

October 2012

President's Notes

Next Meeting: The next meeting of the Huachuca Astronomy Club will be Friday, October 5, 2012 at the Student Union Building, Community Room at Cochise College at 7 pm. The guest speaker will be the Astronomical League's Planetary Nebula observing program coordinator and HAC member, Ted Forte. Planetary Nebulae are perhaps the most beautiful, mysterious, and colorful of deep sky objects. But they have absolutely nothing to do with planets. Ted's talk will describe what we know about these most interesting of celestial jewels and outline this very challenging observing program. Ted is a contributing editor of Sky & Telescope Magazine and the author of several articles on deep sky observing including Flowers of the Night Sky. He observes the heavens from his home observatory outside of Sierra Vista.

Star Night at Kartchner Caverns State Park: The weather was great and all was well at our September 15 Star Night. After the talk and once the sun went down, telescopes were put into action. At my telescope we started with Saturn. I thought it might be too low, but someone at a nearby scope said "No, it's just above the mountains in the west." The atmospheric distortion was significant, but nonetheless, a number of people said "WOW!" at my telescope. That always makes my day.

I'd like to thank all the HAC members who were able to attend and/or bring telescopes. Kim Rogalski brought the Cochise College H alpha scope, Chris Ubing (astronomy-physics instructor at Cochise College) had a small refractor, Ted Forte brought a big light bucket, Howard Day brought Barb's scope, Dave Roemer and his wife were there early with a solar scope and stayed late, Tommy (HAC member and Brown Canyon Ranch host) helped, Katherine Zellerbach and Bill Howard attended, our News Editor Cindy Lund, and many others attended. Doug Snyder was there taking photos, and Doug gave us a heads up on the Iridium flare. The Iridium flare was so bright that it attracted attention. Thanks to you all.



To the left: Young astronomers at the telescope of HAC members David Roemer and Nancy Hannaford.

Starizona: Dean Koenig continues to be most generous to our club. In addition to visiting Starizona in person, we can also order much needed astronomy items from their website: www.starizona.com.

Public Night at the Patterson: The next Patterson Observatory public night is October 18. We had another great turnout at the last public night on September 20, and this event is growing in popularity.

HAC annual Picnic: The 30th anniversary HAC picnic will be at Glen and Deanna's place on Saturday, October 13. If you would like to attend this potluck celebration, please contact Glen Sanner at 803-0576 or email longeyes1@msn.com.

Audubon Research Ranch: We are also planning an astronomy night with a talk and telescopes at the Audubon Society's Research Ranch near Elgin on Oct 20. If you would like to bring a telescope and need directions, please let me know at RLGent@cox.net.

Return to Douglas: Yes, it's a long drive to Paul Huber Middle School in Douglas, but last year's star party extravaganza was so exciting, we are doing it again. This event is planned on Tuesday evening October 23. Last year we had about 300 students, teachers, parents, and friends, so we will need a lot of help again this year.

Arizona Science and Astronomy Expo: On Friday and Saturday, November 10 and 11, the ASAE will be held at the Tucson Convention Center. This is a big deal! The organizer is none other than Alan Traino who runs the biggest astronomy show on the planet, called NEAF. NEAF is held near New York City, and it will be great to have an event of this magnitude in our back yard. As it now stands, many dozens of vendors and organizations will have booths at this expo. Don't miss it!

HAC Meeting Schedule for 2013: We will be meeting on the fourth Friday of the month next year. That's generally closest to the full moon. Again, we will meet in the Community Room of the Student Union at Cochise College on the following dates: Jan 25, Feb 22, March 22, April 26, May 24, June 28, July 26, August 23, Sept 27, Oct 25, and Nov 22. The fourth Friday of December is too close to Christmas, so instead of a regular meeting, we will hold a party on December 14 -- location TBD.

