NIGHTFALL
Huachuca Astronomy Club of Southeastern Arizona

General Meeting
17 September 2010

7 pm, Cochise College, Sierra Vista, Rm. 305A/B

Guest Speaker: Dr. Phil Pinto

Topic: LSST - A New Way To Observe

PLUS our monthly Show-N-Tells, upcoming event details, refreshments & Door Prizes!

Dr. Pinto will speak about the Large Synoptic Survey Telescope (LSST) which was just ranked by the National Academy of Sciences as the top priority for ground-based astronomy for the next decade. This 8.4-meter robotic telescope will rapidly scan the sky a couple times a week from a mountain top in Chile with a wide field of view and 3000 megapixel camera, accumulating catalogs and images into an enormous public database. The LSST's six-band optical survey will address over 100 new explorations of our universe, including studies of Dark Matter, Dark Energy, the Formation of Galaxies, and Potentially Hazardous Asteroids. The LSST is being built by a consortium of (currently) 34 institutions including Tucson-based Research Corporation for Science Advancement, the National Optical Astronomy Observatory, and the University of Arizona.

Huachuca Astronomy Club P.O. Box 922 Sierra Vista, AZ 85636 http://www.hacastronomy.com, Yearly Membership: Individual: $25; Family: $35; Military: $20; Student:$10 (with restrictions); President: Wayne Johnson; Vice President: Glen Sanner, (520) 803-0576; Treasurer: Bob Kepple, (520) 366-0490; Webmaster: Del Gordon; Star Party Coordinator: Glen Sanner; Past President: Doug Snyder; Outreach Events Coordinator: Rich Swanson, (520) 803-7298; Loaner Scopes: Bob Gent, (520) 378-2915; Newsletter Editor: Mark Meanings

President's Perspective

Wayne (aka Mr. Galaxy) Johnson

Welcome back after the summer recess of the past couple months! Though we did have not any HAC General Meetings for the hot summer months of July and August it does not mean our astronomical events came to a halt. I hope you were one of several members who attended the major Star Parties in California, Texas and northern AZ and perhaps made it to the Astronomical League's ALCon which is their major convention held this year in Tucson. Dave Healy continued to invite people to his house to enjoy the night sky when the weather cooperated, Bob Gent hosted members and the general public at the UA South's Patterson Observatory, and Glenn Minuth continued to plan Sidewalk Astronomy events at Ace Hardware, SV Mall, and Walmart.

This past Friday, encroaching clouds that had been rolling off the Huachuca Mts all day threatened to blot out our featured objects of the night: the moon and its retinue of planets. Despite the threat of inclement monsoonal weather we set up our telescopes and displays on the sidewalk near the main entrance of Walmart. The storm clouds started to back off just the tiniest bit and finally retreated as the sun set and allowed us to have a nice view of the urban sky. Eric Sundius, Rob Shernick and myself set up our telescopes to look at the crescent moon, half-phase Venus, tiny Mars, and the edge-on rings of Saturn, which were all crowded in a very small part of the sky. We were there from about 7-9pm when we regrettably had to shut down because all our objects were setting in the west. As I said this was an "urban setting" with many parking lot lights interfering with the light from our celestial objects, but we chose this location so that we could catch people while they were running their chores and ask them take a break to see something that they ordinarily would not. We also chose bright objects so that people unfamiliar with viewing through a telescope could easily see what was in the eyepiece. We get the entire spectrum of the population, from youngsters to oldsters, the rich and the poor, and the interested and disinterested (the most challenging). I would eventually like to see a telescope with an integrating video camera attached to it so that a large number of people could experience the same object at the same time and perhaps see fainter objects easier. We have done this a few times for events that we have held in Veteran's Park and people are always astounded by the views. Many thanks to Glenn who has done yeoman work in coordinating HAC Sidewalk Astronomy events with our three current venues mentioned above. He has brought the concept of Sidewalk Astronomy up a notch with his ideas of using visually attractive and informative posters that bring people to the telescopes and inform them about what they should see once they take a peek through our HAC members' telescopes. It's hard to know who is having more fun, the HAC members who bring telescopes to the Sidewalk event or the shoppers who take a moment out of their busy lives to look through the scopes and are totally agog at what they see. Come join us at Ace Hardware for the next Sidewalk Astronomy event on a date to be announced in September. You'll wonder why you hadn't done it earlier!

