Nightfall

Monthly publication of the Huachuca Astronomy Club

April 2013

President's Notes

Next Meeting: The next meeting of the Huachuca Astronomy Club will be on Friday, April 26 at the Cochise College student union building at 7 PM in Sierra Vista, AZ. Our guest speaker will be Dolores Hill, Senior Research Specialist at the UA Department of Planetary Sciences Lunar and Planetary Lab (LPL). She has a lifelong interest in amateur astronomy and meteorites, and has been analyzing and studying meteorites at LPL since 1981. As is our custom we will have a drawing at the end of the meeting for door prizes. This meeting is free of charge and open to the general public. For more information, visit www.hacastronomy.org.

HAC Outreach: Our outreach coordinator, Bob Hoover, has scheduled an event for Thursday, April 11 at the Joyce Clark Middle School 1045 Lenzner Ave, Sierra Vista. Set up will begin at around 5:00 PM. We are expecting 250-300 people but need more telescopes (at present, we have only three). Any help will be greatly appreciated. Please contact Bob Hoover at: (520) 378-0369, or send email to: outreach@hacastronomy.com

Messier Marathon (Member Star Parties): The next Member Star Party is at the Bob & Barb Kepple's Desert Starlight Observatory in Palominas on Saturday April 6. This will be our annual Messier Marathon event. I cannot think of a better member star party to attend. Bring a telescope if you can, and try to arrive before dark. A map to DSO is available on our web page.

Astronomy Day: We will be celebrating National Astronomy Day at the Sierra Vista City Library on Tacoma Street on Saturday, April 20th from 10 AM until late afternoon, weather permitting. There will be telescopes set up for safely viewing the Sun, and the afternoon Moon. There will be additional exhibits and astronomy related materials inside and outside of the library, as well as a 1000 yard (3000 feet) scale model of our Solar System from the Sun to dwarf planet Pluto! Everyone is welcome and the admission is free - A Great Family Activity! Please call (520) 559-0160 or (520) 258-9045 if you have any questions. In the event of inclement weather (rain, high winds), the event will be cancelled.

Public Nights at the Patterson: The next Patterson Observatory public nights are Thursday, April 18, May 16, and June 13. All of these events start shortly after sunset, and as always, we appreciate your help. Again, this year, we will not be holding any events during July or August due to monsoons.

Science & Math Experience: On Friday, April 26 we will be providing solar viewing for approximately 1300 students from schools around the county at the Patterson Observatory on the UA Sierra Vista Campus. The students will be 4 – 8 graders. They and their teachers are extremely appreciative of our support. If you have a solar telescope, could you think about attending? The event starts at 8:30 AM and lasts until 1:30 PM so an early set-up is essential. Of course, later that same evening we will have our next public meeting. It's a busy month.

Support from Amazon: Our club continues to receive funds from Amazon.com. A percentage of every Amazon sale that passes through our website is automatically donated back to our club.
If you plan any online shopping, please use the "Amazon" link.

Clear skies and bright stars,

Kim Rogalski
President, Huachuca Astronomy Club

New Members Corner

We would like to welcome our newest members. Welcome to Eddie Collins and Joan Morschel and also welcome to our 2013 scholarship winner, Laila Awadalla, who has earned a complimentary membership. Welcome to the Club! We are glad you joined.

HAC Wants YOU for Astronomy Day!

If you are unused to participating in public outreach events, you may be wondering what you can do to help with our Astronomy Day activity at the Sierra Vista Library on Saturday, April 20th. The most important thing you can do is just come out. It will help just to have more astronomers at the event. After all, nothing sparks curiosity like a crowd.

Don't have a solar telescope? No problem, you can help with the scopes that others bring and you can help by talking to the guests that will probably be wondering what it's all about.

Don't think you know enough to be a help? Nonsense. Anyone with even a mild interest in astronomy and the sky knows more than the average person on the street. It's your interest and enthusiasm that are needed, not any vast store of knowledge.

If you are new to the club, or if you've never really tried your hand at public outreach, you may be in for a real treat. Most amateur astronomers would agree that sharing our passion with the public is the most rewarding aspect of the hobby. Come on out and give it a try!

