These objects are a part of our solar system; they're in our neighborhood. We 'gravitate' to them more if they have real names, instead of technical names like 2003 UB313."

Nearby planets such as Venus and Mars have been known since antiquity and were named by the ancient Romans after their gods. In modern times, though, who gets to name newly discovered dwarf planets and other important solar-system bodies?

In short, whoever finds it names it. For example, a few days after Easter 2005, Brown and his colleagues discovered a bright dwarf planet orbiting in the Kuiper belt. The team's informal nickname for this new object quickly became Easterbunny.



Artist's rendering of dwarf planet MakeMake, discovered around Easter 2005. Unlikely to gain acceptance their nickname Easterbunny, the discoverers named it for the god of humanity in the mythology of Easter Island.

However, ever since its formation in 1919, the International Astronomical Union (IAU) ultimately decides whether to accept or reject the name suggested by an object's discoverers. "Easterbunny" probably wouldn't be approved.

According to IAU guidelines, comets are named after whoever discovered them—such as comet Hale-Bopp, named after its discoverers Alan Hale and Thomas Bopp. Asteroids can be named almost anything. IAU rules state that objects in the Kuiper belt should be given mythological names related to creation.

So Brown's team started brainstorming. They considered several Easter-esque names: Eostre, the pagan mythological figure that may be Easter's namesake; Manabozho, the Algonquin rabbit trickster god.

In the end, they settled on Makemake (pronounced MAH-kay MAH-kay), the creator of humanity in the mythology of Easter Island, so named because Europeans first arrived there on Easter 1722.

Other names have other rationales. The dwarf planet discovered in 2005 that triggered a fierce debate over Pluto's status was named Eris, for the Greek goddess of strife and discord. Another dwarf planet with an orbit that mirrors Pluto's was dubbed Orcus, a god in Etruscan mythology that, like Pluto, ruled the underworld.

Brown says he takes "this naming business" very seriously and probably spends too much time on it. "But I enjoy it." More tales of discovery and naming may be found in Brown's blog MikeBrownsPlanets.com.

Constellations have also been named after ancient gods, human figures, and animals. Kids can start to learn their constellations by making a Star Finder for this month at spaceplace.nasa.gov/en/kids/st6starfinder/st6starfinder.shtml. There you will also find a handy explanation of why astrology has no place in science.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

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

September 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 Wednesday, September 2, about 4:30 AM, you can see Venus (magnitude -4) about 1 degree away from the Beehive Cluster, M44 (magnitude 3).

On Wednesday, September 2, in the evening, Jupiter's moons put on a rather spectacular display. When it gets dark, Calisto is behind the planet, Europa and Ganymede are on the celestial east about to move in front of the planet, and Io is on the celestial west, about to move behind the planet. You will be able to see the following events best in a medium (6 inch) telescope:
8:43 PM Io moves behind Jupiter (2 moons still visible).
8:58 PM Europa moves in front of Jupiter (1 moon visible).
9:43 PM Ganymede moves in front of Jupiter (no moons visible!).
9:56 PM Europa's shadow falls on Jupiter.
10:20 PM Europa's shadow on Jupiter is directly north of Ganymede in front of Jupiter.
11:29 PM Io appears by moving out of Jupiter's shadow (back to 1 moon visible).
11:42 PM Ganymede's shadow falls on Jupiter (2 shadows!).
11:49 PM Europa moves from in front of Jupiter (2 moons visible).
12:47 AM Europa's shadow leaves Jupiter (1 shadow left).
1:20 AM Ganymede moves from in front of Jupiter (3 moons visible).
1:30 AM Callisto appears near Io by moving out of Jupiter's shadow (all 4 moons visible).
3:18 AM Ganymede's shadow leaves Jupiter.

On Friday, September 4, at 6:44 PM (7 minutes before sunset), the full Moon rises, spoiling any chance of observing faint fuzzies for the whole night.

On Monday, September 7, at 11:00 PM, Io slowly occults about half of Europa. See how close to the event you can tell that there are 2 of Jupiter's satellites at the spot.

On Thursday, September 10, you can observe a lot of events with Jupiter's moons. Here is the schedule:
6:43 PM (the Sun sets.)
7:42 PM Io moves in front of Jupiter.
8:22 PM Io's shadow falls on Jupiter.
9:24 PM Europa passes north of Ganymede. Their edges miss by less than 0.3 arcseconds.
10:00 PM Io moves from in front of Jupiter.
10:25 PM Callisto moves in front of Jupiter.
10:40 PM Io's shadow leaves Jupiter.