Karchner Caverns Star Party

Wayne (aka Mr. Galaxy) Johnson

Thanks to all who took time to help out at the Karchner Caverns Star Party and thanks to Bob Gent for organizing it once again. We even had some enthusiastic folks (JD and his wife) from the Sedona area helping out, and visitors from Phoenix who I talked with at length toward the end of the night as the crowds were finally dwindling.

We had about 6 telescopes set up and about 200 people of all ages in attendance, some local and some campers, so lines got to be quite long at all of the scopes. The weather was pleasant with a few scattered clouds later in the evening that didn't dampen the enthusiasm of the participants one bit.

The moon, Jupiter and Venus were the brighter highlights, while many deepsky objects, including M13 and M31, were shown to many inquisitive eyes. One little girl, about 10 years old, after looking at Jupiter and its moons through my telescope, informed me she was a Greek mythology buff, and proceeded to tell me the stories of each of the Galilean moons. I never realized that Europa was the first queen of Crete. You never know when you're going to learn something interesting and from whom!

The Caverns staff wants to keep us involved in more activities, especially regarding light pollution and sharing our telescopes for observing, and there will be a number of upcoming events where our help is requested. Bob Gent is our point of contact with Karchner and I hope he will continue to keep us posted on some of those events at our future HAC meetings.

I hope to many more HAC members cooperate in these worthwhile events. The skies are dark and the drive is relatively easy.

ALCON 2010

Del Gordon, HAC Webmaster

The Astronomical League's Expo and convention held in Tucson, Arizona on June 24 through June 27, 2010, was well-organized and well-attended. Bob Gent, HAC member, former HAC Secretary, and Past President of the Astronomical League and the International Dark-Sky Association, was the conference's Co-Chair, along with Keith Schlottman, President of the Tucson Amateur Astronomy Association. The days I attended were Friday, Saturday, and part of Sunday.

There were talks from noted speakers, a vendor area, and field trips. There was a vendor area that included telescopes, equipment, art, books, software, clothing, meteorites, and many other items to make any astronomer happy. I did my best to add my own stimulus package to the Arizona economy! Bob Kepple and Glen Sanner had several vending tables where they were selling their essential reference books, the *Night Sky Observer's Guides, Volumes 1, 2, and 3*, along with software and Bob's skillful artwork, which includes scenes of nature, wildlife, astronomical observation, and space. One of the "Meteorite Men" was there, Geoffrey Notkin. He has an entertaining show on the Science Channel titled *The Meteorite Men* and is now producing Season 2, which will premiere on October 15. For $40, I purchased an iron meteorite from Meteor Crater in Arizona, also known as the Canyon Diablo meteorite, and I got my picture taken with Geoff. I did not get to attend the field trips to Dave Levy's Jarnac observatory in Vail, or the trip up to the Mt. Lemmon SkyCenter. There was also a co-resident Arizona Solar Conference. Lunt Solar Systems had H-Alpha and Calcium-K scopes set up outside on the patio by the pool for observing solar flares and sunspots.

The Meteorite Men on the Science Channel: http://www.meteoritemen.com/

There were many representatives of the Astro League and the IDA present. Several members of the HAC attended, as well as some HAC speakers. Those that I saw there included Howard Day, HAC Librarian, Jim McCaw, Bob Kepple, HAC Treasurer, and Glen Sanner, HAC Vice President. HAC Speakers included Adam Block, Dolores Hill, and Dean Salman.

