Nightfall

Monthly publication of the Huachuca Astronomy Club

January 2014

President's Notes

Happy New Year!
Just a couple things this month so you can get back to your eyepieces. First, the January meeting of the Huachuca Astronomy Club will be held on January 10th. You'll notice that the 2014 meetings will be earlier in the month than was customary last year. That is so we can keep the meetings to evenings when the moon would interfere with observing. January's meeting will be in a different place, too. We'll be meeting in the science building lecture hall, room 1110 at Cochise College. The meeting starts at 7PM. (We'll be using the usual community room location most of the year, but January's and March's meetings will be in the lecture hall in the nearby science building).

January Meeting Meal Reminder
Remember we have an exciting speaker for January, Dr. Vishnu Reddy from the Planetary Science Institute in Tucson, Arizona, and we will be treating him to dinner at the Outback Steak House before the meeting (5PM). If you would like to join us for dinner at Outback, please RSVP to Ted Forte [tedforte511@gmail.com]

Digital Sign Saga Continues
Also, we need to keep up the fight against light pollution and lighted signage. We have one of our best leading the fight. Bob Gent has been a tireless advocate for our cause, but we cannot leave him to fight alone. We need to start showing ourselves at planning meetings and letting our feelings and concerns be known.

February Meeting a Special Treat
Our February meeting, to be held on the 14th (Valentine's Day), will have a different format than we have become accustomed to. It will be the first of our member nights where you and I will have the opportunity to tell what we have been doing and show some of the clever equipment we are using to enjoy the hobby. Maybe you got a shiny new toy for Christmas. Maybe you got time over the holidays to try out that filter or eyepiece you got at the Science and Astronomy Expo back in November. This would be a great time to tell us what you think of these things. Whatever it is, it doesn't have to be completely original, clever, or incredibly expensive; just something you find interesting or even perplexing! Just sharing what you've been viewing or drawing, or a simple method for finding a good collimation on your scope, or even a new website or app that you've found useful. This will be a time to speak out. Your presentation doesn't need to be long or professionally presented either. No, you don't need a polished PowerPoint show or a memorized speech. But you might want to bring in the thing-a-ma-bob or an image or three to share. And that image doesn't need to be a good image either. If you are having a persistent problem in your images, take a couple of images that showcase the problem and a couple shots of your rig as you are using it and bring them in, you'll get the combined brain power of the club to help you to a solution. Think of it as an AA or Astronomical Anonymous meeting, a time to share triumphs and trip ups.

Congratulations HAC
Once again we have received certificates of appreciation from NASA JPL for our participation as a NASA Space Place Astronomy Club Partner and for the Patterson Observatory, which is a NASA Space Place Community Partner. The certificates recognize our *"valuable contributions to our community in the areas of science, technology, education and inspiration."* Due to our earlier publication deadline for the newsletter there is no Space Place article this month. The Space Place will return in February!

To Members and Friends of the Huachuca Astronomy Club:

The City of Sierra Vista is moving ahead to lift a prohibition on digital signs that has existed for years. Apparently, some local businesses have been pushing for digital signs, and a task force has been formed that would modify the current code to allow such LED or digital signs. I am a member of that task force and have expressed an objection to allowing these signs, but I am in a minority.

Opening the doors to digital signs is not a step in the right direction. Signs tend to cutter our scenic beauty. With changing messages on display boards, it would be distracting and ugly to drive through the city. For their size, these signs can consume a lot of energy. For example, some of the larger signs in Phoenix can burn over $2,000 in power each month. Thank goodness, LED signs of this size are not proposed for our area. Also, some cities and towns have permitted digital signs, and owners have forgotten to set dimmer limits at night. This could be a code enforcement challenge and a threat to our night skies.

Perhaps you, too, would not like to see new digital signs? If so, please contact the Mayor and City Council and let them know your thoughts on this. As it now stands, they are hearing from businesses that these digital signs are important to them. If we care about scenic beauty of the area, we must all speak up. I would also ask that you please share this email with friends who live in or near Sierra Vista.

Please send letters to:

Mayor and City Council
City of Sierra Vista
1011 N Coronado Dr
Sierra Vista, AZ 85635

The following link to the mayor and city council web page contains addition contact information:
http://www.sierravistaaz.gov/department/index.php?structureid=2

On a plus side, if the city decides to move ahead and allow digital signs, I have offered to help set standards to control sign brightness. So far, the staff and businesses seem wiling to accept these recommendations to limit light output.

