Nightfall

Monthly publication of the Huachuca Astronomy Club

DECEMBER 2014

President's Notes

Is it December already? I'm not ready for it, but it is here anyway. Well, at least I hope you are ready to look up (or down if you are using a diagonal) to see some dazzling sights this December in the winter sky. The annual Geminids Meteor Shower is coming December 7 through 17, with peak estimated on the night of the December 13 through the morning of December 14. The moon will be in its last quarter to block so some of the fainter Geminids, but most are so bright and usually numerous that we should still have a good show. Best viewing, as with any meteor shower, will be from a dark location after midnight. But again, Geminids tend to be bright, and many can be seen before midnight, so no excuses. Meteors will seem to radiate from the Gemini constellation, but they can appear anywhere in the sky. Some say the Geminids are the best of all the meteor showers, but many have never braved the winter weather to watch. The Geminids are also somewhat different from the other meteor showers in they are believed to come from an asteroid not a comet.

Object 3200 Phaethon, parent of the Geminids, is the odd object. Phaethon is an asteroid but with unusual characteristics. The asteroid has a large orbital inclination, plunging it through the ecliptic, more like that of a comet than an asteroid. In fact, it has been referred to as a "rock comet." The experts think it may be the remaining rubble pile of a comet-like object that has lost all of its ice and volatiles. The asteroid is theorized to be impact ejecta from Pallas, the extremely large asteroid that resides in the asteroid belt between Mars and Jupiter that also has a large orbital inclination. Pallas, with a mean diameter of about 550 km now has minor-planet designation. The composition of Pallas resembles the carbonaceous chondrite class of meteorites, and its surface is believed (spectroscopic analysis) to contain hydrated minerals. So it makes sense that Phaethon may have begun its life with water ice onboard. All in all, this adds up to a beautiful meteor shower from an odd duck asteroid. So bundle up and give it a try.
Next month let's talk about everybody's favorite constellation Orion that is starting to rise up in the east, and that red star that doesn't seem so red to me anymore. What's its name? Oh yeah, Betelgeuse, Betelgeuse, … you know the rest.

Also a heads up for the January meeting, it will be a Post-Christmas Telescope Clinic. This is a time for giving and that includes the energy, experience and knowledge we have for our hobby to others wanting to take up the pursuit. Now, while many may be away for the holidays those who can make the meeting and have experience with telescope mechanics can play a very important role in making the first steps into astronomy far less stressful for others. And for those of you who are just taking those steps, this makes it a great time to bring your new telescope, accessory, or astro whatnot and get help making it work the way it was intended.

Please Renew Your Membership

HAC memberships expire in December. You can pay your 2015 dues by mailing your check to PO Box 922 Sierra Vista AZ 85636 or by bringing your check to the holiday pot luck party at David and Nancy's home on Dec 12. Thank you to all those that have already renewed their memberships; we look forward to another great year! Individual membership $25, family $35, military $20, military family $25, student $10.

New Members Corner

We welcome David and Phyllis James of Sierra Vista who joined at the November meeting. Welcome to the club, we are glad you joined!

Calendars and RASC Handbooks

If you ordered 2015 Astronomy Deep Space Mysteries calendars or the RASC Observer's Handbooks, you can pick them up at the December pot luck. Please be prepared to pay for them if you have not already done so, and please remember that the total cost of the handbooks is actually $22 (many of you prepaid $20). Contact Ted Forte <tedforte511@gmail.com / 520 432-6099> if you are unsure what you paid or if you would like to coordinate an alternate pick-up of your merchandise. Ted will also bring any remaining books/calendars to the Patterson public night on Dec 18.

Astronomical League observing programs

A new year is about to begin. What better time to consider starting an Astronomical League observing program? There are 49 programs to choose from - literally something for everyone, every interest, every skill level and every sort of instrument you might have at your disposal. There are several new programs so be sure to check out www.astroleague.org for a look at them. The observing programs appear on the OBSERVE pull down menu. The requirements vary quite a bit so read the rules carefully. Most of the programs allow you to submit your logs to our ALCOR/Awards coordinator, Ted Forte. HAC has several “Master Observers” (observers with ten or more AL programs under their belt) as well as a large number of other very experienced observers that can help you and answer your observing questions.