There were many excellent presentations. My top favorites were Adam Block, Wally Pacholka, Vivian White of NASA, and Dean Salman. The CEO of Celestron, Joe Lupica, gave a moving talk about the 50 Years of Celestron History, which included the story of the company's founder, Tom Johnson, who did not listen to the experts who said, "it can't be done," and was determined to leave his mark on the world. Instead, Tom Johnson figured out how to produce Schmidt-Cassegrains at a high volume and low cost, thus sparking a revolution in the amateur astronomical and educational communities. One of the biggest thrills of the weekend was being able to listen to the Keynote Speaker, Dr. Roger Angel talk about his exciting new projects in solar energy production.

Astronomy and Solar Energy, Dr. Roger Angel

The keynote speaker at ALCon 2010 was Dr. Roger Angel. He is the Regents Professor of Astronomy and Optical Sciences at the University of Arizona, and the recent winner of the Kavli Prize in Astrophysics. He directs the Steward Observatory Mirror Lab, which has made the mirrors for the largest telescopes in the world, including the LBT at Mt. Graham.

Dr. Angel knows a lot about focusing light, and now he is directing his focus onto the field of solar energy. He talked about his new startup company, REhnu. This is an exciting venture—for Arizona, the United States, and for the world. Dr. Angel hopes to use the technology of triple-junction photovoltaic solar cells, combined with the focusing power of his specialty, glass mirrors, to concentrate solar energy and harvest

it at efficiencies of forty percent. This level of efficiency and a large scale production will make solar energy production economically competitive with fossil fuel, and without any subsidies. The bonus is that Arizona is mapped out to be a major provider of this renewable form of energy, with Arizona, Southern California, and New Mexico having enough solar radiation to power the entire United States! This will make Arizona a major exporter of energy—clean, renewable, and virtually infinite. The REhnu startup was formed last year (2009), and holds exclusive license to the University of Arizona concentrated photovoltaic (CPV) technology. The plan is to have 2 megawatts/year of production by 2012. The first commercial 20 kW prototype will hopefully be running by next year. For further details, see the website rehnu.com.

I asked Dr. Angel why we don't put solar panels over parking lots, putting that already-disrupted land to additional use, while creating valuable shade and reducing the urban heat island effect. He replied that this would be a good usage of the conventional flat PV panels, not the curved type of concentrator mirrors that he will be making, and that this electricity could be used to plug in our electric cars like the Volt, the Leaf, and the plug-in hybrids. See the website mentioned below to read about the exciting innovations that Dr. Angel is working on.

REhnu, Gigawatt Scale Solar Power:
http://www.rehnu.com/

Side Trips on the Celestial Sphere

Mark Meanings

The constellation Cygnus is high up in the sky at sunset, and stays with us through the early part of the evening. Being situated right in the plane of the Milky Way galaxy, it offers a huge number of stars, nebulae, and clusters.

There are two different major stories associated with this constellation. The first one has something to do with my favorite character, Zeus. Zeus loved many different beings including, men, women, and animals. In this story, he fell in love with the beautiful Leda, daughter of Thestius, King of Aetolia (located in central Greece), who was also married to the Spartan king Tyndareus. As always, Zeus wanted badly to get to know her better.

Zeus knew from past experience that a disguise would work better to approach her. He disguised himself as a beautiful white swan and flew over to her. Leda noticed the beautiful swan, and played with it, not knowing it was Zeus. Even though Zeus was still in disguise, he had his way with her. Leda became pregnant and laid two eggs. One egg hatched Pollux and Helen, immortal because they were the offspring of Zeus. The other egg hatched the mortals Castor and Clytemnestra; they were the offsprings of Tyndareus. Of course, Pollux and Castor are known as the Heavenly Twins.

The second story is also associated with Eridanus, the River story, so I will not go too deeply into the story. A young man named Phaethon (the son of sun god Helios) was driving his father's fiery chariot across the heavenly sky. He lost control of the chariot and started burning everything in sight. Zeus didn't want him to damage the earth any further. He threw a strong thunderbolt at the chariot. Phaethon and the chariot fell in the Eridanus. One of his best friends searched for his scorched body in the water for so long that he eventually became a swan.

