nightwatch
Newsletter of the Pomona Valley Amateur Astronomers

Pay club dues at the General Meeting or by mail. $30 individual / $40 family.

President's Address

As I am not a candidate for reelection, this will be my last President's Message. Being president for 8 years has been a great experience but I think it is time for me to step aside and give someone else a chance. At the August meeting we will continue to accept nominations for club offices right up until the election. If you would like to run for an office it is not too late.

September 18 - 19 the third annual Pacific Astronomy and Telescope Show will be held in the Pasadena Convention Center. PVAA will be offering discounted tickets at the August general meeting. PATS will have a great lineup of speakers including Alex Filippenko, UC Berkley astronomy professor and key note speaker at RTMC a few years ago. PATS is brought to you by the same group that puts on RTMC every year and they do a terrific job. If you want to see what is new in astronomy, are looking to save money on equipment, or just want to hear all the interesting speakers, be sure to be there. PATS is looking for people to support the public outreach program at Paseo Colorado again this year. I hope some of you will be able to help out.

Our next star party will be Saturday, September 4th. We will be joining the Riverside Astronomical Society at their Landers site. RAS will be holding a Star-B-Que at 4:00 PM. If you would like to join them for the feast, bring a main dish, salad, dessert, or sodas. The swimming pool will be open. Just remember that RAS has a "no speedos" rule!

Happy Stargazing!

Ron Hoekwater

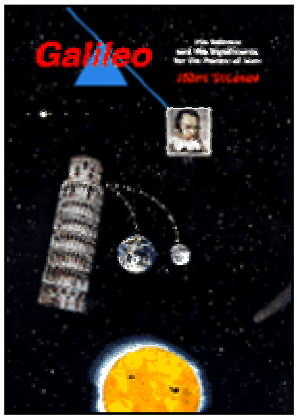
Club Events Calendar

August 27, General Meeting - Dr. Rachael Akeson - "Finding Planets Through Transits"
September 4, Star Party—GMARS in Landers with RAS
September 16, Board Meeting
September 17&18, Star Party at mall near PATS - Pasadena
September 18&19, – PATS in Pasadena
September 24, General Meeting - Christine Pearce from Columbia Memorial Space Center
October 9, Star Party - High Desert Club at Afton Canyon
October 12, Star Party – Ontario Library, Main 7–9 PM
October 14, Board Meeting
October 22, General Meeting - Robert Piccioni - "Einstein for Everyone"
November 6, Star Party
November 11, Board Meeting
November 13, Townsend Junior High School in Chino Hills
November 19, General Meeting - Gene Serabyn of JPL
December 4, – Star Party
January 11, 2011 – Main Branch, Ontario Library, 7 – 9 PM
January 21, 2011, – General Meeting
February 18, 2011, – General Meeting
March 18, 2011, – General Meeting
April 15, 2011, – General Meeting
May 13, 2011, – General Meeting

July General Meeting

We began the evening with the announcement that members could obtain one day tickets to PATS, worth $20, for only $15 when purchased from the Club. This indoor astronomy expo will be held in Pasadena on September 18th and 19th. We will only have our August 27th meeting before the Expo so make sure to attend and purchase your tickets at this special price. Many interesting speakers will be there including ones from Sky and Telescope and from JPL. New attendee Scott Little joined our meeting. Hopefully we will see him at other Club events, please make him welcome.

Our current Club officers all agreed to stand for re-election, with the notable exception of Ron who will not be a candidate for President. His term will expire after the August meeting. I'd like to extend my personal gratitude to Ron for his many years of service to the Club. During all the years I've been a member, he has held an office and helped us all out in a many ways – writing articles for the monthly newsletter and soliciting articles from others, making sure we are all informed of upcoming Board meetings and Star Parties, being present at most of our Club, school, and public star parties, and for the last 8 years serving as the fearless leader of our small band of night sky watchers. It has been a complete pleasure to work with Ron over the years and the good news for us all is that he isn't disappearing from our midst. Ron has offered to locate speakers for our monthly meetings and he is, of course, still a member so I expect he will continue to attend most of our Club events. As I write this article, no one has stepped forward to run for Ron's office so our Vice President, Joe Hillberg, will serve in the meanwhile. I'd like to encourage other Club members to step forward to take a turn. This is not a job that requires special training, or has any prerequisites - the rest of the Board is a great group of people and we are all ready to help a new President learn the ropes.