Please join HACLIST

Haclist is the club’s Yahoo group. We use the group to make announcements, last minute schedule changes and post the latest space and astronomy news articles. It is also a great place to discuss astronomy, telescopes and astro-photography with other club members. To join, just send an email to haclist-subscribe@yahoogroups.com

Remember HAC when shopping at Amazon

Please remember when shopping at Amazon this holiday season to use the link to Amazon on the club's home page www.hacastronomy.com When you use that link, Amazon makes a generous payment to the club.

Scheduled HAC events for 2015

HAC general meetings are held monthly on a Friday night at 7PM in the community room of the student union building (SU), or in the Library (Lib) room 900 at Cochise College, Sierra Vista campus 901 North Colombo Avenue subject to availability. Alternate locations will be announced when necessary. *Public Night* is an outreach event held at the Patterson Observatory on the campus of the University of Arizona, South 1140 North Colombo Avenue, Sierra Vista. Public nights start 30 minutes after sunset. Member Star Parties are held at member's homes and will be announced when volunteers are identified. The MSP holder will announce the start time of the event. All observing events are weather dependent. Watch for event announcements in the Nightfall newsletter, the HAC website, the *HACLIST* Yahoo group, and in the Around Your Town Section of the *Sierra Vista Herald*. Most events are also listed in the *Mountain View News,* and *The Scout*.

January 2, General Meeting (SU); January 17, Member Star Party; January 22, Public Night (6:15 PM)

February 6, General Meeting (Lib); February 21, Member Star Party; February 26, Public Night (6:45 PM)

March 6, General Meeting (Patterson Obs); March 14, Kartchner Star Party, Kartchner Caverns State Park; March 21, Member Star Party (Messier Marathon); March 26; Public Night (7:00 PM)

April 3, General Meeting (Lib); April 18, Member Star Party; April 23, Public Night (7:30 PM); April 25, Astronomy Day at Sierra Vista Library (Tentative)

May 1, General Meeting (SU); May 16, Member Star Party; May 21, Public Night (7:45 PM)

June 5, General Meeting (SU) June 13, Member Star Party, June 25, Public Night (8:00 PM)

July 3, General Meeting (SU); (No observing events scheduled)

August 28, General Meeting (SU); (No observing events scheduled)

September 12, Member Star Party; September 17, Public Night (7:00PM); September 25, General Meeting (SU)

October 10, Member Star Party: October 15, Public Night (6:30 PM); October 17, Kartchner Star Party/Astronomy Day; October 30, General Meeting (Lib)

November 14, Member Star Party; November 19, Public Night (5:45 PM); November 27, General Meeting (SU)

December 12, Member Star party; December 17, Public Night (6:00 PM); December 18, General Meeting (SU) (may be replaced by a Holiday party)

Update on Signs at the Tuscon Convention Center

Mark Mayer
Government Affairs & Outreach Coordinator
Scenic Arizona

Dear Scenic Arizona Members & Friends [SE Arizona Distribution]:

After three hours of proceedings yesterday, the Sign Code Advisory & Appeals Board voted to continue the hearing on the Tucson Convention Center variance request for overheight & oversize electronic signs. The continued hearing will be held on Wednesday, December 10 at 2:00 P.M., so please mark that date and time on your calendars (exact location to be determined).

A few highlights of the hearing:

Planning & Development Services staff gave their powerpoint report that predictably supported the variance requests (after all, that department reports directly to the Assistant City Manager whose assistant is out aggressively promoting the variances). Staff indicated 25 communications in opposition and eight in support. As indicated in more detail below, most of the support is incestuous and self-serving.

The Rio Nuevo Multipurpose Facility District with the aforementioned operative that works out of the City Manager's Office, was permitted to give a powerpoint presentation that, with questions and answers, lasted over 35 minutes (Fletcher McCusker, architect Phil Swaim, Elaine Becherer). That was followed an additional ten minutes for other "supporters", that included a different Rio Nuevo Board officer (Mark Irvin); a representative of SMG, the management company that the City has recently hired to run the TCC; and Allan Norville, owner of the property across the street from the TCC west of Granada. Norville leases other property for billboards (SE corner of Broadway & Kolb in particular) and would presumably love to have really big electronic signs or even billboards on his downtown property when developed. Curiously absent were any of the other downtown development interests. Even the very short list of five supporters shown in their powerpoint was self-serving. It included the applicant itself, the Economic Initiatives Section of the City Manager's Office, and Visit Tucson (that gets a large portion of its funding from the City of Tucson). The only one listed that was not part of this COT-Rio Nuevo cabal was the Downtown Merchants Council, for which the Scenic Arizona has yet to see any documentation. The applicants were even so brash as to state that a majority of their "stakeholders" list of about a dozen nearby major property owners supported the application, but there is nothing in the record to support this assertion.