The Great Rift of the Milky Way begins south of Deneb (Alpha Cygni) with a broad opening consisting of the dark areas, Barnard 346, 348, and 349. These form what some call the Northern Coalsack. It merits sweeping with binoculars.

The Cygnus Star Cloud is a portion of the Milky Way that stretches from Sadr (Gamma Cygni) to Albireo (Beta Cygni). The Milky Way divides south of Deneb (Alpha Cygni) and continues south to Ophiuchus. The Cygnus Star Cloud resides in the western portion of this division.

IC5146 (Caldwell 19) is also called the Cocoon Nebula. You find it in the far NE of Cygnus near Lacerta. Dreyer calls it faint (mag. 7), large (9'), and sort of round. A mag. 9.5 star sits in the center, and the whole area is shot through with light and dark areas. Some observers report an H-beta filter works well.

M39 (NGC7092) is located 9.2° ENE of Deneb (Alpha Cygni). At mag. 4.6, this open cluster

consists of a number of bright stars scattered over a 32' field. Like M29, the "field" is also the Milky Way. Dreyer adds that this is a poor cluster of mag. 7-10 stars. "Poor" means few stars for the area; it does not mean to avoid it.

NGC7031 is an open cluster located 7° NE of Deneb (Alpha Cygni). Dreyer says it is a cluster of triple stars with little condensation. Depending on whom you read, it is either a gorgeous jewel, or the most boring NGC cluster up there. What do you think? Catalogs give it as 50 stars in a 5' area. Most of the stars are around mag. 12, with the brightest at mag. 11.

NGC7000 (Best 46, Caldwell 20) is an extremely (Dreyer uses "extremely" twice) large (roughly 2°), faint (integrated magnitudes do not mean much at this size) nebula located 3.2° east of Deneb (alpha Cygni). Difficult in most scopes, it comes alive in an 11x80 finder with an OIII filter.

Dolidze 36 is an open cluster located 4.2° WNW of Sadr (Gamma Cygni). Frankly, it's not too exciting; it stands out poorly from a rich Milky Way. An interesting S shaped asterism of stars lies just north of the cluster. A line of six stars (PA105) runs through the cluster. The cluster itself contains about 30 mag. 12 stars.

NGCs 6992, 6995, and 6960 (Best 45 & 44, Caldwell 33 & 34) make up the eastern and western areas of the Veil Nebula, a supernova remnant in Cygnus. Traveling 3.3° south of epsilon Cygni, you come to 52 Cygni, which sits in the center of the western Veil. The Eastern Veil sits 2.5° WNW. Both areas have "extremely" applied to "faint," "large," and "elongated." An OIII filter at about 6 power per inch of aperture transforms the object. It looks great in a 15x80mm spotting scope; the entire nebula is visible. A 6" easily will bring out the filamentary structure. A 12" produces awe inspiring views.

M29 (NGC6913) is located 1.8° south of Sadr (Gamma Cygni). At mag. 6.6, this open cluster is consists of relatively few, bright stars scattered over a 7' field. Since the "field" happens to be the Milky Way, the effect is quite pretty.

NGC6910 is sometimes called the Y Cluster. You find it .6° ENE of Sadr (Gamma Cyg). Dreyer calls it fairly bright (7.4), fairly small (8'), poor, and fairly condensed. Later estimates raise the number of stars from 20 to 50 at mag. 9.6 and fainter. Faint nebulosity throughout a gorgeous field. A low power eyepiece can include Sadr with the cluster.

IC4996 is a pretty open cluster located 2.8° SSW of Sadr (Gamma Cygni). It contains 15 stars, several of contrasting colors, from mags. 8-13 over a 6' area, all embedded in a rich field. Sitting .7° south is Dolidze 3, a cluster of 40 stars in a 15 minute area, surrounded by an small empty area, and then embedded in the Cygnus Star Cloud.

NGC6888 (Caldwell 27) is sometimes called the Crescent Nebula. It is 2.7° SW of Gamma (Sadr). About 20' long, Dreyer calls it faint, very large (20'x10') and very elongated.

