Nightfall

Monthly publication of the Huachuca Astronomy Club

JULY 2014

President's Notes

Well it is July, the rains should be starting any day now, and if not, I am going to have to ask one of you to make a significant but humane sacrifice. The only quasi-scientifically proven means to produce cloud cover and any sizable amount of rainfall is to purchase very fine pieces of astronomical equipment. Of course, it will be a hardship, buying a new telescope, eyepiece or astro-widget always is, but it is for the good of the whole. That said, let us move on.

While we may have partially cloudy days and nights there will be times of crystal clarity; so be ready. The Milky Way is up all night just waiting to be examined and rediscovered. If you are worried about the fickle weather dousing your equipment, don't try to set up your big telescope. Just use binoculars. Last week Nancy and I had a wonderful time at the Rocky Mountain Star Stare (RMSS) scanning the sky with small and large binocs. I was able to catch Comet PanSTARRS 2012 K1, in the early evening sky, using small (8x42) binoculars. Even with the 8x42s you could see a condensed coma and a bit of a fan tail. With 22x100 binoculars, we could just discern the fantail is in fact two tails.

Throughout our four-night stay at RMSS we did a great deal of our observing using binocs, and never ran out of objects to target. Really, many of the Messier objects, large bright nebulae and the dark lanes that crisscross the Milky Way stand out better at the low powers of binocs when viewed from a dark sky like RMSS and ours. Just point towards Sagittarius and Scorpio and start wandering around the star clouds. Surely, you can spend what few quality night time hours we have this month gazing at our own galaxy.

Image by Rick Burke, April-May 2014

Our Next Meeting

The July meeting of the Huachuca Astronomy Club will be on Friday, July 11 at 7PM in the Student Union Building, Community Room at Cochise College, 901 N. Colombo Avenue, Sierra Vista. This month's speaker is Glenn Minuth. His presentation, entitled "What Does it Take to Make a Telescope?" will retrace the construction of the Mt. Graham International Observatory (MGIO). MGIO was conceived and constructed amidst much local controversy and in this talk, Mr. Minuth will revisit the history of the project to examine the many legal, societal and environmental challenges that the project faced. There will be special emphasis on the supposed impacts to the surrounding Sky Island ecosystem and what has transpired since the construction of the scopes. This presentation may stimulate you to visit the scopes, but be aware of the requirements surrounding your visit! Find out what it takes to visit the MGIO.

Glenn Minuth is a respected educator, lecturer and scientist with a wide range of academic interests. Glenn's federal civil service career has spanned 33 years. He has a graduate degree is in geomorphology with focus areas in cartography, remote sensing, and geology.
His local academic interests in the greater southeastern Arizona area involve geology (including: ancient fossilized coral reefs, metamorphic core complexes, copper mining, speleology (caves), and volcanic terrains), astronomy, agriculture, forest fire ecology, sky island biogeography, monsoon season dynamics, and military history/staff rides covering the Apache Campaign.

Congratulations, Glen Sanner!

Congratulations are in order for Glen Sanner who has completed the requirements of the Astronomical League's Master Observer Award. This is a most significant accomplishment.

To qualify as a Master Observer, there are five *core* programs that have to be completed. These are the most popular AL awards: The Messier Program (honorary level), the Lunar Program, the Herschel 400 program, the Double Star program and the Binocular Messier program.

Five additional programs of the observer's choice must be completed. Glen's elective programs were the Galaxy Groups and Clusters program, Globular Cluster program, Flat Galaxies Program (Honorary), Northern Arp program and the Binocular Deep Sky program. These are some of the most challenging programs offered by the League, and they represent a considerable amount of work.

Glen is just the fifth HAC member to earn a Master Observer Award. Congratulations, Glen, great job!

A Glorious Gravitational Lens

By Dr. Ethan Siegel

As we look at the universe on larger and larger scales, from stars to galaxies to groups to the largest galaxy clusters, we become able to perceive objects that are significantly farther away. But as we consider these larger classes of objects, they don't merely emit increased amounts of light, but they *also* contain increased amounts of **mass**. Under the best of circumstances, these gravitational clumps can open up a window to the distant universe well beyond what any astronomer could hope to see otherwise.