Thank you very much for speaking up on this subject.

Best wishes for the holidays,

Bob Gent, Lt Col, USAF, Ret.
Past President, HAC and
Past President, International Dark-Sky Association

Another way to make your views known is to send a letter to The Sierra Vista Herald:

Send letters to the editor of the Sierra Vista Herald by mail:

102 Fab Avenue, Sierra Vista AZ 85635

or by email: **svhnews@transedge.com**

Huachuca Astronomy Club
of Southeastern Arizona
Post Office Box 922
Sierra Vista, AZ 85636-0922

January 1, 2014

Mayor and City Council
1011 North Coronado Drive
Sierra Vista, AZ 85635

Dear Mayor Mueller and Council Members:

It has come to our attention that the City of Sierra Vista is exploring the possibility of lifting the ban on lighted digital signage. The Huachuca Astronomy Club would like to go on the record as formally opposing any changes to allow such signage. At last count we have identified 53 private, university, and semi-professional observatories in Cochise County with a great many of them close enough to the city to be severely impacted by any increase in Sierra Vista's light dome. We are alarmed that lifting this ban ever became an issue to pursue.

Lighted digital signage is not a right. It is not a matter of free speech. The citizens of Sierra Vista have the right to be protected from the light trespass inherent in digital signage, from the nuisance of being barraged with unwanted advertising, and from the unnecessary distractions of these flashing, scrolling signs while driving. These are personal rights the citizens of Sierra Vista should not have to cede.

Once, nearly everyone had dark skies such as ours. Sky glow, as we now call it, was relegated to the big cities. Out in the country, the stars could still be seen plainly. Indeed, most astronomy clubs, originally formed in those big bright cities in order to find remote sites out in the country to which their members could travel to observe. Now, just a handful of areas in the United States remain close to towns where the Milky Way can be seen. The City of Sierra Vista is a member of that handful.

Dark skies are not a resource to be squandered. Nor are they a resource to be vilified or seen as a deterrent to business or progress. Indeed, they are a resource that can be banked on if the city is willing. Other cities, including our fellow Arizonian city of Flagstaff, have embraced the preservation of their night sky and with it the businesses and tourism that it attracts. Rather than looking into ways Sierra Vista can become Tucson or Phoenix, we would like the city to look in a different direction and investigate becoming an International Dark-Sky Community.

Sierra Vista should be taking steps to strengthen rather than relaxing the lighting codes for our community. We urge the city to retain the current ban on digital signs. This would protect our night skies and keep our city much less cluttered and distracting. We look forward to working with the city to preserve our scenic beauty and protect our magnificent star-filled nights.

Sincerely,

David Roemer
President, Huachuca Astronomy Club of Southeastern Arizona

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Do we have your observatory listed?

HAC is preparing a directory of observatories in Cochise County to share with city and county officials. This directory is meant to illustrate the importance of astronomy to residents in our area. You can help by sharing information about your own observatory.

If you are a HAC member and would like to have your observatory listed on our web page please contact our webmaster, Ken Kirchner, with the details.

If you want to make sure your observatory appears in the directory that will be made available to the county officials, please contact Gary Grue.

You can reach either Ken or Gary by sending an email to: info@hacastronomy.com

Establishing the importance of astronomy in southeastern Arizona will help to convince the county administration of the value in protecting our dark skies.

No Compromise on Digital Signs

by Ted Forte

Recently, a club member asked why this issue of digital electronic signs has to be an all or nothing proposition. After all, isn't compromise the best way forward? Can't we concede that the interests of the business community here are important and we should be looking to moderate these lights rather than oppose them? That was my own first reaction to the question as well. These digital signs represent the future of advertising, their proliferation is, perhaps, inevitable and maybe not such a bad thing. Won't they bring added prosperity to our town?

Let me explain why I now believe that our position must be one of uncompromising opposition to these signs.

Experiences in other communities have shown that it is unlikely that these signs can be successfully managed to prevent damage to the night sky. While reasonable safeguards are likely to be written into the code, cities like ours simply won't have the resources, and perhaps not even the will, to enforce them.

Once signs are legally installed, it will be difficult if not impossible to remove them later. So even if the city was to change its mind in a few years, we'll be pretty much stuck with whatever signs are already in use.