Candidates for HAC Board of directors: I'd like to thank Robert Kelher for his outstanding work with the nominating committee. We have put the slate together, and the elections will be held at our November meeting. For those running for reelection, thank you for your service, and for those stepping down, like Glen Sanner and Keith Mullen, we greatly appreciate all you have done and continue to do for HAC!

President: Bob Gent
Vice President, Kim Rogalski
Secretary: Ted Forte
Treasurer: Bob Kepple

Members at Large:

Duke Glishke
Bob Hoover
Ken Kirchner
Doug Snyder

Past President: Wayne Johnson (not elected position)

Clear skies and bright stars,

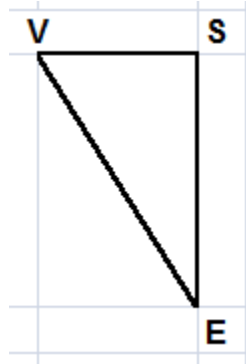
Bob Gent
President, Huachuca Astronomy Club

GREATEST ELONGATIONS by Tommy Neyhart

VENUS

As Venus makes its 225 Earth day trek around the sun, it reaches several points of particular interest to an observer on Earth.

As it crosses an imaginary point on the opposite side of the sun to Earth, called Superior Conjunction, it begins to travel almost straight toward the Earth. As it does, it appears to slowly separate from the Sun, setting increasingly later each night. After a couple of months, it reaches a point in its orbit where it forms a right triangle between the Earth, Sun, and Venus, with the right angle of the triangle becoming next to the Sun.



“S” = Sun; “V” = Venus, and “E” = Earth.

A short time later, Venus reaches a point where it has the largest angle of separation from the Sun. Called Greatest Eastern Elongation, there is another right angle formed between the Earth, Venus, and the Sun. This time the right angle of the triangle is next to Venus (see illustration below). The points of maximum separation on a standard clock face, where the Earth is underneath the clock, are 8:00 (Greatest Eastern Elongation) and 4:00 o'clock (Greatest Western Elongation). See the next three illustrations.