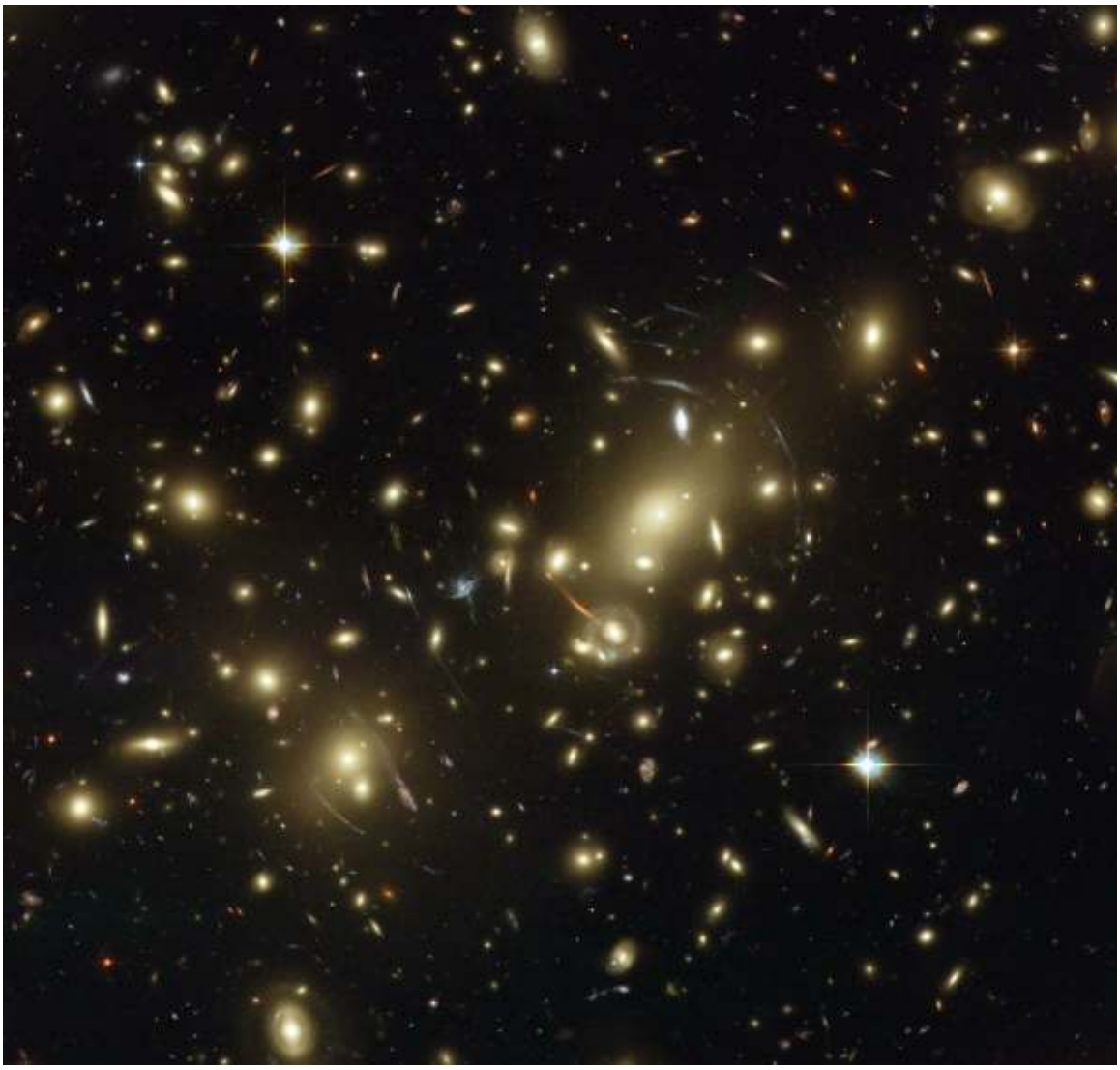
The oldest style of telescope is the refractor, where light from an arbitrarily distant source is passed through a converging lens. The incoming light rays—initially spread over a large area—are brought together at a point on the opposite side of the lens, with light rays from significantly closer sources bent in characteristic ways as well. While the universe doesn't consist of large optical lenses, **mass itself** is capable of bending light in accord with Einstein's theory of General Relativity, and acts as a *gravitational* lens!