July featured two speakers instead of the usual one – Al DiCanzio and Bob Eklund both spoke to us during our meeting. Along with two speakers, we heard about two perspectives on the same topic – that far from being the polar opposites we often imagine science and art form a strong and mutually supporting relationship. Both study and interpret natural phenomenon. It was easy to hear the science behind Bob's poetry as he read a few excerpts from his book. For his part, Al has extensively studied Galileo and shared the example of how Galileo's knowledge of perspective – a more artistic talent – helped him to an understanding of the real nature of sunspots. We as amateur astronomers are another good example of the blending of science and art as we use our skills with math and gadgetry to operate telescopes then use our appreciation of beauty to enjoy the sights we see through them. Thank you for a very interesting lecture, gentlemen.

Mid-August brought an event familiar to many of us – the Girl Scout Camp "Nature at Night". It was held again this year in the mountains north of Idyllwild and the lucky attendees were again treated like royalty in exchange for sharing their telescopes with small groups of scouts throughout the evening. Up on the mountain were Ron Hoekwater, Laura Jaoui, Larry Kawano and his friend Barry, Claire and John Stover, Joe Hillberg, Gary Thompson along with his son and his son's friend, Bill Vaskis, and Ken Crowder. I think the food was even better that usual this year and we enjoyed chicken along with, spinach cranberry salad, corn on the cob, rolls, and fresh fruit salad – certainly not usual Girl Scout camp fare! Nighttime accommodations for Laura and Claire in the women's cabin and for Ron and John in the men's featured bunk beds and substantial mattress pads then we were treated to breakfast and hot coffee in the morning. I encourage all who can to attend this fun event when it comes up each year. We enjoyed clear views of the Milky Way, great food, overnight camping for those who wished to stay, and enjoyable interactions with the Scouts, who were sent up the hill to the telescopes in small groups so we had plenty of time for those with questions or special viewing requests.

Claire Stover

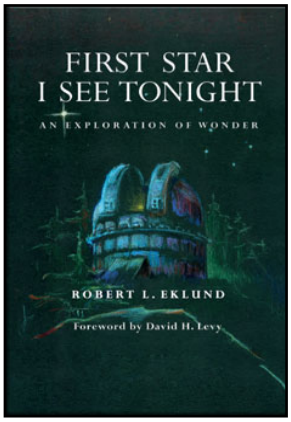
References:

A review of Al DiCanzio's book:
http://www.adasi.com/book1.html

An article of Galileo:
http://hubpages.com/hub/galileo

Bob Eklund's website:
http://www.bobeklund.com/

Review of Bob's book:
http://firststarbook.com/index.htm



PVAA Officers and Board

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This is the third installment in a series on the largest single-aperture optical telescopes through history, starting at the present and working backward. Last time we saw how University of California astronomers had been forced to conceive of the world's largest and most technologically advanced telescope—a 10-meter behemoth with a novel multi-segment mirror—because no one would fund the merely average 3-meter scope they intially wanted. By the early 1980s the 10-meter telescope was essentially complete...at least on paper.

One of the easiest ways to cut costs is to cut out materials. By designing a fast, lightweight scope on a small mount in a compact dome, the UC crew had whittled down the cost of their 10-meter scope to $100 million. For the same price as the 200-inch Hale telescope (allowing for inflation), they would build a telescope twice as big, with four times the light-gathering area—if they could get the funding. Following Hale's lead, they had bet everything on the hope that donors who balked at giving a few million dollars for a 3-meter scope would happily give many times that amount for the World's Largest Telescope. And they were right.