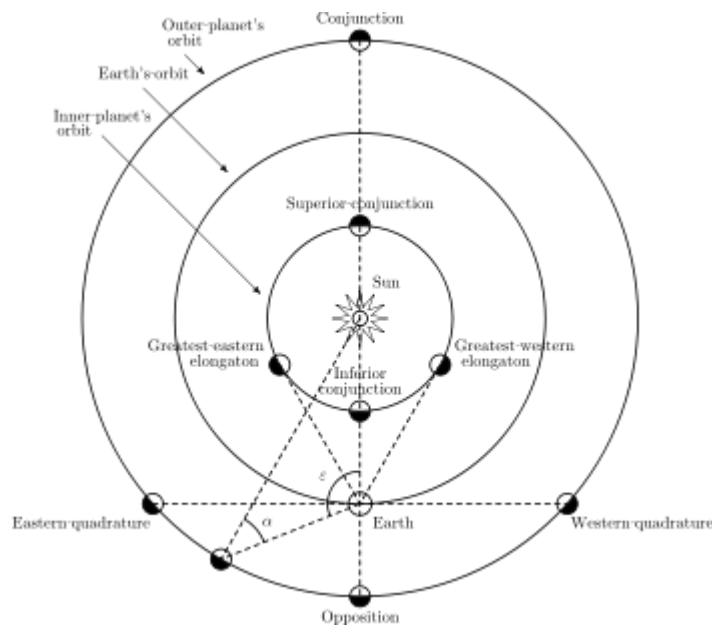


Diagram A

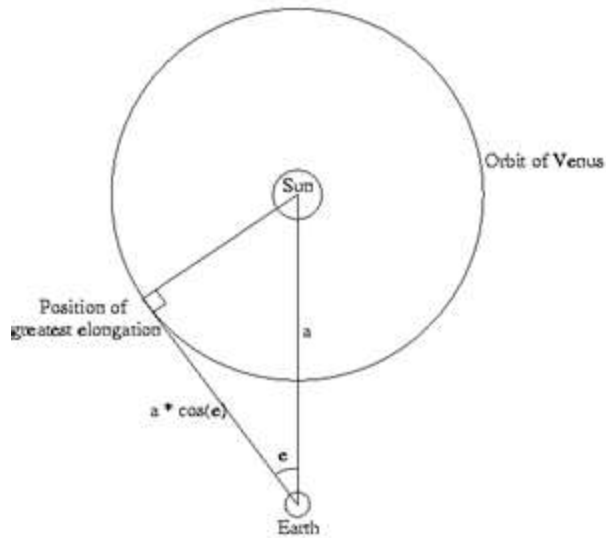


Diagram B

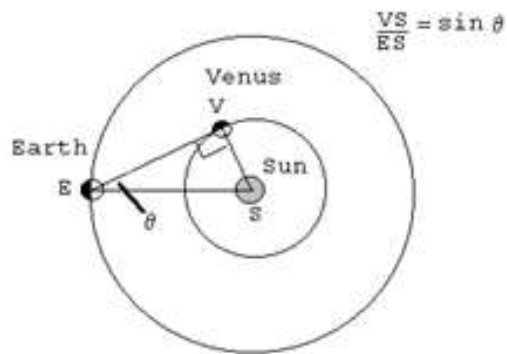


Diagram C

Knowing the distances that both Venus and the Earth are from the Sun, applying trigonometry can tell us the angle of separation at Greatest Eastern and Western Elongations.

Venus is 68 million miles from the Sun and the Earth is 93,000,000 miles. Knowing these two distances, the angle of separation can be calculated as follow:

$$\sin \Theta = \text{opposite side} / \text{hypotenuse} = 68,000,000 / 93,000,000 = 0.731 = 46.97^\circ$$

NOTE: The two figures shown are the approximate average distances to the Sun of both the Earth and Venus, as they have nearly circular orbits.

Following Greatest Eastern Elongation, as Venus continues its counterclockwise orbit around the Sun as seen looking down from above the Sun, the angle of separation decreases until Venus arrives at a point directly between the Earth and Sun. This is called Inferior Conjunction. As it crosses this point in its orbit, it suddenly becomes visible in the morning sky. It appears to rush to Greatest Western Elongation, taking much less time to reach this point of elongation than when it was first seen in the night sky and it later arrived at Greatest Eastern Elongation. But why?

Refer to the *Diagram B* above. Note the distance between Venus' Superior Conjunction and Greatest Eastern Elongation. Compare this distance to that between Inferior Conjunction and Greatest Western Elongation. The distance of the second, and time (see chart below), is nearly one-third the first distance, explaining why Venus climbs so dramatically away from the Sun in the morning sky with each passing day after Inferior Conjunction, as compared to when it crossed Superior Conjunction and the evening sky, then slowly made its way to Greatest Eastern Elongation.

Orbital Point	Date	Days
Superior Conjunction	August 16, 2011	
Greatest Eastern Elongation	March 27, 2012	224
Inferior Conjunction	June 6, 2012	71
Greatest Western Elongation	August 15, 2012	70
Superior Conjunction	March 28, 2013	225

From the ephemeris details above, you can see that Venus takes 224 Earth days to go from Superior Conjunction, where it crosses over to the east side of the Sun and appears in the evening sky, to Greatest Eastern Elongation, yet it takes only 70 Earth days to travel from Inferior Conjunction, where it crosses over to the west side of the Sun and appears in the morning sky, to Greatest Western Elongation, supporting the explanation and corresponding diagrams above.