The event starts (officially) at 10 AM and should continue into the evening. Your help will be appreciated for all or any part of the event. Even if you can just volunteer over the lunch hour to help spell those of us that will be there all day, it would be a great help and most appreciated.

The Mayor has made a proclamation declaring April 20th as International Astronomy Day in Sierra Vista and encouraged citizens to come out and celebrate with us. We have done our best to spread the word and spark interest in the event. Now it's up to all of us to take advantage of this opportunity to reach out to our neighbors and encourage them to LOOK UP and WONDER.

It can't be a success without YOU!

Your Daily Dose of Astonishment

By Diane K. Fisher

As a person vitally interested in astronomy, you probably have the Astronomy Picture of the Day website at apod.nasa.gov set as favorite link. APOD has been around since practically the beginning of the web. The first APOD appeared unannounced on June 16, 1995. It got 15 hits. The next picture appeared June 20, 1995, and the site has not taken a day off since. Now daily traffic is more like one million hits.

Obviously, someone is responsible for picking, posting, and writing the detailed descriptions for these images. Is it a whole team of people? No. Surprisingly, it is only two men, the same ones who started it and have been doing it ever since.

Robert Nemiroff and Jerry Bonnell shared an office at NASA's Goddard Space Flight Center in the early-90s, when the term "World Wide Web" was unknown, but a software program called Mosaic could connect to and display specially coded content on other computers. The office mates thought "we should do something with this."

Thus was conceived the Astronomy Picture of the Day. Now, in addition to the wildly popular English version, over 25 mirror websites in other languages are maintained independently by volunteers. (See http://apod.nasa.gov/apod/lib/about_apod.html for links). An archive of every APOD ever published is at http://apod.nasa.gov/apod/archivepix.html. Dr. Nemiroff also maintains a discussion website at http://asterisk.apod.com/.

But how does it get done? Do these guys even have day jobs?

Dr. Nemiroff has since moved to Michigan Technological University in Houghton, Michigan, where he is professor of astrophysics, both teaching and doing research. Dr. Bonnell is still with NASA, an astrophysicist with the Compton Gamma Ray Observatory Science Support Center at Goddard. APOD is only a very small part of their responsibilities. They do not collaborate, but rather divide up the calendar, and each picks the image, writes the description, and includes the links for the days on his own list. The files are queued up for posting by a "robot" each day.

They use the same tools they used at the beginning: Raw HTML code written using the vi text editor in Linux. This simple format has now become such a part of the brand that they would upset all the people and websites and mobile apps that link to their feed if they were to change anything at this point.

Where do they find the images? Candidates are volunteered from large and small observatories, space telescopes (like the Hubble and Spitzer), and independent astronomers and astro-photographers. The good doctors receive ten images for every one they publish on APOD. But, as Dr. Nemiroff emphasizes, being picked or not picked is no reflection on the value of the image. Some of the selections are picked for their quirkiness. Some are videos instead of images. Some have nothing to do with astronomy at all, like the astonishing August 21, 2012, video of a replicating DNA molecule.

Among the many mobile apps taking advantage of the APOD feed is Space Place Prime, a NASA magazine that updates daily with the best of NASA. It's available free (in iOS only at this time) at the Apple Store.

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

Caption:

The January 20, 2013, Astronomy Picture of the Day is one that might fall into the "quirky" category. The object was found at the bottom of the sea aboard a Greek ship that sank in 80 BCE. It is an Antikythera mechanism, a mechanical computer of an accuracy thought impossible for that era. Its wheels and gears create a portable orrery of the sky that predicts star and planet locations as well as lunar and solar eclipses.

Astronomical League Observing Programs - Planetary Nebula

by Ted Forte

(Captured from the HACList)

Just like last month, only three planetary nebulae on the Astronomy League Planetary Nebula Program list reach their best position of the year in April. With the arrival of spring, an astronomer's fancy should turn to galaxies. That doesn't mean, however, that PNe are absent from the April sky. There are 108 objects from the Planetary Nebula Program that rise above our horizon on the night of new moon. Plenty to keep you busy, but in keeping with the premise that we will observe the objects only at their very best, the three you want to check off this month are offered here.