Speaking in opposition (and refusing to be held to three minutes as the SCAAB Chair attempted to do were):

Ruth Beeker, former member of the City of Tucson Board of Adjustment, who particularly addressed the inappropriateness of the process
Mark Mayer, Scenic Arizona (and also representing the Sierra Club)
John Barrington (International Dark Sky Association)
Dan Brocious (Smithsonian Whipple Observatory)
Lori Allen (Kitt Peak National Observatory)

In total, the opposition took a little over 45 minutes, roughly matching the applicant's group time, while the Rio Nuevo-COT group were given yet another fifteen minutes for rebuttal that included a false assertion regarding the Barrio Viejo Association opposition (stating that it only related to parking issues). It should be noted that Barrio Viejo never received any notification of the hearings (although their officers are on the mailing label print out). Furthermore, the aforementioned Elaine Becherer barged into their regularly held October 14 meeting and insisted on doing a presentation in favor of the variances without ever having attempted to contact the relevant officers to request a place on the agenda. She further solicited their shotgun support for the electronic sign variances without the benefit of any due consideration (the original SCAAB meeting was scheduled the very next day). Her initiative was roundly rejected and after such due consideration the Association instead submitted a letter in opposition to the variances just prior to yesterday's hearing.

Then Brent Davis briefly addressed the Board, indicating that the Rio Nuevo-COT list of "stakeholders" did not include the dark sky, scenic preservation and other community-based interests that had been working on these issues for decades and that the Rio Nuevo-COT team needed to be talking to them. It was on this basis (apparently) that the Board voted 4-1 to continue the hearing until December. The lone vote against was Dan Santa Maria, who was just installed on the Board by the Mayor and Council at Council Member Shirley Scott's urging. Santa Maria advocated immediate approval of the variances, castigating the opponents in the process.

Lastly, after the meeting, Rio Nuevo Board Chair approached the observatory representatives to discuss lighting controls, but it became clear that he had no interest in talking to anybody else and was playing the same divide and conquer game that key Republicans in the State Legislature tried to play in 2012 on the electronic billboard bill.

If you have not made a comment yet in opposition, please do so (see Updates #269, 11/4/14). Scenic Arizona believes that this proposal is intentionally being floated as the camel's nose in the tent and with the Rio Nuevo Multipurpose Facility District now owning the land on the east side of I-10 south of Congress, there is a great danger that the ultimate goal is to place electronic billboards along this frontage (with the help of some preemptive legislation). This location has the highest traffic counts in all of southern Arizona and the billboard industry would absolutely salivate over the opportunity to win this prize.

Your ongoing attention to this issue is appreciated. Please make your voice heard.

Mark Mayer
Government Affairs & Outreach Coordinator
Scenic Arizona

Update : TCC Electronic Sign Hearing is Wednesday

Sign Code Advisory and Appeals Board Meeting

Wednesday, December 10, 2014, 2:00 P.M.

Basement Conference Room C

Public Works Building

201 N. Stone Ave. (Northwest Corner of Stone & Alameda)

If you did not previously express your opinion on this request or wish to supplement your previous communication, please do so now through Tuesday afternoon. Your comments may be sent to the Sign Code Advisory & Appeals Board via email to: glenn.moyer@tucsonaz.gov . The comments can be sent as either an attached letter or simply by entering your text into the body of the email. In either event, be absolutely sure to include the case number and a reference to the Tucson Convention Center electronic sign variances as per (or similar to) the following heading: .