On Friday, September 11, it is last quarter Moon which doesn't rise till 11:08 PM.

On Tuesday, September 15, after 2:45 AM, you can see quite a collection of objects. Look low in the east-southeast as these object rise. They are: the thin, crescent Moon (magnitude -6); the Behive Cluster, M44 (magnitude 3); the asteroid 4 Vesta (magnitude 8); and the asteroid 10 Hygiea (magnitude 12). They will all be inside a 3 degree circle. Dawn starts to interfere about 4:45 AM.

On Thursday, September 17, all night, you can find the asteroid 3 Juno fairly easily. It is brighter than usual and near a bright star. With a small (3 inch) telescope, look for 29 Piscium (magnitude 5.1). It is at the 90 degree angle of a small 45-45-90 triangle formed by the asteroid and 2 stars. 1/4 degree north is BU Piscium (magnitude 6.9). 1/4 degree east is 3 Juno (magnitude 7.7). Check it the next night to see that the triangle has changed by the motion of 3 Juno.

On Friday, September 18, it is new Moon so you have all night to look for faint fuzzies.

On Sunday, September 20, about 4:45 AM, you can see Venus and Regulus about half a degree apart. With your unaided eye look low in the east for the magnitude -4 and 1.4 pair.

On Friday, September 25, it is first quarter Moon which sets at 11:09 PM.

On Sunday, September 27, you can see a lot of events with Jupiter's moons. Here is the schedule:
6:19 PM the Sun sets with Europa already in front of Jupiter.
6:59 PM Europa's shadow falls on Jupiter.
7:53 PM Europa moves from in front of Jupiter.
8:39 PM Europa passes directly in front of Ganymede.
9:39 PM Ganymede goes behind Jupiter.
9:48 PM Europa's shadow leaves Jupiter at almost the same spot as the previous event.
11:05 PM Callisto's shadow finally falls on Jupiter.
1:18 AM Ganymede appears from behind Jupiter.
1:41 AM Ganymede disappears in Jupiter's shadow.

On Tuesday, September 29, at 10:20 PM, you can see Io occult half of Europa. Through most telescopes all you can see is that 2 of Jupiter's moons become 1 then 2 again.

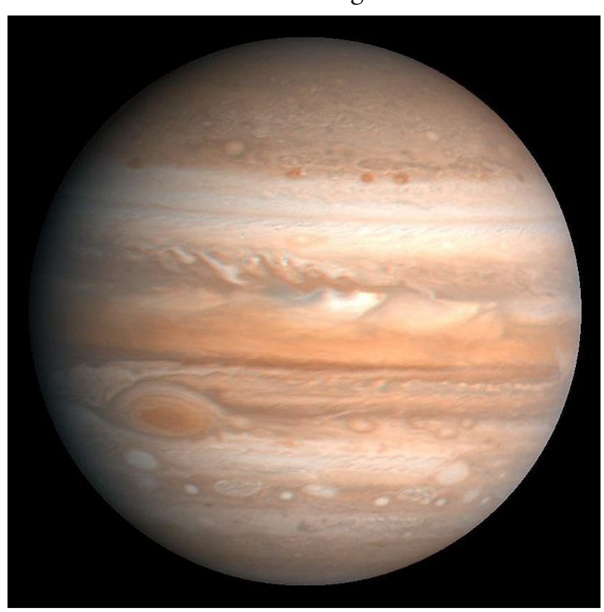


Image courtesy of NASA / JPL.