The first prediction that real-life galaxy clusters would behave as such lenses came from Fritz Zwicky in 1937. These foreground masses would lead to multiple images and distorted arcs of the same lensed background object, all of which would be magnified as well. It wasn't until 1979, however, that this process was confirmed with the observation of the Twin Quasar: QSO 0957+561. Gravitational lensing requires a serendipitous alignment of a massive foreground galaxy cluster with a background galaxy (or cluster) in the right location to be seen by an observer at our location, but the universe is kind enough to provide us with many such examples of this good fortune, including one accessible to astrophotographers with 11" scopes and larger: Abell 2218.

Located in the Constellation of Draco at position (J2000): R.A. 16h 35m 54s, Dec. +66° 13' 00" (about 2° North of the star 18 Draconis), Abell 2218 is an extremely massive cluster of about 10,000 galaxies located 2 billion light years away, but it's *also* located quite close to the zenith for northern hemisphere observers, making it a great target for deep-sky astrophotography. Multiple images and sweeping arcs abound between magnitudes 17 and 20, and include galaxies at a variety of redshifts ranging from z=0.7 all the way up to z=2.5, with farther ones at even fainter magnitudes unveiled by Hubble. For those looking for an astronomical challenge this summer, take a shot at Abell 2218, a cluster responsible for perhaps the most glorious gravitational lens visible from Earth!

Learn about current efforts to study gravitational lensing using NASA facilities: http://www.nasa.gov/press/2014/january/nasas-fermi-makes-first-gamma-ray-study-of-a-gravitational-lens/

Kids can learn about gravity at NASA's Space Place: http://spaceplace.nasa.gov/what-is-gravity/



Abel 2218. Image credit: NASA, ESA, and Johan Richard (Caltech). Acknowledgement: Davide de Martin & James Long (ESA/Hubble).

NASA's Space Place (*spaceplace.nasa.gov/)* is an educational website about space, space exploration, and Earth science. It is fun for kids of all ages but targets upper-elementary aged children. Youngsters will find informative articles, hands-on activities, and interactive web games on the site. There are also resources for parents and educators. The Huachuca Astronomy Club and the Patterson Observatory are both Space Place partners. In addition to providing us with informative articles for our newsletter, the NASA Space Place supplies HAC with kid friendly materials like stickers, tattoos, and book marks that greatly enhance our outreach activities.

Pictures from the University of Arizona's Steward Observatory Mirror Lab tour

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www.hacastronomy.com -- A great place to visit!

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FOR SALE: Mirror Blank. 13 7/8" diameter by 4 1/2" thick. Pyrex Glass with no scratches or bubbles. Very Rare - Perfect for doing a large binocular. $75.00
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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.
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FOR SALE: Celestron Celestar 8 inch S/C Deluxe - $1200. Will also sell pieces individually
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2014—Astronomically Handy Sky Calendar from Doug Snyder & the H.A.C.—2014

ARIZONA Observers SKY EVENTS Calendar for 2014 —All Times listed are MOUNTAIN STANDARD

JANUARY 2014

HIGHLITES:

Quadrantid Meteors
Jupiter at Opposition

01 We ● **NEW MOON** 0414 hrs. (MST)
03 Fr **QUADRANTIDS** Meteor Shower very favorable; view after midnight; radiant near constellation Bootes; possible hourly rate of up to 120
04 Sa Earth at perihelion 0500hrs.; 0.983 A.U.
04 Sa **HAC** Member Star Party (S.P.)
05 Su JUPITER AT OPPOSITION 1400 hrs.; Mag. –2.7 distance=4.2 AU size=47″
07 Tu ☽ First Quarter Moon 2040 hrs.
09 Th **HAC** Public S.P.; P.O.;SS@ 1735 hrs.
10 Fr **HAC Meeting,** Cochise College 7pm
15 We ○ Full Moon 2153 hrs.; smallest of 2014
23 Th ☾ Last Quarter Moon 2220 hr
25 Sa Saturn 1.2° north of Moon, 0535 hrs.
30 Th ● **NEW MOON** 1439 hrs.; lunation 1127
31 Fr Mercury G_ Elong. East (18☒0300 h., view as 'evening' star in western sky 1/2 hour after sunset; mag. –0.7