NGC6883 is an open cluster located 3.1° ENE of Eta Cygni. You find it in the upper, left of the picture. Dreyer describes this mag. 8 cluster as fairly rich (30 stars), with a double star involved. NGC6883 sits in a nice field that includes the fainter cluster Biurakan 2 (30' to the lower right, or southwest). This mag. 6.4 cluster contains ten stars of mag. 7.9 and fainter.

NGC6871 is a mag. 5.2 open cluster described as having "large and small" stars (i.e. of varying brightness). The cluster contains 15 stars mag. 6.8 and fainter over a 20' field in a very rich section of Milky Way. A double star is involved. It is located 2.1° ENE of Eta Cygni.

NGC6826 (Best 43, Caldwell 15) is a planetary nebula called the Blinking Planetary. Located 1.3° ENE of theta Cygni, you find it in the lower, left of the picture. Dreyer describes it as bright (mag. 10), pretty large (2.3'), round, and with a mag. 11 central star. Stare at the central star directly, and it may "blink" out.

NGC6819 (Best 42) is a mag. 7.3 open cluster lying 7.8° west of Sadr (Gamma Cygni). Dreyer describes it as very large (5'), and very rich in stars. It packs in close to 100 stars of magnitude 11 to 15.

What is the HyperStar?

Max Reason & Mark Meanings

I've recently heard quite a bit of chatter about the HyperStar. Going to the website http://www.hyperstarimaging.com/, I saw that it's essentially just a prime-focus camera. The surprise came when I read "Deep-sky astrophotos now take seconds instead of hours!"

Wha??? I turned immediately to an optics expert and friend of mine, Max Reason, to see if he could provide an explanation. Here is his response (edited slightly):

Everyone, especially scientists, tend to love to have, wield and believe simple equations rather than focus on the physical processes involved. That's dangerous, and quite often leads to confusion. This issue you're discussing is one of those issues that is often confused by "scientific thinking".

Okay, let's perform a visualization of what happens on the surface of a CCD when images of a star are being exposed. Later we'll perform a similar visualization for nebula, because the situation may seem different for nebula (at first).

To help us understand our visualization, let's start with a specific optical system which we will later change (aperture, focal-length, focal-ratio) and then re-visualize to see what difference those changes make.

We start with a 200mm (8") aperture telescope with 400mm focal-length == F/2 focal-ratio. If we compute the scale of a 400mm focal length telescope, we see that 1 arc-second on the sky covers 2u (2 microns) on the CCD. Let's also assume our CCD has 5u (5 micron) pixels. Furthermore, let's assume the seeing is great and thus the star image is always 1 arc-second.

Okay, let's focus on the single pixel at 1000,1000 on the CCD, because smack in the center of that pixel is a star that is causing the CCD to detect and store 1 electron every 1 second. Clearly this "1 electron per 1 second exposure" is a very useful measure of "how fast the entire system (telescope and CCD) captures the image".

Now, let's change our visualization. Let's keep the focal-length the same, but double the aperture from 200mm to 400mm. From simply looking at the entire system, we can easily see that the entrance aperture of the optical system has four times the area, and therefore captures four times as many photons per second from every star and every fixed-size piece of the nebula (fixed-size in arc-seconds == fixed-portion of the physical nebula).

So, what do we notice? Well, since the optical system is focusing four times as many photons per second from our target star (and any fixed-size part of the sky) on the pixel, this 400mm aperture optical system captures a given image four times faster... or collects a four times richer (denser) image in the same exposure as the 200mm aperture system.

Is this because the second telescope is twice the aperture of the first (400mm vs 200mm)? Or is this because the second telescope is twice as fast as the first (F/1 versus F/2)? Well, in the case of this visualization, it is certainly true that both relationships hold. FACT: increasing the aperture increased the speed the star image was collected. FACT: speeding up the focal-ratio increased the speed the star image was collected. So, which is it? One or both? Hint: beware of all such simplistic formulations.