From the Desk of the President

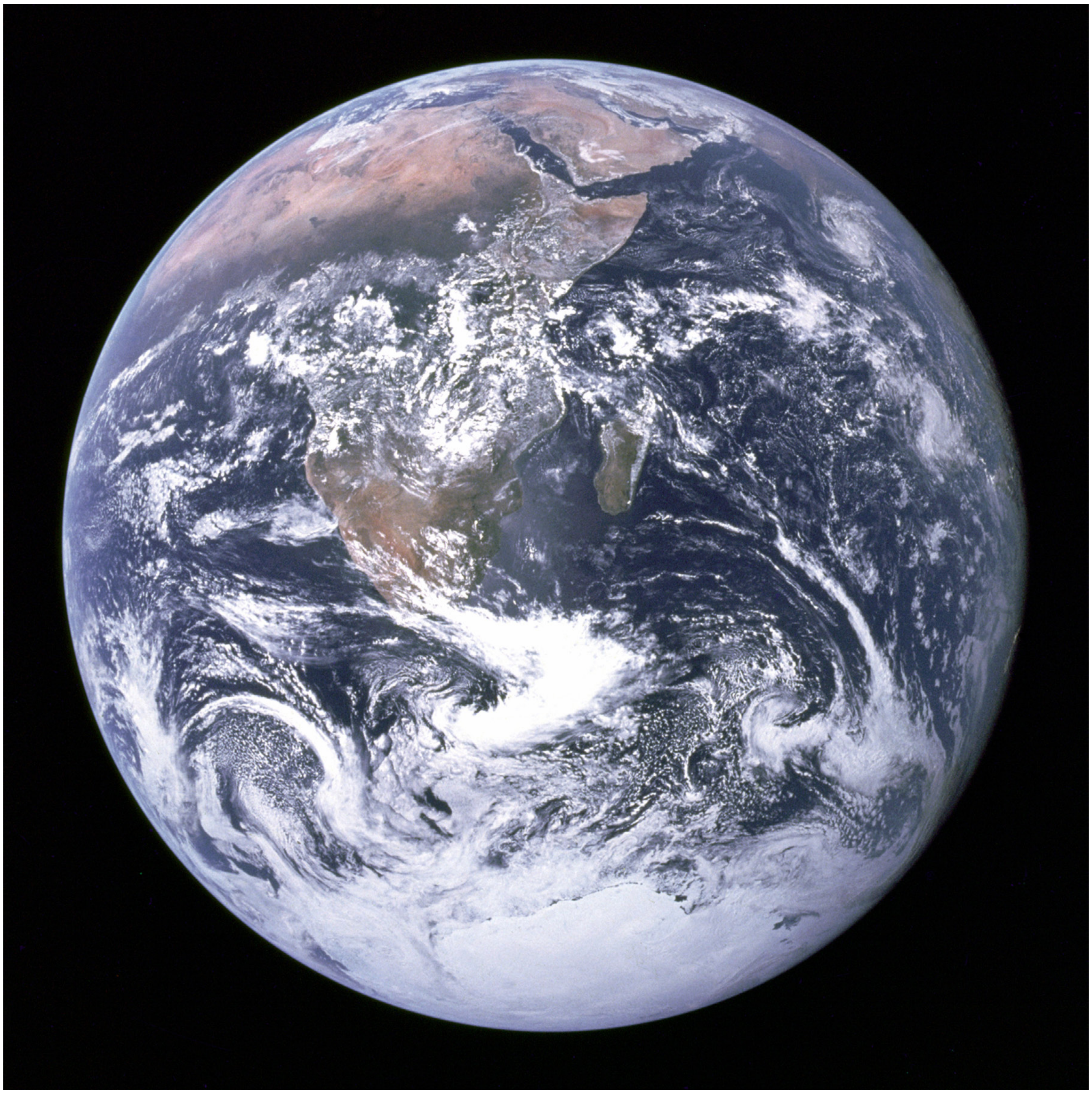
Continued from page 1

in the classroom environment this year. This is an outstanding effort by members of EVAC in an outreach program to expand knowledge about astronomy to our valley's youth.

I am pleased and proud to be among that group of volunteers. Unfortunately, that means this group will miss the September General Membership Meeting on September 18th. But not to fear, our hard working Vice President, Wayne Thomas will be at the podium again, doing a fine job from what I have heard.

Election of Officers will be in November, with nominations opening at the October meeting, which will be on the 4th Friday, instead of the usual 3rd Friday, due to the All Arizona Star Party schedule. Due to term limits, we know that we will need a new Treasurer, and a new Vice President, as well as a couple of new Board Members. Please consider volunteering for one of these positions, and contact either myself, or one of our other officers to let them know of your interest. All officer and board positions are open to nomination.

Keep Looking Up!



"The Big Blue Marble." This is one of the last Apollo photos of the whole Earth, taken by the crew of Apollo 17.