Jupiter's Galilean Moons—January 2014
There are no double-transit events this month, but satellite Callisto has four encounters with its mother planet (local dates and times):
1/11:1944 hrs. Occultation Disappearance
1/12: 0044 hrs. Eclipse Reappearance
1/20: 0438 hrs. Transit Ingress
1/28: 1854 hrs. Eclipse Reappearance
Note:**HAC=H**uachuca **A**stronomy **C**lub

FEBRUARY 2014

HIGHLITES:

Venus at its brightest,
Callisto's Shadow on Jupiter

01 Sa **HAC** Member S.P.
06 Th ☽ First Quarter Moon 1221 hrs.
Double Shadow Transit, Jupiter; 0323 hrs. (Europa & Callisto); rare
HAC Public S.P.; P.O.;SS@ 1800 hrs.
07 Fr Alpha Centaurid Meteors, Pk. 2305 hrs. Radiant point in southern hemisphere
11 Tu Venus greatest magnitude: -4.6, 1600h.
14 Fr ○ Full Moon 1654 hrs.
HAC Meeting, Cochise College 7pm
15 Sa Venus at greatest illumination, mag.-4.9; morning 'star' in southeast sky
17 Mo Zodiacal Light in the west for next two weeks following evening twilight
19 We Spica (star) within 2.5° of Moon,0500 h.
22 Sa ☾ Last Quarter Moon 1016 hrs.
26 We Venus within 6° of Moon, 0500 hrs.

Long Period Variable Stars– Feb. 2014
Verify with www.aavso.org ;listed are stars brighter than mag. 8 at max.: period in days (d);date is predicted epoch max.

0228-13;U Cet;7.5>12.6;235d;Feb.10
1811+36;W Lyr;7.9>12.2;196d;Feb.17
1901+08;R Aql;6.1>11.5;267d; Feb.15
2044-05;T Aqr;7.7>13.1;202d; Feb. 04

MARCH 2014

HIGHLITES:

Kartchner Caverns S.P.(22)
Messier Marathon?(29)

01 Sa ● **NEW MOON** 0100 hrs.
01 Sa **HAC** Member S.P.
06 Th **HAC** Public S.P.; P.O.; SS@1823 hrs.
08 Sa ☽ First Quarter Moon 0628 hrs.
14 Fr Mercury G_Elong. W. (28°); morning 'star' in twilight to the east
14 Fr **HAC Meeting,** Cochise College 7pm
16 Su ○ Full Moon 1010 hrs.
18 Tu Zodiacal Light in the west for next two two weeks following evening twilight
20 Th **Vernal Equinox** 0957 hrs.
21 Fr Saturn close (north) to Moon
22 Sa **Kartchner Caverns S.P. ;**1830 hrs.
23 Su ☾ Last Quarter Moon 1847 hrs.
29 Sa **HAC Messier Marathon**-Proposed This date 110 objects should be visible
30 Su ● **NEW MOON** 1146 hrs.

Possible Favorable Periodic Comets—Reaching Perihelion March 2014
Obtain elements/ephemerides at www.minorplanetcenter.net; listed dates/times are in UT (to retain MPC accuracy)
P/2007 H3 (Garradd); Mar 01.23;1.8 AU
P/2008 A2 (LINEAR); Mar 03.40; 1.3 AU
52P (Harrington-Abell); Mar 07.54; 1.8 AU
290P/1998 U3(Jager); Mar 12.57; 2.15 AU
117P/Helin-Roman-Alu; Mar 27.16; 3.0 AU