MERCURY

Even though Mercury has different orbital elements, and is only 36,000,000 miles from the Sun, the way of calculating its maximum separation from the Sun is the same. Here is the calculation:

$$\sin \Theta = \text{opposite side} / \text{hypotenuse} = 36,000,000 / 93,000,000 = 0.387 = 22.8^\circ$$

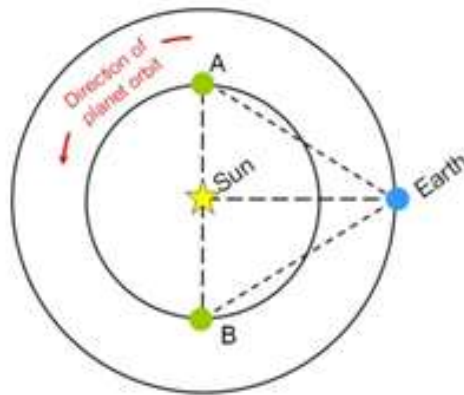
NOTE: With Mercury's greater orbital eccentricity, the above results could be off by a degree.

Orbital Point	Date	Days
Superior Conjunction	September 10, 2012	
Greatest Eastern Elongation	October 27, 2012	47
Inferior Conjunction	November 17, 2012	21
Greatest Western Elongation	December 5, 2012	18
Superior Conjunction	January 18, 2013	44

From the ephemeris details above, you can see that Mercury takes 47 Earth days to go from Superior Conjunction to Greatest Eastern Elongation, yet it takes only 18 Earth days to travel from Inferior Conjunction to Greatest Western Elongation, again supporting the explanation and corresponding diagrams above.

Epilogue

The following illustration, found on a college's website, is incorrect. Points A and B are when Venus forms right angles with the Sun, NOT the points of maximum separation from the Sun!



In the above incorrect illustration, the two elongations are at 6:00 and 12:00 o'clock respectively, NOT 5:00 and 1:00 o'clock as they should be.

DOING SCIENCE WITH A SPACECRAFT'S SIGNAL

David Doody

Mariner 2 to Venus, the first interplanetary flight, was launched August 27 fifty years ago. This was a time when scientists were first learning that Venus might not harbor jungles under its thick atmosphere after all. A Russian scientist had discovered that atmosphere during the rare Venus transit of 1761, because of the effects of sunlight from behind.

Mariner 2 proved interplanetary flight was possible, and our ability to take close-up images of other planets would be richly rewarding in scientific return. But it also meant we could use the spacecraft itself as a “light” source, planting it behind an object of our choosing and making direct measurements.

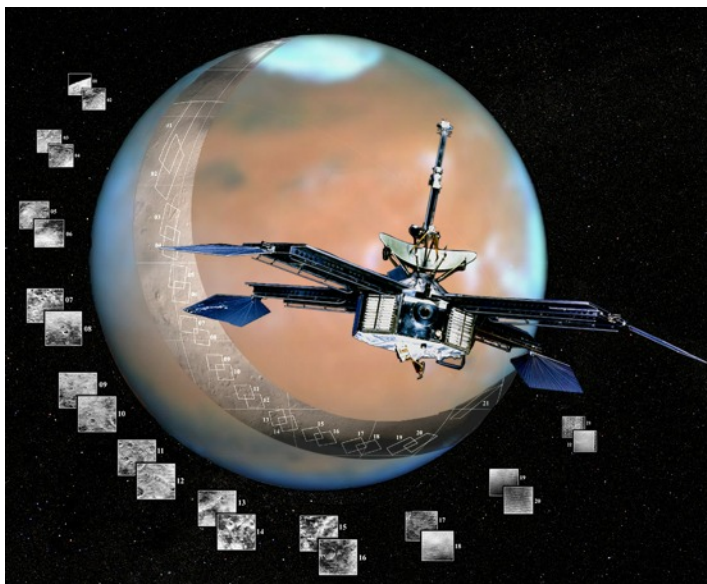
Mariner 4 did the first occultation experiment of this sort when it passed behind Mars as seen from Earth in July 1965. But, instead of visible light from the Sun, this occultation experiment used the spacecraft’s approximately 2-GHz radio signal.