New EVAC Members in August

David Calvino - Gilbert

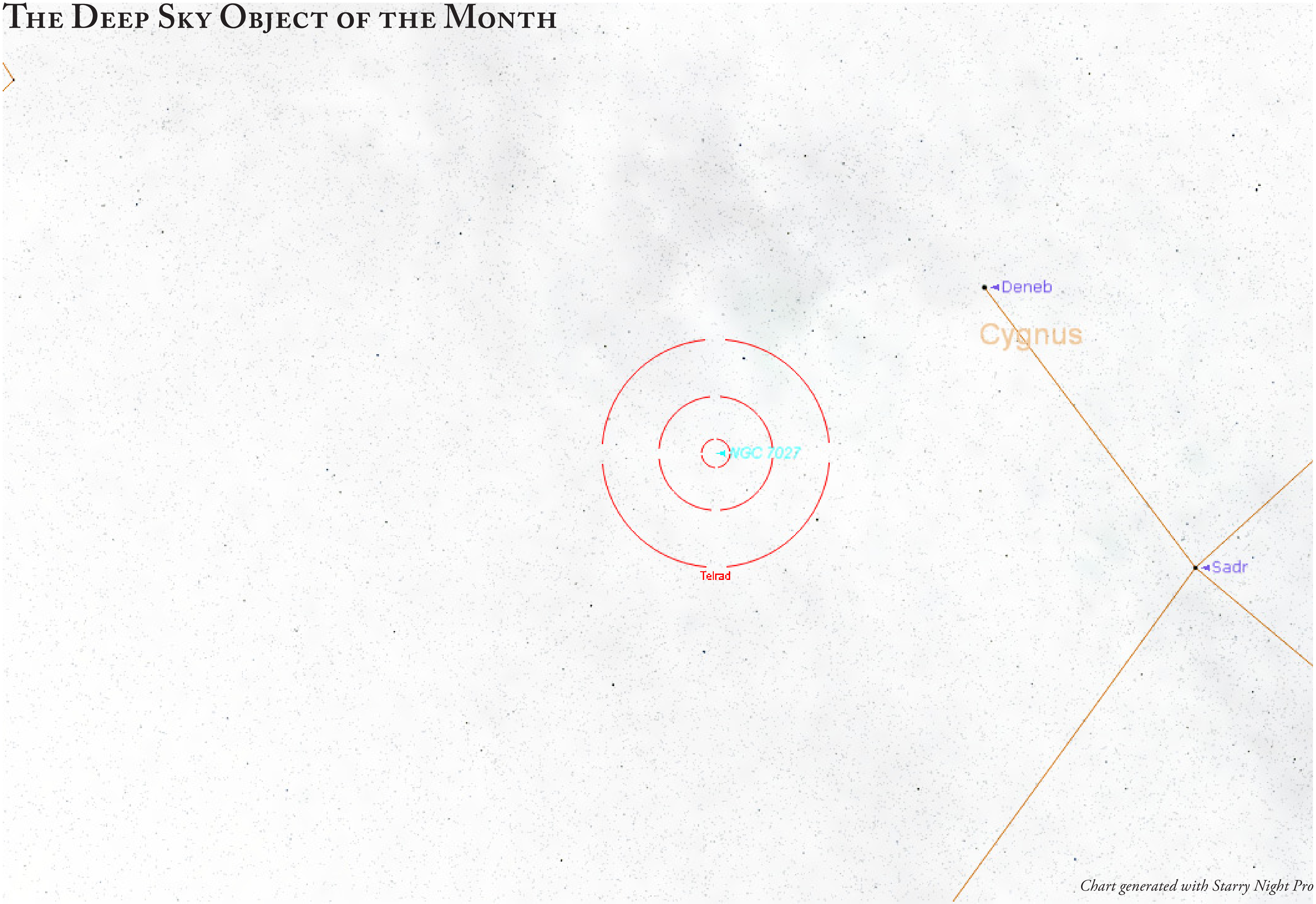
Thomas Haynes - Mesa

Trevor Brooks - Apache Junction

Thaddeus Liversedge - Mesa

Jason Utt - Apache Junction

The Deep Sky Object of the Month



NGC 7027 (PK 084-3.1)   Planetary Nebula in Cygnus

RA 21h 07m 01.7s   DEC +42° 14' 10"   Magnitude: 9.6   Size: 18"

LCROSS Overview

Lunar CRater Observation and Sensing Satellite

Earth's closest neighbor is holding a secret. In 1999, hints of that secret were revealed in the form of concentrated hydrogen signatures detected in permanently shadowed craters at the lunar poles by NASA's Lunar Prospector. These readings may be an indication of lunar water and could have far-reaching implications as humans expand exploration past low-Earth orbit. The Lunar CRater Observing and Sensing Satellite (LCROSS) mission is seeking a definitive answer.