APRIL 2014

*HIGHLITE: **Total Lunar Eclipse (1 of 2 in 2014)***

03 Th **HAC** Public S.P.; P.O.; SS@1841 hrs.
07 Mo ☽ First Quarter Moon 0132 hrs.
08 Tu MARS at opposition, 1400 hrs.
09 We Comet 124P (Mrkos) at perihelion 0738 hrs.; perihelion distance 1.6 AU
11 Fr **HAC Meeting,** Cochise College 7pm
12 Sa Asteroid 4 Vesta at opposition 2200hrs.
14 Mo Mars closest approach, 0600 hrs.; 0.62 AU from Earth, mag. –1.5; Size:15.2 arc-seconds
14>15 (Mo>Tu): **Total Lunar Eclipse** 2157 hrs. (14th) to 0337 h.(15th) Total from 0010h. to 0124h. (15th)
15 Tu ○ Full Moon 0043 hrs.
17 Th Saturn close (north) to Moon, 0000h.
22 Tu ☾ Last Quarter Moon 0053 hrs.
23 We **Lyrid Meteor Shower,** Pk. 1045 h.; some 46% moon; view on 23rd am
26 Sa **HAC** Member S.P.
28 Tu ● **NEW MOON** 2315 hrs.

MAY 2014

*HIGHLITE: **Astronomy Day & Saturn at opposition, May 10***

01 Th **HAC** Public S.P.; P.O.; SS@1900 hrs.
1 Th Mercury @ perihelion; evening star, mag. –1.6; view WNW at dusk
6 Tu **Eta Aquarid Meteor Shower**, Pk@ 0100 hrs.;40% Moon; rate 60+?
06 Tu ☽ First Quarter Moon 2016 hrs.
09 Fr **HAC Meeting,** Cochise College 7pm
10 Sa **NATIONAL ASTRONOMY DAY** (**HAC** event at Sierra Vista City Library)
10 Sa **Saturn** at opposition, 1100 hrs.; mag. +0.1, 8.9 AU from Earth, total size of 42.4″ (planet itself 18.7″)
14 We ○ Full Moon 1217 hrs.
21 We ☾ Last Quarter Moon 0600 hrs.
24 Sa **NEW** Meteor Shower? Predicted strong peak from Midnight to 0100 on am of 24th; radiant in Camelopardalis; from Comet 209P/LINEAR; best of 2014?
28 We ● **NEW MOON** 1141 hrs.
31 Sa **HAC** Member S.P.

JUNE 2014

HIGHLITE:

Venus/Moon Conjunction
(photo-op?)

05 Th **HAC** Public S.P.; P.O.;SS@1923 hrs.
☽ First Quarter Moon 1340 hrs.
12 Th ○ Full Moon 2112 hrs.
13 Fr **HAC Meeting,** Cochise College 7pm
19 Th ☾ Last Quarter Moon 1140 hrs.
21 Sa **Summer Solstice** 0351 hrs.
24 Tu Conjunction of crescent 7% Moon and Venus; 0518 to ENE
27 Fr June Bootids Meteor Shower; overhead to dawn on 27th; may show outburst
27 Fr ● **NEW MOON** 0109 hrs.
28 Sa **HAC** Member S.P.

Long Period Variable Stars–June 2014
Verify with www.aavso.org ;listed are stars brighter than mag. 8 at max.: period in days (d);date is predicted epoch max.

1946+32; x Cyg; 5.2>13.4; 407d; Jun 24
1432+27; R Boo; 7.2>12.3; 223d; Jun 21

*Times/Dates= ARIZONA Mountain STANDARD Time (MST; 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; dbl= double; I=Io; Eu=Europa; G=Ganymede; C=Callisto; UT=Universal Time; **bold text=**possibly a promising/noteworthy event, activity or object; G_Elong=Greatest Elongation; AU=Astronomical Unit (93 million miles); °= degrees; *compiler*: **Doug Snyder**(C/2002 E2,MP15512, starhaven@me.com);V1.1.2014

2014–Astronomically Handy Sky Calendar from Doug Snyder & the H.A.C.–2014

ARIZONA Observers SKY EVENTS Calendar for 2014 –All Times shown are MOUNTAIN STANDARD TIME*