The Mariner 4 experiment revealed Mars’ thin atmosphere. Since then, successful radio science occultation experiments have been conducted at every planet and many large moons. And another one is on schedule to investigate Pluto and its companion Charon, when the New Horizons spacecraft flies by in July 2015. Also, during that flyby, a different kind of radio science occultation experiment will investigate the gravitational field.

The most recent radio science occultation experiment took place September 2, 2012, when the Cassini spacecraft carried its three transmitters behind Saturn. These three different frequencies are all kept precisely “in tune” with one another, based on a reference frequency sent from Earth. Compared to observations of the free space for calibration just before ingress to occultation, the experiment makes it possible to tease out a wide variety of components in Saturn's ionosphere and atmosphere.

Occultation experiments comprise only one of many categories of radio science experiments. Others include tests of General Relativity, studying the solar corona, mapping gravity fields, determining mass, and more. They all rely on NASA’s Deep Space Network to capture the signals, which are then archived and studied.

Find out more about spacecraft science experiments in “Basics of Space Flight,” a website and book by this author, <http://www2.jpl.nasa.gov/basics>. Kids can learn all about NASA’s Deep Space Network by playing the “Uplink-Downlink” game at <http://spaceplace.nasa.gov/dsn-game>.



Caption for the accompanying image:

In this poster art of Mariner 4, you can see the parabolic reflector atop the spacecraft bus. Like the reflector inside a flashlight, it sends a beam of electromagnetic energy in a particular direction. Credit: NASA/JPL/Corby Waste.

SKY-CALENDAR UPDATE FOR OCTOBER 2012

Doug Snyder

Note: Unless otherwise noted, all dates and times are shown in Arizona's Mountain Standard Time – NOT in Universal Time (U.T.) nor in Eastern Time (E.T.). MST is behind UT by 7 hours.

October 1 (Monday): Comet 168P/Hergenrother reaches perihelion and will be visible (telescope) **through much of October** in the constellation Pegasus. For a finder chart of this comet, and magnitude information, visit <http://www.aerith.net/comet/catalog/0168P/2012.html>.

October 3 (Wednesday): A pairing, or close appulse, of the planet Venus and the alpha-star Regulus in the constellation Leo will be at its 'minimum' separation for observers here on the morning of October 3 at around 3 am to 5 am. This is considered to be one of the best pairings to occur in 2012 involving a planet and a bright star. There is also a nice color contrast between the two: golden-yellow planet and striking blue-white star. During the following mornings, although separation will increase, the two heavenly bodies remain relatively close – through October 7, the distance should remain at less than 5°.

October 8 (Monday): Draconids Meteor Shower, also known as the "Giacobinids"; quite favorable conditions for this sometimes strong shower. A good time for viewing is from 3 am to dawn on that Monday morning, 10/8/2012. Historically, the ZHR ranges from 0(zero) to STORM levels! The last storm occurred in 1946; these meteors are very slow-moving with a velocity of around 20 kilometers/second.

October 10 (Wednesday): Southern Taurids meteor shower; associated with Comet 2P/Encke. Quite favorable with a waning crescent moon.

October 13 (Saturday): Zodiacal Light in East, morning hours, next two weeks before morning twilight.

October 15 (Monday): New Moon, 5:02 am; start of lunation 1111.

October 21 (Sunday): Orionid Meteor Shower; very favorable this year. ZHR is variable, usually ranging from 15 to 30 per hour. In the recent past, there has been moderate shower activity on nights prior to the associated peak of 10/21. Velocity of 66 km/sec – moving along pretty good and some are very bright with persistent trains. Associated with Comet 1P/Halley. Good conditions for viewing on the morning of the 21st, and possibly even on the 20th or 19th? We'll pay attention to your observing reports!