The nickname "Eight Burst Nebula" was applied to NGC 3132 in Vela due to the multiple outbursts of its central star described in a 1940 paper by Harlow Shapley and J.S. Paraskevopoulos. More inviting is its other moniker: "The Southern Ring Nebula". It is an extremely interesting and intricate object; multiple layers of gaseous shells that evidence the sporadic upheavals of its formation, are layered upon a binary star system to create a marvelous telescopic target. NGC 3132 reaches its highest altitude about 9 PM in mid-month. It is a bright disk with an obvious ring structure, elongated a bit SE-NW and has a faint outer shell. Most observers report a bright central star, but it is the much fainter (about 16th magnitude) companion that is responsible for the nebula. Filters help a good deal, especially the OIII filter. Add this one to your observing list if you are going to this month's HAC Member Star Party - it will be best placed about 9:30 P.M. that night. Star hoppers will prove their mettle to find this one - it is not near anything bright or famous. It lies in the top of Vela, two degrees NW of the 3.8 magnitude star (HR 4023) that is usually depicted as the mast head of Argo's sail.

NGC 3242 is best known as the Ghost of Jupiter. David Knisley lists William Tyler Olcott as the source of that popular nickname. It has others; The CBS Eye or Just The Eye, and the Diamond, for Instance. NGC 3242 lies in Hydra; in fact it is arguably that huge constellation's best deep sky object. It was discovered by William Hershel in 1785. It is a favorite of observers because it can stand up to outrageous magnifications and shows more and more structure to larger and larger scopes. Attack Jupiter's Ghost on a night of good seeing and pump up that power and you'll become hooked on this planetary too. Filters can enhance some of the detail, but are not required to see the object, or even to see some of the intricate inner structure. It has some color, you'll see pale blue or a faint green. Try for the central star; I wonder how large a scope it takes to see it? Even in tiny scopes, NGC 3242 is a bright oval that is visible from an urban backyard. It lies 1 degree and 50 minutes south of the 4th magnitude star, Mu Hydrae.

Our understanding of planetary nebulae is changing from year to year. Theories of how they achieve the shapes and structures we see in the eyepiece keep evolving. What is becoming more and more obvious is the role of binary stars in the creation of the more intricate morphologies they exhibit. The "Binary Hypothesis" of planetary nebula formation is a hot subject today. Models suggest that PNe with internal bubbles like NGC 3587 might require a very wide binary star - where the period of the secondary's orbit is longer than the lifetime of the planetary nebula. You know NGC 3587 better as M97 or "The Owl Nebula" in Ursa Major. And whether its two dark bubbles are due to the action of a binary star system or not, they are surely the object's most notable features. They form the eyes that make this puff ball remind us of an owl's face. One of just four planetaries on Messier's famous list, it was actually discovered by Pierre Mechain. In poor skies you might need a filter like the OIII to catch site of the Owl, but I've detected it easily enough in 8-inch aperture, under city lights, without one. It's a matter of knowing what to expect. The Owl is located just outside of the bowl of the Big Dipper a short star hop from Merak. No excuses will be accepted for not taking a peek, even if you are concentrating on galaxies this spring - it lies just one telescope field from the fine edge-on galaxy M108.

Good hunting!

Planetaries for April

Eight Burst	NGC 3132	Vel	10h07m25.2s	-40°29'09"
Ghost of Jupiter	NGC 3242	Hya	10h25m13.5s	-18°41'33"
Owl Nebula	M 97	UMa	11h15m20.9s	+54°58'12"

Book Review

Astronomical Enigmas: Life on Mars, the Star of Bethlehem & Other Milky Way Mysteries

Cindy Lund

Astronomical Enigmas is about a few of the many questions astronomers have tried to answer in recent years. The author, Mark Kidger, discusses 12 different mysteries, some simply questions that lay people might have about astronomy, along with some questions that astronomers wonder about. Kidger also discusses the future of the space program and how he thinks we are in danger of retreating. While all the chapters were very interesting, my favorites were 'What was the Christmas Star', 'How do We Know When Halley's Comet was Seen', and 'Going to the Planets'.