Sign Code Advisory and Appeals Board

c/o Sign Code Administrator

RE: Case #T14SA00283, Tucson Convention Center Electronic Sign Variances

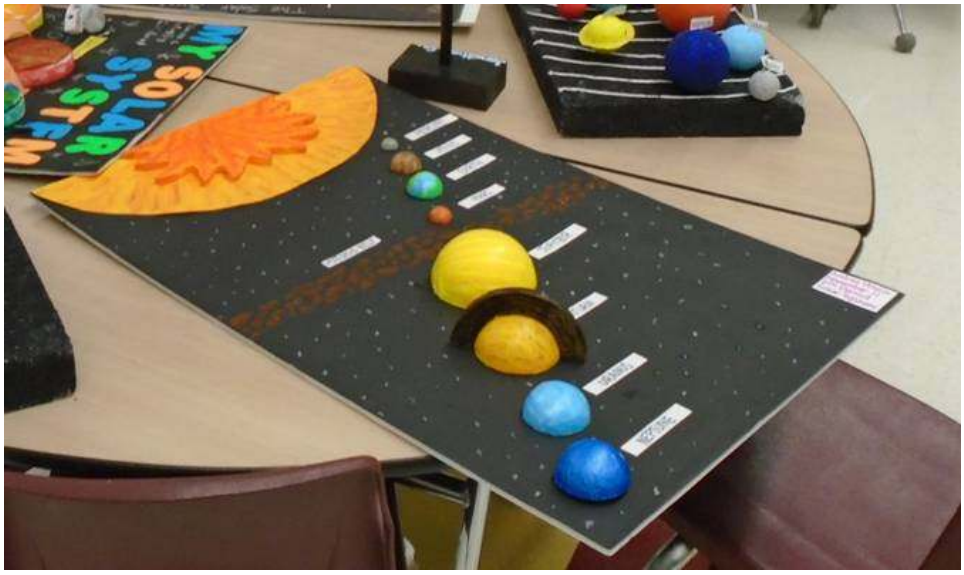
Douglas Pie in the Sky Report

Bob Gent

The Pie in the Sky event at Paul Huber Middle School in Douglas, AZ went quite well. I'd estimate there were somewhere around 50 attendees. This count was down from previous events, but this was likely because it was so close to Thanksgiving.

President David, Bob H, Ted, Rick, Jim, and I traveled from Sierra Vista. The weather was clear, and the crescent moon was a big hit. I also aimed my scope at Mars and the Double cluster as well as a few other targets. Other telescopes were aimed at the Andromeda Galaxy and other wonders of the night sky. There was plenty of pie and other goodies in the cafeteria for all the participants. Incidentally, that's why it's "pie" in the sky.

The science class students made about 20 solar system models. It was easy to see some of the students did a lot of work on these projects. We gave out 20 HAC certificates of achievement for the projects.



One of the solar system models we liked

Ted Forte at his telescope

Where the Heavenliest of Showers Come From

By Dr. Ethan Siegel

You might think that, so long as Earth can successfully dodge the paths of rogue asteroids and comets that hurtle our way, it's going to be smooth, unimpeded sailing in our annual orbit around the sun. But the meteor showers that illuminate the night sky periodically throughout the year not only put on spectacular shows for us, they're direct evidence that interplanetary space isn't so empty after all!

When comets (or even asteroids) enter the inner solar system, they heat up, develop tails, and experience much larger tidal forces than they usually experience. Small pieces of the original object—often multiple kilometers in diameter—break off with each pass near the sun, continuing in an *almost* identical orbit, either slightly ahead-or-behind the object's main nucleus. While both the dust and ion tails are blown well off of the main orbit, the small pieces that break off are stretched, over time, into a diffuse ellipse following the same orbit as the comet or asteroid it arose from. And each time the Earth crosses the path of that orbit, the potential for a meteor shower is there, *even after* the parent comet or asteroid is completely gone!

This relationship was first uncovered by the British astronomer John Couch Adams, who found that the Leonid dust trail must have an orbital period of 33.25 years, and that the contemporaneously discovered comet Tempel-Tuttle shared its orbit. The most famous meteor showers in the night sky all have parent bodies identified with them, including the Lyrids (comet Thatcher), the Perseids (comet Swift-Tuttle), and what promises to be the best meteor shower of 2014: the Geminids (asteroid 3200 Phaethon). With an orbit of *only* 1.4 years, the Geminids have increased in strength since they first appeared in the mid-1800s, from only 10-to-20 meteors per hour up to *more than 100* per hour at their peak today! Your best bet to catch the most is the night of December 13th, when they ought to be at maximum, before the Moon rises at about midnight.