In 1985, the William M. Keck Foundation, established by a California oilman, granted $72 million to the project on the condition that the observatory be named for its late founder. CalTech, which had long operated the Hale telescope, wanted a piece of astronomy's new big gun and agreed to split the remaining cost with the UC. The Keck Foundation later gave another $70 million to build a second, identical telescope. This was not just a case of “more is better”; the two telescopes would be linked together to form the world's largest optical interferometer, with the resolving power of a single telescope 85 meters across. NASA became a funding partner in 1996, when the second Keck telescope came online and just before the second servicing mission to the Hubble Space Telescope. That is not a random datum; NASA planned to pool data from the HST and the twin Keck telescopes to make observations that neither observatory could do its own. The final partner is the University of Hawaii, which automatically gets a small percentage of the observing time on any telescope built on Mauna Kea.

Since the Keck telescopes were explicitly built to be the successors to the 200-inch Hale telescope, it is worthwhile to spend a moment comparing them. Here are some vital statistics; in each comparison, the first value is for the Hale telescope and the second is for one of the twin Keck telescopes.

Primary mirror diameter: 5.08 m / 10.0 m
Light-gathering area: 20.3 m^2 / 76 m^2
Weight of glass: 14.5 tons / 14.4 tons
Moving weight: 500 tons / 270 tons
Dome diameter: 42 meters / 37 meters
Dome weight: 1000 tons / 635 tons

In short, despite having almost four times the light-gathering area and twice the angular resolution of the Hale telescope, the Keck telescopes each have about the same weight of glass (thanks to the multi-segment mirror), about half the moving weight (thanks to an alt-az mount), and a smaller dome with two-thirds the weight (thanks to the fast optics and alt-az mount)—all for about the same cost in adjusted dollars.

With funding secured, construction proceeded apace. Keck 1 saw first light in 1993, and Keck 2 came online in 1996. Since then, the Keck telescopes have done far more than just give UC astronomers a place at astronomy's crowded high table; to a large extent, the Keck Observatory has been the high table among terrestrial observatories. Like the 100-inch Hooker and 200-inch Hale telescopes before them, the Keck scopes have pushed back the boundaries of the observable universe and revolutionized cosmology again.

The realization in the late 1990s that the expansion of the universe is accelerating was based on observations of supernovae in highly redshifted galaxies; data from the Keck telescopes were crucial to this discovery. The Keck scopes have also been used for groundbreaking work closer to home, from the formation of stars and protoplanetary disks, to imaging the outer planets and their moons in our own solar system, to the search for exoplanets around other stars. In the exoplanet hunt, the unparalleled angular resolution of the Keck scopes has allowed them to detect and directly image planets that are invisible to smaller telescopes, even those as big as the 8.1-meter scopes at the Gemini North and South observatories. The Keck/Hubble collaboration facilitated by NASA has been especially fruitful. The HST has a much smaller primary mirror than either of the Keck scopes, only 2.4 meters, but because it is above the atmosphere and can be left "on target" for more than the duration of a single night, it can actually detect fainter objects than any existing Earthbound telescope. However, the angular resolution of the much larger mirror of each Keck telescope is many times better, and outstandingly better when the two scopes are linked to form an interferometer. Astronomers have used the Keck/Hubble combination to study everything from the patterns of turbulence in the atmosphere of Jupiter to the formation of the earliest galaxies at the edge of the observable universe.