I liked 'What Was the Christmas Star' because Kidger provided a compelling explanation for the Star of Bethlehem. Kidger first reasons that Jesus was most likely born in the spring of 5 BC. (Dionysis Exiguus, who created the BC and AD system, did not include a year zero and forgot to include the four years that Caesar Augustus ruled as Octavian, which makes a five year error. Since shepherds were keeping watch over their sheep, it must have been in the springtime.) He also says that the Magi were most likely from Persia. Kidger then discusses various theories that have been proposed, including Venus, a meteor, a comet, a supernova, and a planetary conjunction. He explains why these explanations do not make sense, but does note that a triple conjunction of Jupiter and Saturn in 7 BC in Pisces may have put the Magi on alert. Finally, Kidger discusses the Chinese star, which was a 'bushy star', then thought to be a comet, that appeared in Aquila on March 31 of 5 BC. He notes that the 'comet' did not move in the sky which suggests it was actually a nova. Kidger contends that this nova was the Star of Bethlehem.

I learned a lot from 'How Do We Know When Halley's Comet was Seen?'. This chapter is about how people calculated when Halley's Comet had appeared before Edmond Halley found it to be periodic, and how people predicted when the comet would return. I learned that Halley's Comet does not come every 76 years. Its orbital period has decreased from 79.3 years between 1066 and 1145 to 74.4 years between 1910 and 1985, due to the influence of the planets. I also learned that ever since Edmond Halley predicted the comet's return, people have been trying to determine exactly when it would next reach perihelion. However, even accounting for the influence of all the planets, the orbit of Halley's Comet cannot be precisely predicted, since the jets of dust and gas produced when the comet passes the Sun, act as small rockets and change its orbit slightly. People have also calculated when Halley's Comet appeared previously. The most comprehensive calculations were done by Cowell and Crommelin in 1907. They calculated Halley's Comet's orbit back to 240 BC, identifying a comet seen that year as Halley's. I was really impressed because this was a huge calculation, possibly the most complicated ever done without a computer.

'Going to the Planets' is about Kidger's ideas for humanity's future in space. He discusses reasons to visit the planets, including the ability to learn more than is possible with robots. He also writes that building a moon base would make it easier to get to the planets, because of the Moon's lower gravity. He also mentions that atomic engines that generate continuous thrust would allow us to reach the planets much faster than conventional rockets; with travel to Mars taking only a month. He writes that there is great commercial interest in mining the asteroids and discusses the possibly of Terraforming Mars. He then writes that in the seventies it seemed we would soon visit Mars, but now send people no further than low Earth orbit. He would like to change that. I liked reading about Kidger's ideas for the future and hope that at least some of them are actively pursued.

Overall, *Astronomical Enigmas* is a pretty good read. There is a wide variety of topics, so I was able to learn a lot of different things. Having multiple topics means the book does not delve deeply into any of them, but Kidger added a list of suggestions for future reading at the end of each chapter. These include Internet websites, science fiction books, popular books, and more advanced books. I would recommend *Astronomical Enigmas* for anyone getting into astronomy, or for people who want to explore different topics in astronomy than they currently study.

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FOR SALE: Meade Starfinder 8" Reflector Telescope. Will Sell at a very reasonable price. Included are a Telrad Finder, Filters, and additional Lenses. Please contact Mr. Jim Moses at (520) 803-0913 or at email <jjmoses2@gmail.com>

How to contact the Nightfall editor, Cindy Lund:

Email: alund@juno.com
Phone 520-456-4817 Mail:
3666 Via El Soreno
Sierra Vista, AZ, 85650

Astronomy Day 2013

What will there be? Well, gather round and lend an ear. There will be solar viewing in both white light and through the amazing Hydrogen Alpha filter. There will be a 1,000 yard long scale model of the Solar System. The local NASA/JPL Solar System ambassador will be on site with his amazing expertise. Local experts and enthusiastic amateurs will be on hand to answer your questions. Various other exciting astronomical exhibits will be presented both inside and out.

April 20, 2013 (Saturday)
Sierra Vista Library
10:00 a.m. to Late Afternoon

www.hacastronomy.com Like us on Facebook

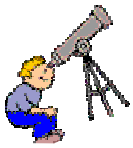
A Celebration!