October, 2012 occultations a-plenty! If at all curious or interested in learning more about any of the October 'asteroid/star' occultations and/or the several Lunar grazing (by a star) events occurring this month and visible within Arizona, don't hesitate to contact me. There is so much to be learned from these events and a joy to witness live through a telescope. For October, I will be attempting at least one of the asteroid occulting events which are discussed in the October issue of Sky & Telescope as well as several others occurring in our area but were not mentioned in S&T. For lunar grazing events, I see that there are at least two coming up for southern Arizona in October (UT dates of 10/6 & 10/10) and details are given in the 2012 RASC Observer's Handbook; maps showing the paths are also provided. Visit the IOTA site!

LATE September, 2012 Discovery Advisory: Newly discovered Comet C/2012 S1 (ISON). Currently located beyond the orbit of Jupiter, Comet ISON is heading for a *very* close encounter with the sun next year. In Nov. 2013, it will pass less than 0.012 AU (1.8 million km) from the solar surface. This comet 'could' become a bright naked-eye object. Much about this comet--and its ultimate fate--remains unknown. Thousands of folks in the astronomical community will be keeping a keen eye on its development! You can obtain much more information and data about this comet at the following site:

<http://remanzacco.blogspot.it/2012/09/new-comet-c2012-s1-ison.html>

Reminder: There are ALWAYS exciting and unusual sky phenomena happening in our visible universe whether WE know it or see it; make your discovery tonight! These Arizona updates are just a fraction of observable sky events! Your feedback is always welcome. THANK YOU & CLEAR SKIES UNTIL NEXT MONTH – Doug (starhaven@palominas.com)

HAC Officers and Board of Directors:

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Secretary: Bob Hoover
Treasurer: Bob Kepple

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Doug Snyder
Kim Rogalski
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<http://www.farpointastro.com/>
<http://starizona.com/>

How to contact the Nightfall editor, Cindy Lund:

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Sierra Vista, AZ, 85650

2012—ARIZONA's Astronomically Handy Sky Calendar from Doug Snyder—2012
ARIZONA SKY PHENOMENA Calendar—All Times shown are MOUNTAIN STANDARD TIME*

January 2012

HIGHLIGHT: Shadow Transits on Jup.

- 01 Su New Year's Day; HNY2012 !
- 03 Tu Dbl. Shadow Tr., 2327hrs.,G&Eu
Quadrantid Meteors Pk@2400h.
view a.m. of 4th**; an 80%
moon sets just after 0300 hrs.
- 09 Mo ○ Full Moon 0031 hrs.
- 10 Tu Dbl.Shadow Tr., 2326hrs., Eu&G
- 11 We Comet P/2006 T1(Levy); mag.7?;
perihelion@2343 hrs, 1.0074AU
- 16 Mo Spica 2°N. of Moon, 0100 hrs.
- 21 Sa ☾ Last Quarter Moon 0209 hrs.
- 23 Mo ● **NEW MOON** 0040 hrs.
- 30 Mo ☽ First Quarter Moon 2110 hrs.

February 2012

HIGHLIGHT: C/2009 P1 Garradd

- 03 Fr ● **Comet Garradd**, 0.5° from
M92 Globular in Hercules, 3am
- 07 Tu ○ Full Moon 1454 hrs.
- 09 Th Venus 0.3° N. of Uranus, pm;
mag. -4.1 & +5.9; size: 16",
3.4"; eyepiece recommended
- 10 Fr Zodiacal Lt. in W., pm, next
2 weeks; after twilight.
- 14 Tu ☾ Last Quarter Moon 1005 hrs.
- 21 Tu ● **NEW MOON** 1535 hrs.
- 25 Sa Venus 3° S. of waxing Moon
- 26 Su Jup. 4° S. of Moon, pm
- 29 We ☽ First Quarter Moon 1822 hrs.
- Leap-day: 2012 has 366 days

March 2012

HIGHLIGHT: Planetary Arrangements

- 03 Sa Mars @**opposition**, 1335 hrs.,
size at 13.9", mag. -1.2
- 05 Mo Mars closest to Earth, 1000hrs
Merc. evening planet in W., 7"
- 08 Th ○ Full Moon 0239 hrs.
- 10 Sa Zodiacal Lt. in W., pm, next
2 weeks; after twilight
- 14 We ☾ Last Quarter Moon 1826 hrs.
- 19 Mo Vernal **Equinox**, 2214 hrs.
- 22 Th ● **NEW MOON** 0738 hrs.
- Dbl. Shadow Tr., 1935hrs., I&G
- 27 Tu Venus G_Elong. E., 46°, in
western sky after sunset
- 30 Fr ☽ First Quarter Moon 1241 hrs.