The industry's own research finds that most people find digital signs to be tacky and unattractive. The reason given for this attitude is that so many of the signs are cheaply constructed or poorly designed or inadequately programmed. Can we trust that if digital signs are allowed that they will be tasteful and appealing? Or should we expect that we may be stuck with some garish, ugly monstrosities spouting sometimes tasteless messages?
The right of a business owner to advertise should not trump other property owner's right to be protected from light trespass. The purpose and design of these signs are at odds with the very premise that it is unlawful to beam unwanted light across property lines.

The disadvantages of these signs to the general public seem obvious. We will be bombarded by more unwanted advertising. We will be purposely distracted while we try to drive. We will be subjected to light trespass and glare. We will have our dark skies degraded to at least some degree. The eye appeal of our city streets will be despoiled. None of these disadvantages can be mitigated; they are inherent properties of the signage.

A basic premise of our development plan is that Sierra Vista will grow and prosper by attracting visitors and residents. Visitors come here for birding and other wildlife observation, for biking and hiking, to visit historical sites, for the weather and to enjoy the scenery and the night sky. And, so long as they have work and affordable housing, residents choose to settle here for many of the same reasons. Digital electronic signs do nothing to attract visitors or residents.

Below are some factors to consider when formulating an argument opposing digital electronic signs.

It would be best to use your own words when incorporating any of the facts and findings provided below in your letters or comments.

Here are some specifics about astronomy in our area

In 2007, a study conducted by the University of Arizona estimated that astronomy contributed $250 million annually to the state's economy.

At last count we have identified 53 private, university, and semi-professional observatories in Cochise County. Several of them are close enough to the city to be severely impacted by any increase in Sierra Vista's light dome. All of these observatories, however, and many more in neighboring counties will be at least somewhat affected by any increase in the skyglow from Sierra Vista and will certainly suffer significantly if digital signs become legal in the county.

Most of these observatories represent a significant investment. They are nearly all large, permanent structures containing very sophisticated equipment. Their owners, in many cases, relocated to our area because of its astronomy-friendly attributes and sky-friendly lighting ordinances.

Amateur astronomers in and around Sierra Vista have made significant contributions to science and are responsible for a number of important discoveries. The late Dave Healy's observatory is responsible for the discovery of more than 500 minor planets (asteroids) some of which are potentially hazardous NEOs. HAC member Doug Snyder visually discovered a comet from his observatory just a dozen miles outside of Sierra Vista. HAC member Bruce Gary was the first person in the world to recover comet ISON from his observatory in Hereford. Local amateurs make many valuable observations that professional observatories simply cannot afford to spend time on. They perform occultation timings, monitor NEOs and variable stars, and search for supernovae and extra solar planets.

Local amateur astronomers contribute importantly to education. They conduct hundreds of hours of astronomy outreach in support of STEM education each year, informing, and perhaps more importantly inspiring, kids, their parents and their teachers.

HAC operates the Patterson Observatory located on the University of Arizona Sierra Vista campus. In addition to doing public outreach and supporting area schools and university classes, we've used that scope to do valuable science. We have video recorded an asteroid occultation with a star. That data was combined with others to help determine the shape of the asteroid. As a member of the *"Target Asteroid"* campaign in support of NASA's OSIRIS REx asteroid sample return mission, we have contributed observations of the potentially hazardous asteroid 1998 QE2 during its close approach to earth. We also contributed to the world-wide comet ISON observing campaign (CIOC).

Dr. Timothy Swindle of the U of A Lunar and Planetary Laboratory made this observation: "*Although the survey telescopes for the Catalina Sky Survey and Spacewatch are located well away from Sierra Vista on Mt. Lemmon and Kitt Peak, there are a number of observatories in southeast Arizona providing crucial follow-up observations of new discoveries. This valuable service is provided by well- equipped and competent astronomers scattered throughout Cochise County, who volunteer their time to make timely observations from which asteroid orbits can be determined. They can do this because of the dark skies and the protection of the outdoor lighting code. Lifting the ban on digital signs could very well prevent future observations of potentially hazardous asteroids."*

The Sierra Vista City webpage advertises: *" The clear, dark night skies in Cochise County have not gone unnoticed: Cochise County has more member observatories per capita than any other place in the United States, with astronomy clubs having 50 members or more"* and the city's official visitor's guide features a star filled sky on its cover.