In April 2006, NASA selected the LCROSS proposal for a low-cost, fast-track companion mission to the Lunar Reconnaissance Orbiter (LRO). The main LCROSS mission objective is to confirm the presence or absence of water ice in a permanently shadowed crater near a lunar polar region.

LCROSS launched with the Lunar Reconnaissance Orbiter (LRO) aboard an Atlas V rocket from Cape Canaveral, Fla., on June 18, 2009 at 2:32 p.m. PDT. The LCROSS shepherding spacecraft and the Atlas V's Centaur upper stage rocket executed a fly-by of the moon on June 23, 2009 and entered into an elongated Earth orbit to position LCROSS for impact on a lunar pole. On final approach, the shepherding spacecraft and Centaur will separate. The Centaur will act as a heavy impactor to create a debris plume that will rise above the lunar surface. Projected impact at the lunar South Pole is currently: Oct 9, 2009 at 4:30 a.m. PDT. Following four minutes behind, the shepherding spacecraft will fly through the debris plume, collecting and relaying data back to Earth before impacting the lunar surface and creating a second debris plume.

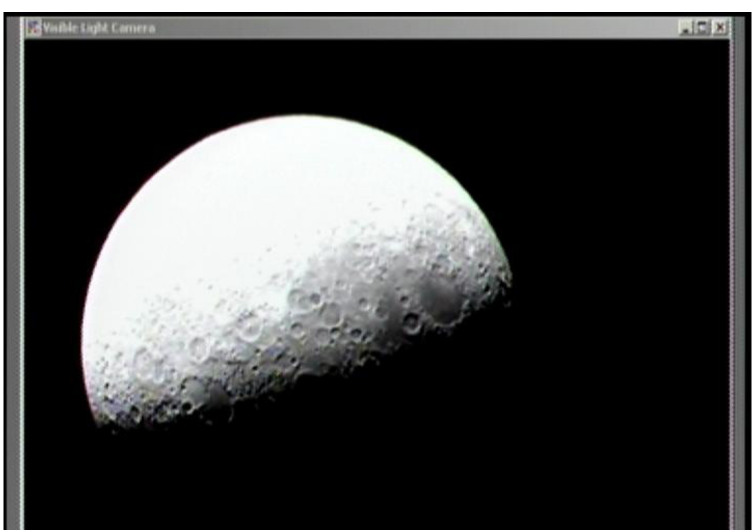
The debris plumes are expected to be visible from Earth- and space-based telescopes 10-to-12 inches and larger.

Technicians at Northrop Grumman gently maneuver the LCROSS spacecraft into the thermal vacuum chamber. Credit: NASA, courtesy of Northrop Grumman.

The LCROSS science payload consists of two near-infrared spectrometers, a visible light spectrometer, two mid-infrared cameras, two near-infrared cameras, a visible camera and a visible radiometer. The LCROSS instruments were selected to provide mission scientists with multiple complimentary views of the debris plume created by the Centaur impact.

As the ejecta rises above the target crater's rim and is exposed to sunlight, any water-ice, hydrocarbons or organics will vaporize and break down into their basic components. These components primarily will be monitored by the visible and infrared spectrometers. The near-infrared and mid-infrared cameras will determine the total amount and distribution of water in the debris plume. The spacecraft's visible camera will track the impact location and the behavior of the debris plume while the visible radiometer will measure the flash created by the Centaur impact.

NASA's Ames Research Center, Moffett Field, Calif., is overseeing the development of the LCROSS mission with its spacecraft and integration partner, Northrop Grumman, Redondo Beach, Calif. LCROSS is a fast-paced, low-cost, mission that will leverage some existing NASA systems, commercial-off-the-shelf components, the spacecraft expertise of Northrop Grumman and experience gained during the Lunar Prospector Mission in 1999. Ames is managing the mission, conducting mission operations, and developing the payload instruments, while Northrop Grumman designed and is building the spacecraft for this innovative mission. Ames mission scientists will spearhead the data analysis.



Visible light camera image of the moon as the Lunar Crater Observation and Sensing Satellite (LCROSS) swings by the moon.
Photo Credit: NASA

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.

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Keep Looking Up!

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