April 2012

HIGHLIGHTS: Saturn, Lyrid Meteors

- 03 Tu Venus 0.5° S. of M45 (Pleiades)
in early evening, western skies
- 06 Fr ○ Full Moon 1219 hrs.
- 13 Fr ☾ Last Quarter Moon 0350 hrs.
- 15 Su **Saturn@ opposition**, 1100hrs
Merc. morning planet in E., 8"
- 21 Sa ● **NEW MOON** 0019 hrs.
Lyrid Meteors, Pk 2200hrs.
- 28 Sa **Astronomy Day #1 2012**
- 29 Su ☽ First Quarter Moon 0259 hrs
- 30 Mo Venus at brightest mag., -4.7

May 2012

HIGHLIGHT: Annular Solar Eclipse

- 05 Sa η-Aquarid Meteors; unfavorable
year due to moon; pk.1200hrs.
○ Full Moon 2036 hrs.; largest
in 2012
- 12 Sa ☾ Last Quarter Moon 1447 hrs.
- 20 Su ● **NEW MOON** 1648 hrs.
Annular Solar Eclipse; best
Arizona site: near city of Page;
low altitude Sun; starts at
1724 hrs., max. at 1834 hrs.
- 28 Mo ☽ First Quarter Moon 1317 hrs.

June 2012

HIGHLIGHT: Solar Transit of Venus

- 04 Mo Partial Lunar Eclipse; penumbra
starts 0148 hrs.; partial at
0259 hrs; partial ends 0506 hrs
○ Full Moon 0412 hrs.
- 05 Tu **Transit of Venus**; start at
1510 hrs.; still in progress at
sunset at 1916 hrs.
- 11 Mo ☾ Last Quarter Moon 0342 hrs.
- 19 Tu ● **NEW MOON** 0803 hrs.
- 20 We Summer Solstice, 1607 hrs.
- 26 Tu ☽ First Quarter Moon 2031 hrs.

July 2012

HIGHLIGHT: Jupiter's Morning Light

- 01 Su Merc., west sky, pm twilight, mag.
+0.4, size 8.1"
- 03 Tu ○ Full Moon 1152 hrs.
- 10 Tu ☾ Last Quarter Moon 1849 hrs.
- 12 Th Venus, am, brightest mag., -4.7
- 14 Sa Comet 96P/Machholz, Perihelion
- 18 We ● **NEW MOON** 2125 hrs.
- 21 Sa Dbl.Shadow Tr., 0354hrs, Eu & I
- 26 Th ☽ First Quarter Moon 0157 hrs.
- 28 Sa Dbl.Shadow Tr., 0446hrs, Eu & I
- 29 Su S. δ- Aquarid meteors Pk. in am,
unfavorable year, 78%Moon
- 30 Mo Jupiter, am, size 36", mag. -2.1

August 2012

HIGHLIGHT: Perseid Meteor Shower

- 01 We ○ Full Moon 2028 hrs.
- 09 Th ☾ Last Quarter Moon 1156 hrs.
- 12 Su **PERSEID** Meteors: **favorable!**
View pm 11th & am 12th
- 13 Mo Dbl.Shadow Tr., 0348hrs., I & G
**Occultation of Venus by
the Moon; near 1340 hrs.**
- 16 Th Merc. morning planet in E., 8"
- 17 Fr ● **NEW MOON** 0855 hrs.
- 24 Fr Neptune @ Opposition,0600h.
mag.+7.8, size 2.3", 29AU
☽ First Quarter Moon 0654 hrs.
- 31 Fr ○ Full Moon (2nd) 0659 hrs.