HB 2543 (signed into law May 9, 2012) carves out zones in northern, southern and eastern Arizona where no new signs of this type will be allowed. This is designed to ensure that none of the internally illuminated signs with their changing messages will be within 75 miles of the Kitt Peak, Mt. Lemmon or the Discovery Channel Telescope observatories. This is evidence that the Arizona legislature recognizes the detrimental effects of these signs on astronomical observations.

In her veto of a bill that would have allowed digital billboards along Arizona's highways, Gov. Brewer cited the state's unique position as a national leader in astronomy due to its famed dark night skies. "The astronomy industry has invested $1.2 billion in Arizona, represents more than 3,300 jobs and has an estimated economic impact of $250 million each year," she said. "I simply refuse to place all of this in jeopardy."

Some general facts about digital signs

Article 151.11 (Outdoor Light Control) of the Development Code for Sierra Vista does not specifically address digital electronic signs of the type being advocated by some city businesses. It does, however, place restrictions on general lighting and signage that currently puts these signs out of compliance with the code.

Once digital signs are legally installed, it becomes quite difficult for regulatory agencies to have them removed even if new regulations make them illegal later. The city would have to purchase the signs or otherwise compensate the owners.

Proponents of these signs will argue that their detrimental effects can be mitigated by placing restrictions on brightness, scroll rates, and operating hours. The experience in locales like Tucson, however, makes it clear that these restrictions are routinely ignored. The characteristics of these signs can be adjusted at a keystroke, and cities like Sierra Vista do not have the resources to monitor compliance.

Digital signs are energy hogs. While the individual LED lights are energy efficient, the signs contain great numbers of them. The signs must be quite bright to be read during daylight hours, and that requires extra energy.

The signs are, by design, distracting. Their very purpose is to grab the attention of drivers. One manufacturer's own advertising makes this point: *"Nothing's as eye-catching as an electronic LED display. The brightly-lit text and graphics can be seen from hundreds of feet away, drawing the attention of everyone within view"* Trans Lux*'s* ad proclaims.

Digital signs have the potential to be every bit as distracting as having a movie playing alongside the highway. While everyone would agree that such a movie would constitute an unsafe distraction hazard, the billboard industry's assurances that they will not operate flashing or moving billboards have convinced some authorities that they would not pose a similar distraction hazard. They cannot avoid those effects, however, if they change the displayed images while we are watching. Displaying ads on multiple frames encourages the viewer to stare at the sign just as if they were watching a movie.

The signs are a relatively new phenomenon and there may not be enough data to decide whether or not they constitute a distraction hazard. A Swedish study concludes that [digital billboards] attract "*more and longer glances"* than regular traffic signs but says, "*whether they are a traffic safety hazard, cannot be answered conclusively based on the present data.*" Mary Tracy, president of Scenic America, a national non-profit conservation group whose local chapters oppose digital billboards, points out that
Sweden ordered digital billboards removed after the study.

Outdoor lighting is typically intended to illuminate the property it is on. Any light trespass is then incidental and unintended. But illuminated signs are designed to broadcast their lights to neighboring property and far beyond. Light trespass is an inherent property of digital signs. Light emitted *sideways* - that is light emitted between the horizontal and just 20° above - contributes much more to skyglow than light emitted at higher angles. Low-angle light's effects are visible over a much broader area. While the louvers in these signs (designed to shade the LED's from sunlight)effectively limit the light emitted straight up , they do nothing about the significant amount of light broadcast at lower angles making these signs a significant source of skyglow.

Cosmology 101

An Armchair Voyage through the Universe from One of America's Top Astronomers
By David Levy

Reviewed by Cindy Lund

Cosmology 101 includes both a review of basic astronomy and stories of David Levy's experiences viewing eclipses. I already knew most of the astronomy, but I did learn several new facts, and I enjoyed reading about Levy's eclipse viewings.

The preface tells about the influence celestial events had on Shakespeare's work. Cosmology 101 then begins with an imagined voyage though the universe, from the earth, out through the solar system, to the stars, the galaxies, and out to the quasars in a mini review of the cosmos.

In the next chapter, Levy discusses comets and meteors including the comet he is most famous for: ShoemakerLevy 9, the comet that crashed into Jupiter in 1994. I learned that in the discovery images it appeared as a "squashed comet" - a fuzzy bar of light with several tails. It had orbited Jupiter since around 1929. I also learned that the impact sights were visible even in small telescopes and that thick clouds blackened Jupiter's southern hemisphere for months after the impact. (I wish I had been a HAC member then so I could have seen it.)