The cometary (or asteroidal) dust density is always greatest around the parent body itself, so whenever it enters the inner solar system and the Earth passes near to it, there's a chance for a **meteor storm**, where observers at dark sky sites might see *thousands* of meteors an hour! The Leonids are well known for this, having presented spectacular shows in 1833, 1866, 1966 and a longer-period storm in the years 1998-2002. No meteor storms are anticipated for the immediate future, but the heavenliest of showers will continue to delight skywatchers for all the foreseeable years to come!

What's the best way to see a meteor shower? Check out this article to find out: http://www.nasa.gov/jpl/asteroids/best-meteor-showers.

Kids can learn all about meteor showers at NASA's Space Place: http://spaceplace.nasa.gov/meteor-shower.

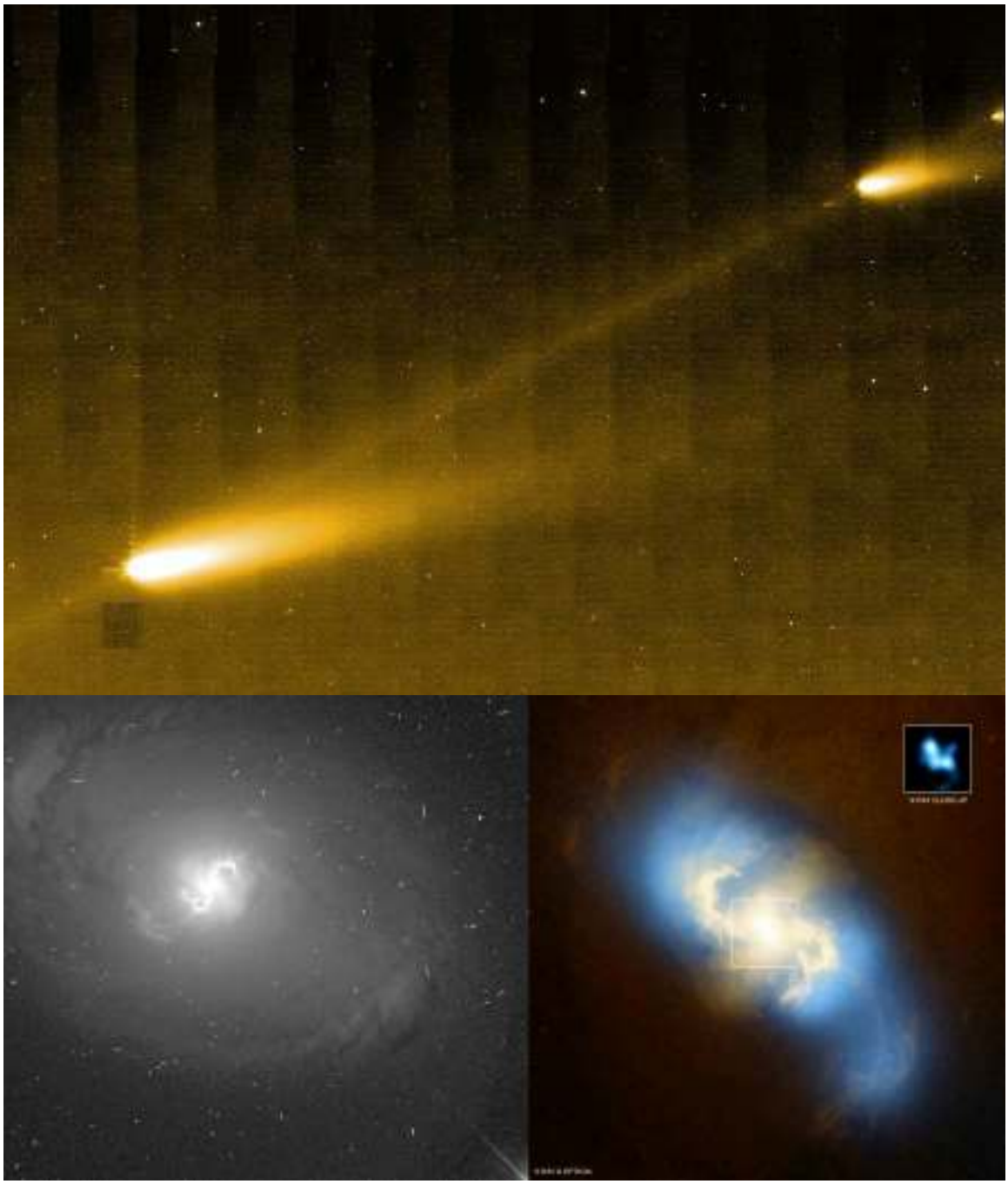


Image credit: NASA / JPL-Caltech / W. Reach (SSC/Caltech), of Comet 73P/Schwassman-Wachmann 3, via NASA's Spitzer Space Telescope, 2006.