September 2012

HIGHLIGHT: Northern Lights in AZ ?

- 08 Sa ☾ Last Quarter Moon 0616 hrs.
- 12 We Epsilon (ε) Eridanids Meteors
peak near 0600hrs; favorable
- 14 Fr Zodiacal Lt. in E., am, next 2
weeks before twilight
- 15 Sa ● **NEW MOON** 1911 hrs
Alert For aurora activity
before, during & after Equinox
- 22 Sa **Autumn Equinox** 0749 hrs.
☽ First Quarter Moon 1241 hrs.
- 29 Sa Uranus @ opposition, 0000hrs.
mag. +5.7, size 3.7", distance
19.1 AU from Earth
○ Full Moon 1241 hrs.

October 2012

HIGHLIGHT: Meteor Showers (3)

- 03 We Venus/Regulus Appulse—one
of the best for 2012; E., 0500hrs
- 08 Mo ☾ Last Quarter Moon 0034hrs
Draconids Meteors: 0300 to dawn
- 10 We **S. Taurids** Meteors: favorable!
- 13 Sa Zodiacal Lt., E., am, next 2 wks.
- 15 Mo ● **NEW MOON** 0503 hrs.
- 21 Su **Orionids** Meteors: v. favorable!
☽ First Quarter Moon 2033 hrs.
- 29 Mo ○ Full Moon 1250 hrs.

November 2012

HIGHLIGHT: LEONID Meteor Shower

- 06 Tu ☾ Last Quarter Moon,1736hrs.
- 12 Mo **N. Taurids** Meteors, 0400h.
- 13 Tu ● **NEW MOON** 1509 hrs.
- 17 Sa **Leonid Meteors!** First of 2
Pk., 0200hrs.; v. favorable
- 19 Mo 2nd **Leonid** pk. possible 2400h.
- 20 Tu ☽ First Quarter Moon 0732 hrs.
- 27 Tu Venus/Saturn Conjunction! E.,
am, 0630hrs., 0.6° separation
- 28 We ○ Full Moon 0747 hrs.

December 2012

HIGHLIGHT: GEMINID Meteor Shower

- 02 Su JUPITER @ Opposition, 1900 h.
- 04 Tu Merc. morning planet in E., 7.4"
- 06 Th ☾ Last Quarter Moon 0832 hrs.
- 13 Th ● **NEW MOON** 0142 hrs.
GEMINIDS Pk: 0500 hrs.;
Very Favorable for 2012
- 19 We ☽ First Quarter Moon 2220 hrs.
- 21 Th Solstice (Winter) 0412 hrs.
- 22 Fr **Ursid** Meteors Pk., 0100 hrs.
- 28 Fr ○ Full Moon 0322 hrs.

*Times/Dates= ARIZONA MountainStandardTime (UT-7hrs), NO DST; **updates/ details**, see: <http://skycalendar.blackskies.org>;
Abbr: Tr=Transit; Pk=Peak; Merc=Mercury; E=East W=West; S=South; N=North; J, Jup.=Jupiter; V=Venus; " =arc seconds;
h., hrs.=hours (24 hour time system); MP=Minor Planet; MS=Moon Set; wks=weeks; Lt=Light; pm=evening; v.= very
am=morning; mag.=magnitude; **meteor shower dates reflect predicted Peak Morning, but Moon may still be present;
I=Io; Eu=Europa; G=Ganymede; C=Callisto; UT=Universal Time; **bold text**=possibly a promising/worthy event or activity;
G_Elong=Greatest Elongation; dbl= double; AU=Astronomical Unit; *compiler:* Doug Snyder (C/2002 E2, MP15512); V2.0.2012