Ultimately the legacy of the Keck Observatory will be a succession of ever-larger telescopes. Since Keck I was completed in 1993 many large solid-mirror telescopes have been built, but they have all been smaller than 9 meters in diameter. All of the planned ELTs (Extremely Large Telescopes), including the Giant Magellan Telescope (24.5 meters), the Thirty-Meter Telescope, and the European Extremely Large Telescope (42 meters), achieve their titanic apertures using the multiple mirror technology first demonstrated at large scale in the Keck telescopes. Even the James Webb Space Telescope will use a Keck-like array of collapsible hexagonal segments to fit a 6.5-meter primary mirror into a package that can be launched by existing rockets. In the distant future the Keck telescopes may be mentioned alongside Galileo's "Old Discoverer", the first achromatic refractors, and Newton's first reflector as instruments that fundamentally shifted the course of telescope design.

That's all for now. Come back next time when we take a big step back in both history and technology to visit the BTA-6, the last single-mirror instrument to hold the title of World's Largest Telescope.

As before I have drawn heavily from J.B. Zirker's An Acre of Glass: A History and Forecast of the Telescope, published in 2005 by Johns Hopkins University Press, which I strongly recommend to anyone interested in the design and construction of large observatory telescopes. For more information on the Keck telescopes, see the Keck Observatory webpage (http://www.keckobservatory.org/) and the Keck Observatory Archive (http://nexsci.caltech.edu/archives/koa/). A nice fact sheet and model kit are available at http://spacecraftkits.com/KFacts.html.

Mathew Wedel

What's Up? A Horse With Wings

Although it's next to the star dense galactic arm of Cygnus the swan, the area around Pegasus (Flying Horse) looks out into deep space and is filled with many galaxy groups. Sadly, constellation Pegasus doesn't look anything like the Mobil Gas signs I fondly remember. Its bright stars have Arabic names which indicate parts of a winged horse, but the shape in the sky doesn't correspond. Three of its brightest stars form part of the Great Square of Pegasus. Markab (saddle), Scheat (leg), and Algenib (flank) outline half the Square, and they could be the wings of the flying horse.

The fourth brightest star Enif (nose) is away from these wings. Yet Enif is an impressive super giant star, 150 times the size of the sun. It's close to a large globular cluster, M15. Also nearby is M2, another good globular.

So although Pegasus doesn't look very horse like, it does have deep sky objects. A dim star, 51 Pegasi, is the first sun-like star to be known to have an extra solar planet. Here are oddly named galaxy groups, such as The Deer Lick Group. It's a square grouping of faint galaxies next to the larger NGC 7331 discovered by William Herschel in 1784. I guess the brighter spiral NGC 7331 is the "deer" in this distant group. NGC 7331 is unusual in that the central bulge rotates in the opposite direction from the rest of the spiral. Nearby is another remote galaxy group, Stephan's Quintet. This group is well known for appearing at the beginning of the Christmas movie It's A Wonderful Life as a gathering of talking angels.

A closer gathering is the Local Group of galaxies. Here lies M31, the Andromeda Galaxy, the only galaxy you can see with your unaided eye. It's a cozy two and half million light years away and has two companion galaxies spotted by Messier: M32 and M110. This Local Group, of which our Milky Way Galaxy and M33 are also members, was named by Edwin Hubble. It contains more than 30 galaxies, most of them faint fuzzy dwarf galaxies. Galaxy M33 is also called the Triangulum Galaxy, not because it's triangular, but because it's found in the constellation of the triangle. Some say you can see M33 without a telescope, but I never could. It's one of many lovely pinwheel galaxies viewed from "overhead" such as 30 million light year distant M74 in nearby Pisces.

The constellation Andromeda, which is linked to the fourth corner of the Great Square, also contains a ball shaped planetary nebula, The Blue Snowball. Also in this area are three of the four planetary nebulae listed by Messier: M27 (Dumbbell), M76 (Little Dumbbell) and M57 (Ring).

To the north of Pegasus are Cassiopeia and Cepheus, Andromeda's royal parents. The myth that involves these four constellations, as well as Perseus and Cetus, is dramatized in the recent movie Clash Of The Titans.