Okay, now we must perform another set of visualizations to help us understand this. Now, I admit it might not be obvious we need to perform any other visualizations to understand what's going on here, but I know we must because I've been through this many times before, and know we must perform another pair of visualizations in what is essentially a different paradigm or phase or state or (find a better identification).

The next set of visualizations will be with the following 4 optical systems (same CCD):
200mm aperture, 4000mm focal-length == F/20 ::: 20 microns per 1 arc-second
400mm aperture, 4000mm focal-length == F/10 ::: 20 microns per 1 arc-second
200mm aperture, 8000mm focal-length == F/40 ::: 40 microns per 1 arc-second
400mm aperture, 8000mm focal-length == F/20 ::: 40 microns per 1 arc-second

Now, we must compute the scale of these optical systems so we can visualize the star image on that CCD pixel at 1000,1000 (this is a 2K x 2K image sensor, BTW).

Well, we noticed 1 arc-second per 1 micron corresponded with 200mm focal-length, so the scales of the above 4 instruments are shown above (microns per arc-second).

Now, armed with the above information, the first thing we notice when we visualize the star image on that CCD pixel at 1000,1000 is... the 1 arc-second star image does not fall inside the

pixel, but instead covers an array of 4x4 pixels or 8x8 pixels!!!

So, when we compare our original 200mm aperture, 400mm focal-length telescope with the 200mm aperture, 4000mm focal-length telescope, we notice that the energy from the star that fell on one pixel is now spread across 16 pixels! Yikes! Clearly this means we need 16 times more exposure for each of those 16 pixels to record sufficient energy [photos] to detect the star. Obviously this totally contradicts the notion that "only aperture matters" when considering how much exposure is needed to record the star [to a given "density" or "level above sensor noise"]. But it is also obvious the exposure required to record the star is not simply a matter of the speed (focal-ratio) of the optical system either. Why is that? Because we can also easily visualize a 200mm aperture 800mm focal-length optical system (which has a scale of 4 microns per 1 arc-second)... and observe that all the light from the star STILL falls on one pixels, just like the 200mm aperture, 400mm focal-length instrument. And therefore the change from F/2 to F/4 made NO DIFFERENCE in how long an exposure is needed to record the star.

Maybe at this point we notice the two "paradigms" or "phases" involved. From our visualizations we have noticed the following:

#1: As long as the image of the star is SMALLER than the CCD pixel, changing the focal-length and focal-ratio has no effect on the "required exposure time". In this case, increasing aperture DOES reduce the required exposure time, but changing the focal-length and/or focal-ratio DOES NOT change the required exposure time.

#2: As long as the image of the star is LARGER than the CCD pixel, changing the focal-length and focal-ratio ALONE has a large effect on "required exposure", because the energy from the star is spread over increasing numbers of pixels.

Also in this case, increasing aperture ALONE reduces "required exposure time", because the energy collected from each star is increased while the number of pixels that energy is focused upon remains the same.

Also in this case, increasing both aperture AND focal-length proportionally (simply "scaling up the instrument to a larger aperture but same focal-ratio") has NO effect on "required exposure". Why is that? Because each time we double the aperture we collect 4 times as much energy from the star, BUT we also double the focal-length which spreads the energy from the star across 4 times as many pixels!!! In other words, in this case we see that "no matter what is the aperture, as long as the focal-ratio remains the same, the required exposure remains the same" --- which is another way of saying "required exposure is only a function of focal-ratio, and nothing else". Of course, this applies as long as the scale is such that the star is always larger than the pixel.