Sierra Vista Mayor, Rick Mueller has declared by proclamation that ...

Saturday, April 20, 2013 is *International Astronomy Day*

in the City of Sierra Vista.

Come celebrate Astronomy Day with the



Huachuca Astronomy Club

at the

Sierra Vista Public Library

Festivities begin at 10AM and last all day

- Walk a giant scale model of the Solar System
- See sunspots larger than the Earth on the surface of the Sun, through our telescopes
- View the sun through the magic of hydrogen-alpha light and see its invisible mysteries revealed; you'll witness giant solar prominences and solar activity of awesome power.
- See our moon's craters, mountains and lava-filled plains in incredible detail.
- Talk with our members and learn about Astronomy
- Learn how to protect our dark night skies
- Visit the NASA Solar System Ambassador's display
- Pick up your free NASA Space Place bookmarks, post cards, stickers and tattoos for kids
- Have Fun, Learn, Discover. And it's FREE!

The Huachuca Astronomy Club is a 501(c)3 Scientific Educational Organization

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All outdoor activities are weather dependent. Solar activity is unpredictable and no guarantee is made that there will be the visible solar features as described above. Moon rise is at 2PM and lunar viewing will be a late afternoon event. All activities at your own risk. The Huachuca Astronomy Club, the Sierra Vista Public Library, and the City of Sierra Vista shall not be held responsible for any injury damage or loss associated with this event.

2013—ARIZONA's Astronomically Handy Sky Calendar from Doug Snyder & the H.A.C.—2013

ARIZONA Observers SKY EVENTS Calendar for 2013 —All Times shown are MOUNTAIN STANDARD TIME*

January 2013

HIGHLITE1: Moon & Jupiter on 21st
HL2(month):**•Saturn's•Rings•open•to•18°**
Note: **HAC** = **H**uachuca **A**stronomy **C**lub

03 Th Quadrantids Meteor Shower - unfavorable year due to Moon light! 04 Fr ☾ Last Quarter Moon 2058 hrs.
11 Fr ● **NEW MOON** 1244 hrs.(lunation#1114)
12 Sa **HAC** Member **S**tar **P**arty (S.P.)
17 Th **HAC** Pub. S.P.;P.O.; SS@1743h.
18 Fr ☽ First Quarter Moon 1645 hrs.
21 Mo MOON & Jupiter v. close, 2000h
25 Fr **HAC Meeting**, Cochise College, 1900 hrs
26 Sa ○ Full Moon, 2138 hrs.
29 Tu Zodiacal Lt. in W., pm, next two weeks after evening twilight.

February 2013

HIGHLITE: Merc. & Mars close on Feb. 8th

03 Su ☾ Last Quarter Moon 0656 hrs.
09 Sa **HAC** Member **S**tar **P**arty (S.P.)
10 Su ● **NEW MOON** 0020 hrs.
14 Th **HAC** Pub. S.P.; P.O.; SS@1808hrs. 15 Fr **NEA** 2012 DA14; to mag.12 in evening hrs.; size= 57meters; visit spaceweather.com
16 Sa Merc.•evening•planet•in•W.,•7"
17 Su ☽ First Quarter Moon 1331 hrs. 22 Fr **HAC Meeting,** Cochise College
25 Mo ○ Full Moon 1326 hrs.
27 We Zodiacal Lt. in W., pm, next two weeks after evening twilight

March 2013

HIGHLITE: Messier Marathon S.P. 04 Mo ☾ Last Quarter Moon 1453 hrs. 09 Sa **HAC Messier Marathon S.P.**
09 Sa **Comet Pan-Starrs** (C/2011 L4); 2100hrs, at Perihelion—Mag. 0?
11 Mo ● **NEW MOON** 1251 hrs.
14 Th **HAC** Pub. S.P.; P.O.; SS@1829h.
16 Sa **KartchnerCavernsStatePark**SP.
17 Su Moon&Jup. close;1900hrs; 1.4°
19 Tu ☽ First Quarter Moon 1027 hrs.
20 We **Vernal Equinox**, 0402 hrs.
22 Fr **HAC Meeting,** Cochise College
27 We ○ Full Moon 0227 hrs.
31 Su• Merc.•morning•planet•in•E.•size•9" Easter Sunday

April 2013

HIGHLITE: Saturn Opposition, 4/28
HL2: Comet Pan-Starrs (early in month & bright?)