2014 Fall Observations

Cindy Lund

This fall, I went to three Star Parties, one in September, one in October, and one in November. The star party in October was at a new location, the San Pedro Valley Observatory. I really liked the San Pedro Valley Observatory. It is like a small museum!

I saw Saturn, its moon Titan, Mars and the Moon. I saw the globular clusters M4, M5, M13 (Hercules Cluster) and M15. I observed the open clusters M18, M45 (Pleiades), and NGC 884 and NGC 869 (Double Cluster). I saw the galaxies M31 (Andromeda) and M32, as well as a planetary nebula M57 (Ring Nebula). I observed the star Arcturus and the multiple star system Epsilon Lyrae, also known as the Double Double. For the first time, I was able to resolve each pair of close binary stars.

I enjoyed each Star Party I went to. I hope to go to several of them this winter.

September 20, 2014 at Kartcher Caverns		
M5	Globular Cluster	White stars that filled the field, bright core, and some dark patches
M4	Globular Cluster	Had a bright bar that went across the core, horizontally. This bar was brighter than the rest of the core
M18	Open Cluster	Filled the field. Stars mostly bluish. Noticed a pattern of stars that looked like Orion (two trapezoids) The upper right star in the Orion pattern was yellow. Some stars were brighter than others
Arcturus	Star, Orange Giant	Very bright in the telescope. Slightly orange-yellow. Appeared to have rays
Saturn	Planet, Gas Giant	Noticed a brownish horizontal stripe on Saturn itself. Rings titled from upper left to lower right. Did not see Cassini gap
Titan	Moon of Saturn	Appeared below and to the left of Saturn. Looked like a star.
Mars	Planet, Inner	Round red disk, no details visible

October 25, 2014 at San Pedro Valley Observatory		
Epsilon Lyrae (Double double)	Double Star each a Double Star	Four white stars, in two groups of two. On the left, two stars in a horizontal line, left one dimmer than right one. On right, two stars in a vertical line, both equally bright. Each pair of stars was very close together, but the pairs were much farther apart
M57 Ring Nebula	Planetary Nebula	Gray elliptical ring of nebulosity, thicker at the long ends. Fainter nebulosity inside the ring
M13 Hercules Cluster	Globular Cluster	Bright core, with dark patch at upper right of core. Filaments of stars spread out from the core.
M15	Globular Cluster	Smaller than M13. Bright dot core looks like a large fuzzy star. Fainter round disk of nebulosity around the core. Two bright stars in field, one above and to the right, the other above and to the left.
Earth's Moon	Moon	Crescent moon, almost new, seen through binoculars. Saw four craters along the limb, toward the lower part. Could see the "old moon in the new moon's arms".

November 20, 2014 at Patterson University		
M45 Pleiades	Open Cluster	Noticed four bright stars that formed a rhombus, another bright star above and to the right of them, two more bight stars that formed a triangle with the lower right star of the rhombus. Many less bright stars around and within the rhombus.
M31 Andromeda	Spiral Galaxy	Bright core. Nebulosity extending out from core, above and below the core. Edges of nebulosity were undefined.
M32 (Sat. of Andromeda)	Elliptical Galaxy	Saw a small, fuzzy dot to the left of M31, slightly below M31's core.
NGC 884 & 869 Double Cluster	Two Open Clusters	Both clusters appeared in the same field. The clusters similar in size and brightness. The gap between the clusters was the same size as the clusters themselves
M57 Ring Nebula	Planetary Nebula	Appeared as a gray, fuzzy, elliptical ring around a light gray disk of nebulosity. The outer ring was thicker at the long sides

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FOR SALE: Older Optical Guidance Systems 12.5" f/9 Ritchey-Chretian telescope. Very good Paul Jones ceramic optics, Robofocus secondary focuser, will include Takahashi collimating telescope. Some of the image through the scope are at Mshadephotography.com.
Contact Mike J. Shade at mshade@q.com

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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 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;
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/worthy 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