Fact is, I have somewhat compressed these visualizations. I have avoided other very nasty cases that matter very much. For example, imagine you are exposing that "double-double star" in Lyra, which is approximately 4 stars of the same magnitude in a small field of view. What if we are in the situation where the star images are smaller than the CCD pixels, but the following happens to be true:

--- star #1 falls entirely within the pixel at 1000,1000
--- star #2 falls 1/2 each inside pixels at 1100,1100 and 1100, 1101.
--- star #3 falls 1/4 each inside pixels at 1200,1200 : 1200,1201 : 1201, 1200 : 1201, 1201
--- star #4 falls 1/2 inside pixel 1300,1300 and 1/8 in pixel 1300,1301 and 3/8 in pixel 1301,1300

Now "how much exposure is required to expose a star of the magnitude of those 4 stars"? The answer is: gulp! Perhaps we feel very uncomfortable when we notice star #1 only requires 1/4 as much exposure as star #3 --- even though both stars are the same brightness!!!

I hope this helps answer your question. Sadly, it requires we drop the "trivial rules of thumb" answers, and look at specific cases. Hopefully you can apply the above method of reasoning to those instruments.

PS: The situation with "nebula" is more-or-less equivalent to the cases where the star images are larger than the pixels... but "not quite"

because as the image in one area overflows into other pixels, the same happens in the other direction.

Former Astronomers Inn Reopening as San Pedro Valley Observatory

Wayne (aka 'Mr Galaxy') Johnson

The well-known Astronomers Inn (formerly The Skywatchers Inn) on the east side of Benson is reopening as the San Pedro Valley Observatory (SPVO). As many of you know, it is the site of the old Vega-Bray Observatory containing the wonderful 20-inch Maksutov, one of the largest telescopes of its kind in the US. When the facility opens for business, new owner Pete McLaughin eventually plans to have remotely controlled telescopes for those who want to observe from their homes, and, for those on vacation, telescopes and host astronomers available for hire to give sky tours. SPVO is _not_ planned to be a Bed and Breakfast at this time, but there are several motel facilities available in and around Benson for those traveling a long distance. SPVO is having a free open house this weekend, Saturday, 18 Sept.

Take exit 307 (Pomerene Rd) off I-10. At the end of the exit ramp turn right (south), then turn left (east) onto the frontage road and go for about 1/2 mile, at the first street (Old Airport Rd) turn right (south) going over the railroad tracks, follow Old Airport Rd for a few miles (there will be several sharp turns and you will go over the San Pedro River). Eventually you will see a sign for Astronomers Rd, turn right onto this dirt road, and follow it to the end where you will see the entrance to the SPVO.

Get Out and Observe Comet Hartley!

Mark Meanings

Comet Hartley is getting brighter and brighter as it moves very quickly across the sky! Periodic comet 103P/Hartley 2 is classed as a young, dwarf comet, with a nucleus roughly 1.14 kilometers across. It belongs to the Jupiter family of comets (comets with periods less than 20 years). The comet was discovered in 1986. Although it then had an orbital period of 6.3 years, an analysis of its orbit reveals the period had been longer in the recent past. During the early decades of the 20th century, the orbital period had been 9.3 years. A close approach to Jupiter in August 1947 (0.22 AU) reduced the period to 7.9 years, while another close approach during April 1971 (0.09 AU) reduced the period to 6.1 years. The comet has been seen at every return since its discovery. The 2010 return is exceptional, as the comet will pass 0.12 AU from Earth on October 20. The Deep Impact space craft will pass about 1000 kilometers from the comet on November 4.

Classifieds

Panoptic Barlow Interface $65; Radians - 14mm (2), 10mm, 5mm $200 ea; Plossls – 32mm $105, 20mm $85, 15mm $75; and finally I have 2 1 1/4" 3X barlows $95ea. Priority Mail is included. Ed Erbeck ed@crazyedoptical.com

Calendar

Sept 17 – HAC General Meeting 7pm
Sept 21 – Jupiter at Opposition
Sept 22 – Autumnal Equinox
Sept 22 – Uranus at Opposition
Sept 23 – Full Moon
Oct 1 – Astronomy Night at JBO
Oct 1 – 3rd Quarter Moon
Oct 4-10 – World Space Week
Oct 7 – New moon
Oct 7 -- Eugene Shoemaker Memorial Lecture
Oct 9 – Draconids Meteor Shower
Oct 14 – 1st Quarter Moon