02 Tu ☾ Last Quarter Moon, 2137 hrs. 06 Sa **HAC** Member S.P.
10 We ● **NEW MOON** 0235 hrs.
14 Su Jupiter within 4° of crescent Moon
18 Th ☽ First Quarter Moon 0531 hrs. Th **HAC** Pub. S.P.; P.O.; SS@1852h.
20 Sa **ASTRONOMY DAY—Global**
22 Mo Lyrid Meteors—v. unfavorable due to moonlight; peak 0400?
25 Th ○ Full Moon, 1257 hrs.
26 Fr **HAC Meeting,** Cochise College
28 Su Saturn at **Opposition,** 0100 hrs. mag.•+0.1,•size•18.8",•8.82•AU

May 2013

HIGHLITE: Merc., Venus, Jup. Conjunction! 02 Th ☾ Last Quarter Moon, 0414 hrs.
05 & 06 Su & Mo **η Aquarid Meteors**; favorable; pk@4am each morning; possibly 40 per hr.
09 Th ● **NEW MOON** 1728 hrs.
11 Sa **HAC** Member S.P.
16 Th **HAC** Pub. S.P.; P.O.; SS@1912hrs.
17 Fr ☽ First Quarter Moon 2134 hrs.
24 Fr ○ Full Moon, 2125 hrs. very shallow penumbral Lunar Eclipse, 1.5%; mostly undetectable, starts at 2053hrs.
24 Fr **HAC Meeting,** Cochise College
24-29 Planetary Conjunction, **best** of 2013;evening twilight line up of Merc.,Venus,Jup.;26th is !!
31 Fr ☾ Last Quarter Moon, 1158 hrs.

June 2013

HIGHLITE: [redacted](Gamma) Delphinids?

04 Tu Venus in **M35**, pm, low in NW
08 Sa ● **NEW MOON** 0856 hrs. **HAC** Member S.P.
11 Tu **Meteors-[redacted]**Del.; 0100-dawn? v. favorable year, activity is ??
12 We Merc. G. Elong. 24°, pm planet
13 Th **HAC** Pub. S.P.; P.O.; SS@1927hrs.
16 Su ☽ First Quarter Moon 1024 hrs. 20 Th Merc. 2° S. of Venus, pm
20 Th Summer **Solstice** 2204 hrs. 23 Su ○ Full Moon,0432h.largest of 2013 28 Fr **HAC Meeting,** Cochise College
29 Sa ☾ Last Quarter Moon, 2153 hrs.

July 2013

HIGHLITE: Mars, Jup., Merc., am, E., July **22nd**

01 Mo Pluto at Opposition,1800 hrs.
06 Fr Moon/Mars close; . low in E.,0430h.
08 Mo ● **NEW MOON** 0014 hrs.
15 Mo ☽ First Quarter Moon 2018 hrs.
22 Mo ○ Full Moon, 1116 hrs.
26 Fr **HAC Meeting,** Cochise College
29 Mo ☾ Last Quarter Moon, 1043 hrs.
29-30 Mo-Tu: **Meteors:** Delta(δ)Aquarids; am hrs.; favorable year

August 2013

HIGHLITE1: Perseid Meteor Shower
HL2: Moon/Planet pairings, am! & pm during month

06 Tu ● **NEW MOON** 1451 hrs
11-13 Su-Tu; **Perseids**; Pk. am of 12th; fast, bright
14 We ☽ First Quarter Moon 0356 hrs.
20 Tu ○ Full Moon, 1845 hrs.
23 Fr **HAC Meeting,** Cochise College
26 Mo **Neptune** at Opposition, 1900 hrs.
28 We ☾ Last Quarter Moon, 0235 hrs.