Next is a chapter about the planets and moons of our solar system. In addition the usual information, Levy also includes tips on observing the planets. For example, Mars has a feature, Syrtis Major that looks like India, and a dark circular feature named Solis Lacus, but called the eye of Mars. Jupiter's belts sometimes have lanes of dark material called festoons jutting out from them or a bridge will join two belts. I plan to look for these in future observations. Levy also writes about the planets found outside our solar system.

Cosmology 101 then covers the stars including the constellations and the life cycle of stars. I learned that the dark nebula that mark stars in an advance stage of formation are called Bok nebulas. They are about 1/3 of a light year across. I also learned that in 1995 a type of globule called an evaporating gaseous globule or EGG was discovered in the Eagle nebula. EGGs are aptly named, for they are the wombs of individual stars. Levy also writes about supernova, neutron stars and black holes.

Next is a chapter on clusters. Levy begins by telling about a Star Night in 1964 where he showed people the globular cluster M15. Levy then writes about globular clusters and open clusters, including the scales Harlow Shapely developed to describe them and gives a small sample of clusters well worth observing. Cosmology 101 then includes a chapter on the Milky Way, its structures and the nebula within it. Levy highly recommends viewing the Great Sagittarius Star Cloud.

The next two chapters address galaxies. Levy includes information on how the galaxies were discovered, and how they were formed. He also includes a list of galaxies to observe. I haven't seen some of these galaxies, so I'll have to ask to view them at future star parties. He also includes information on strange galaxies, including spiral galaxies with five arms, or no arms, galaxies that are extremely bight in radio waves, and colliding galaxies.

Levy finishes his review of astronomy with an outline of modern cosmology, with information about the Big Bang, dark matter, and some of the largest known structures in the universe, the Great Attractor and the Great Wall.

The next section of Cosmology 101 is about eclipses. Levy tells about his first eclipse, a partial solar eclipse he saw in sixth grade in 1959. He was enchanted, and in 1963 made sure to come home from his stay at an asthma home to see a total solar eclipse. At the time of Cosmology 101's writing David Levy had seen 53 eclipses. He relates some of his experiences. I found these stories quite interesting.

Cosmology 101 explains how eclipses work, including that they repeat every 18 years, 10 and 1/3 days, with eclipses that are identical but occur over a different part of the Earth. Levy writes about some discoveries that astronomers made during eclipses including the discovery of helium, and a few comets.

The last part of Cosmology 101 is about telescopes. Levy covers the history of telescopes from Galileo's first telescope, to the Hale telescope, to the Hubble Space telescope. He then gives advice on how to use a telescope. He also includes notes on a few Western US observatories including Kitt Peak and Lowell Observatory.

I really enjoyed Cosmology 101, both for the refresher in basic astronomy and for David Levy's stories about his experiences viewing eclipses and discovering comets. I would recommend this book for HAC members, but I would highly recommend it for people who are looking to increase their knowledge of astronomy, particularly new and prospective HAC members who are new to the field.

Have you renewed your HAC membership for 2014?

The annual membership dues are:

Individual: $25

Family: $35

Student: $10

Military: $20

For new members, these dues are prorated on a quarterly basis. Renewal dates for all members is January of each calendar year.

Make checks payable to "Hauchuca Astronomy Club " and mail to PO Box 922 Sierra Vista AZ 85636 along with a completed membership application. Applications are available on our website www.hacastronomy.org

We appreciate your continued membership. Your dues help to provide scholarship awards to area students and entitle you to a number of exciting benefits such as membership in the Astronomical League, subscription to the Reflector magazine and discounts on Astronomy and Sky & Telescope magazines.

Since, 1982, HAC members have promoted interest in astronomy and related sciences through education, and outreach and through the fellowship of interested individuals. Stay a part of this exciting endeavor and help educate, and inspire future scientists, promote astronomy, and defend our dark skies.

Huachuca Astronomy Club – Board of Directors

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President: David Roemer Vice President: Chris Ubing

Secretary: Ted Forte Treasurer: Tommy Neyhart

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Past President: Bob Gent

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

Our sponsors: Please support our sponsors, ***Farpoint and Starizona***. They have been keeping us supplied in door prizes for some years. If you have not contacted them lately, please consider this. They have a lot of great astronomical products that we all need. For more information on products and contact information, their websites are:

http://www.farpointastro.com/
http://starizona.com/

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>

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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;
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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 !

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