JULY 2014

HIGHLITE: Due to Monsoons, no scheduled observing events

03 Th Earth at aphelion,1700 hrs.; 1.016 AU
04 Fr Pluto at opposition, 0100 hrs.; mag. 14.1, distance 32.5 AU
05 Sa ☽ First Quarter Moon 0500 hrs.
07 Mo Saturn within 1.5° of 76% Moon; 2030 hrs.
11 Fr **HAC Meeting,** Cochise College, 7 pm
12 Sa ○ Full Moon 0426 hrs.
12 Sa Mercury G_Elong. W. (21°); morning 'star' in East, mag. +0.4; reaches mag. 0.0 on July 15
18 Fr ☾ Last Quarter Moon 1909 hrs.
26 Sa ● **NEW MOON** 1543 hrs.
29 Tu **Delta Aquarids** Meteor Shower Pk. at 0200 hrs.; rate may approach 20 per hour, some persistent trains.
30 We Alpha Capricornids Meteors– weak, slow moving, but yellowish fireballs can be photogenic; best rate of 5/hour?

July (first-half): C/2012 K1; evening hrs. in LEO; mag 7?

AUGUST 2014

HIGHLITE: Monsoon Season; Choose your own Highlite !

03 Su ☽ First Quarter Moon 1751 hrs.
08 Fr **HAC Meeting,** Cochise College, 7 pm
10 Su ○ Full Moon 1110 hrs; **largest** of 2014
12>13 Tu>We Perseid Meteor Shower Pk. at 1700 hrs. on the 12th; v. unfavorable due to strong moonlight; rates can be high as 90/hour under dark skies
17 Su **Conjunction:** Venus/Jupiter within 1.0° and close to Beehive cluster; 0500 hrs.; But very low in the ENE skies; closest planet-planet conjunction of 2014
17 Su ☾ Last Quarter Moon 0527 hrs.
24 Su Comet Siding Spring (C/2013 A1) at opposition, 1800 hrs.; may collide with MARS in mid-October !
25 Mo ● **NEW MOON** 0714 hrs.
29 Fr Neptune at opposition, 0800 hrs.; mag. +7.8; distance 29 AU; size 2.4"
31 Su Moon/Saturn/Mars within 5° circle; Moon will be at about 35%; 2000 hrs.

SEPTEMBER 2014

HIGHLITE: Comet Possibilities

01 Mo Aurigid Meteor Shower; peak after midnight of Aug. 31 and into morning of Sept.01; fast and many are bright ; low hourly rate (5) but may outburst
02 Tu ☽ First Quarter Moon 0412 hrs.
08 Mo ○ Full Moon 1839 hrs; Harvest Moon
12 Fr **HAC Meeting,** Cochise College, 7 pm
15 Mo ☾ Last Quarter Moon 1906 hrs.
20 Sa **Kartchner Caverns/HAC S.P.,** dusk
21 Su Zodiacal Light in east before morning twilight for next two weeks
22 Mo **Autumnal Equinox** 1929 hrs.
23 Tu ● **NEW MOON** 2315 hrs.
25 Th **HAC** Public S.P.; P.O.; SS@1813 hrs.
27 Sa **Saturn** within 2° of 14% Moon, low in the WSW, 2000 hrs.

Comet Possibilities for September 2014
C/2013 A1:v.low in S., early evening;9/17>9/30 (Siding Spring); encounter MARS on 10/19
C/2012 K1: low in E., early morning; 9/1>9/30
C/2013 V5: low in E., morning; 9/1>9/13

OCTOBER 2014

HIGHLITES: MARS & COMET; 1 LUNAR ECLIPSE & 1 SOLAR ECLIPSE IN SAME MONTH !

01 We ☽ First Quarter Moon 1233 hrs.
04 Sa **NATIONAL ASTRONOMY DAY** **HAC** opens Patterson Observatory for Public Exhibits and Viewing
07 Tu Uranus at opposition, 1400 hrs.
08 We ○ Full Moon 0351 hrs.
08 We **TOTAL LUNAR ECLIPSE** Start: 0117hrs., End: shortly after moonset at 0630 hrs.; Totality: 0328 h. to 0423 hrs.
09 Th Draconids Meteor Shower; unfavorable due to bright Moonlight
10 Fr S. Taurids Meteor Shower; Pk. 0500h.
10 Fr **HAC Meeting,** Cochise College, 7 pm
15 We ☾ Last Quarter Moon 1213 hrs.
19 Su **Comet Siding Spring** (C/2013 A1) **Close** Encounter/Graze with **MARS!**
20 Mo Zodiacal Light in East before morning twilight for next two weeks
21 Tu **Orionid Meteor Shower**; v. favorable; Swift, some bright, rate about 20+/hr.
23 Th ● **NEW MOON** 1457 hrs.
23 Th Partial **Solar ECLIPSE,** Start:1430 hrs. End: 1648 hrs.; max: 1543 hrs.(29.3%) **HAC** viewing at S.V. City Library, 1 pm
25 Sa **HAC** Member S.P.
30 Th **HAC** Public S.P.; P.O.; SS@1733
30 Th ☽ First Quarter Moon 1949 hrs.