September 2013

HIGHLITE: Moon&Venus close, pm, 8th

03 Tu Zodiacal Lt. in E., am, next two weeks before twilight.
05 Th ● **NEW MOON** 0436 hrs.
12 Th ☽ First Quarter Moon 1008 hrs. **HAC** Public S.P., P.O.;SS@1830hrs.
19 Th ○ Full Moon (Harvest), 0413 hrs.
22 Su Fall **Equinox**,1344 h. (Aurora?)
26 Th ☾ Last Quarter Moon, 2055 hrs.
27 Fr **HAC Meeting,** Cochise College

October 2013

HIGHLITE: Jup. Dbl Shadow Transits (3) 17th, 18th, 26th; details online

03 Th Zodiacal Lt. in E.,am, next two wks. **Uranus** at Opposition, 0700 hrs.
04 Fr ● **NEW MOON** 1734 hrs. **HAC** Member S.P.
05 Sa **Kartchner Caverns StatePark** S.P.
10 Th **HAC** Public S.P., P.O.;SS@1755hrs.
11 Fr ☽ First Quarter Moon 0402 hrs.
12 Sa **Astronomy Day** (Autumn)
18 Fr ○ Full Moon,1638h.; Lunar eclipse @MR
25 Fr **HAC Meeting,** Cochise College
26 Sa ☾ Last Quarter Moon, 1640 hrs.

November 2013

HIGHLITE: Comet ISON (C/2012 S1) !!!! ??? 01 Fr Venus G. Elong. E.(47°),0100hrs., **pm** planet
02 Sa **HAC** Member S.P. Jup., dbl. Shadow Tr., 0414hrs., I & Eu;
03 Su ● **NEW MOON** 0550 hrs.
05 Tu S. Taurid meteors Pk., 0400 hrs.; favorable;
07 Th **HAC** Public S.P., P.O.; SS@1727 hrs.
09 Sa ☽ First Quarter Moon 2257 hrs.
17 Su ○ Full Moon, 0816 hrs.; Merc. **am** planet 22 Fr **HAC Meeting,** Cochise College
25 Mo ☾ Last Quarter Moon, 1228 hrs.
28 Th **Comet ISON**, **Perihelion** @ 1600hrs.
30 Sa **HAC** Member S.P. (for **December**)

December 2013

HIGHLITE: Comet ISON ??? !!!!

02 Mo ● **NEW MOON** 1722 hrs.
06 Fr Venus@greatest illumination, mag. -4.9,•26%•illuminated,•size•41" 09 Mo ☽ First Quarter Moon 1008 hrs. 12 Th **HAC** Public S.P., P.O.;SS@1714h. 13 Fr Geminid Meteors Pk. 2300h., fair? 14 Sa **HAC Meeting/XMAS Party** 17 Tu○ Full Moon,0413h.(smallest 2013)
21 Sa Winter **Solstice,** 1011 hrs.
22 Su Ursid Meteors Pk., 0700 hrs.
25 We ☾ Last Quarter Moon, 0648 hrs.
26 Th **C/ISON:** closest to Earth, 0300h.

*Times/Dates= ARIZONA Mountain Standard Time (NO DST; UT-7hrs); **updates/ details,** see: www.hacastronomy.com or http://skycalendar.blackskies.org;
Abbr: Tr=Transit; Pk=Peak; Merc=Mercury; E=East W=West; S=South; N=North; J, Jup.=Jupiter; V=Venus; v. = very; "=arc seconds; SS=SunSet; S.P.=Star Party; h., hrs.=hours (24 hour time system); MP=Minor Planet; MS=Moon Set; MR=Moon Rise; wks=weeks; Lt=Light; pm=evening; @=at; Pub.=Public ; NEA= **N**ear **E**arth **A**steroid; am=morning; mag.=magnitude; **meteor dates reflect predicted Peak Morning, but Moon may still be present; P.O.=Patterson Observatory; ;
I=Io; Eu=Europa; G=Ganymede; C=Callisto; UT=Universal Time; **bold text=**possibly a promising/worthy event, activity or object; G_Elong=Greatest Elongation; dbl= double; AU=Astronomical Unit; °= degrees; *compiler*: **Doug Snyder** (C/2002 E2, MP15512); V1.1.2013