NOVEMBER 2014

HIGHLITE: METEORS & FIREBALLS

01 Sa Mercury at G_Elong. W.(19°), 0600 hrs.; **best** morning apparition of 2014, east
06 Th C/2012 K1 (PanSTARRS) at (2nd) opposition, 2000 hrs., in Pictor; possibly will or will have brightened to mag. 6
06 Th ○ Full Moon 1523 hrs.
11 Tu North Taurids Meteor Shower; rate of about 5/hr; waning 77% moon & bright
14 Fr **HAC Meeting,** Cochise College, 7 pm
14 Fr ☾ Last Quarter Moon 0816 hrs.
17>18 Mo>Tu **Leonid Meteor Shower** Peak at 1500 hrs on 17th; view pm hrs on 17th into am hours on 18th; about 20% moon; fast meteors & bright; a good number leave persistent 'trails' ; no 'storm' has been predicted, but do you remember 2001? Some of us do. WOW.
20 Th **HAC** Public S.P.; P.O.; SS@1720 hrs.
22 Sa ● **NEW MOON** 0532 hrs.
22 Sa **HAC** Member S.P.
29 Sa ☽ First Quarter Moon 0306 hrs.

Comet Of The Month—An Observing and Imaging Challenge for C/2012 K1 (PanSTARRS)
Throughout November, this comet will remain VERY low near our southern horizon and reside in these constellations: Pictor, Dorado, Phoenix, Reticulum, Horologium, and Eridanus, but may reach mag. 6 this month. Close encounter with Globular Cluster NGC1261 on 11/13; good luck!

DECEMBER 2014

HIGHLITE: GEMINID METEOR SHOWER

06 Sa ○ Full Moon 0527 hrs.
12 Fr **HAC Meeting,** Cochise College, 7 pm
13 Sa **Geminid** Meteor Shower Pk. Favorable Year, but with 50% moon; Pk. 0500 hrs. Saturday am; hourly rate can be as high as 120/hr.; mostly bright, few leaving 'trains';12/14 (Sunday) morning activity is possible also; Parent body is asteroid 3200 Phaethon (1.5 year orbit); radiant is near Castor
14 Su ☾ Last Quarter Moon 0551 hrs.
15 Mo **Dbl. Shadow Transit**, J. ; 2312 hrs. (Europa & Io); Note: At 0025 hrs. on 12/16, **both** Europa & Io will be in the process of transiting Jupiter! See 'em?
18 Th **HAC** Public S.P.; P.O.; SS@1721 hrs.
20 Sa **HAC** Member S.P.
21 Su Winter Solstice, 1603 hrs.
21 Su ● **NEW MOON** 1836 hrs..
22 Mo Ursids Meteor Shower Pk. 1300 hrs.; good date, but poor peak timing; (favors northern Asia); radiant is near β Ursa Minor (Kokab); rate is about 10/hour; faint, with a few fireballs. Parent comet is 8P Tuttle
25 Th *MERRY CHRISTMAS TO ALL !*
28 Su ☽ First Quarter Moon 1132 hrs.
28 Su Conjunction of Moon and Uranus; 2245 hrs.; less than 1.0° apart; first quarter Moon and mag. 5.8 Uranus

HAPPY NEW YEAR !

*Times/Dates= ARIZONA Mountain STANDARD Time (NO DST; UT-7hrs); **updates/ details,** see: www.hacastronomy.com or http://skycalendar.blackskies.org;
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