The W-shaped stars of Cassiopeia lie on the Milky Way and include many fine open clusters. The most charming is NGC 457, the E.T. or Night Owl Cluster, which looks like a cartoon stick figure with glowing eyes. M103 is another beautiful open cluster in Cassiopeia.

Over toward Cepheus is open cluster M52 and the wierd Bubble Nebula (NGC 7635) which appears in many astronomy calendars. It's a rare example of a "bubble" created by a stellar wind from a hot central star.

Also here is the site of Tycho's Supernova of 1527. Observing without a telescope, Danish astronomer Tycho Brahe wrote the first ever study of a "new star" which grew as bright as Venus. It proved that stars weren't eternally fixed objects and caused a revolution in astronomical beliefs.

In Cepheus we find a hyper giant star so huge it makes super giants like Enif or Deneb look small. This is the deep red Garnet Star, named by William Herschel. Also known as Mu Cephei, it's 1,550 times the size of the sun. It lies in a emission nebula called the Elephant's Trunk. Close by is another red hyper giant VV Cephei A which is almost 2000 times the size of the sun. At 4th magnitude these are two of the largest stars that can be seen by the unaided eye. VV Cephei A shares star matter with an orbiting smaller blue star. This is a condition that leads to supernova explosions, so it's fortunate that VV Cephei A is 2,400 light years away. In addition, there are two other fainter and farther red hyper giants in Cepheus. The diameter of these enormous stars would engulf almost all of our solar systems planets. All four are twice as large as the famous red giants Antares and Betelgeuse. Stars don't get much bigger than these Cepheus hyper giants.

Next to the Garnet Star is Delta Cephei, the prototype of all Cepheid variable stars. Cepheid variables are important because they are the "yardsticks of the heavens" by which distances can be measured. In 1908 astronomer Henrietta Swan Leavitt discovered that the variable period depended on the star's brightness. Once an absolute brightness can be determined the Cepheid variable's distance can be judged. It was Cepheid variables in the Andromeda Galaxy that allowed Edwin Hubble to declare (in 1924) that M31 was another galaxy of stars and not a "spiral nebula" within the Milky Way Galaxy.

So we see that this Great Square area of Pegasus, Andromeda, Cepheus and Cassiopeia is filled with astoundly huge and historically important deep sky wonders. .

Lee Collins

Last months picture is of the ceiling at Griffith Observatory taken by Melinda Myers visiting from Maryland.

Nature At Night Camp

Greetings fellow would-be-scouts! PVAA joined the Spanish Trails Council Girl Scouts at their (and our) annual summer camp to observe the night sky this month. PVAA had a good turn out and the Girl Scout camp was at capacity.

Claire Stover spoke with the girls prior to the observing session and answered many of their questions, preparing them for what turned out to be good viewing with quite a few meteor sightings. The scouts came in small groups to look through our scopes and this worked out well so it wasn't a mob scene.

The adult supervision of this scout camp is all volunteer. The organizers provided PVAA members with an ample (and tasty) meals and bunk beds in cabins reserved for adults.

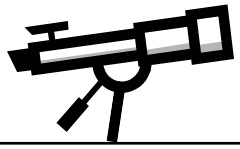
The camp is located a few miles below Idyllwild on an oak and pine strewn meadow and we had pretty good views of the horizon in all directions.

I loved doing this. The scouts were, for the most part, attentive and inquisitive so it was fun to talk with them about what we were looking at. Club members brought quite a few telescopes including the club's 10" Dobsonian and Ron's 22" scope. Ken Crowder used his video camera to take pictures from his Meade go-to scope and so the girls were exposed to a nice variety of observing equipment. I brought my 7x32 binoculars and got to share some really nice views of open clusters with some of the scouts.

The camp cooks, a Claremont couple with grown kids who happen to live a few doors down from me, asked me to think about volunteering a day or so earlier next year and plan a craft activity or two to do with the girls so they'd be that much more prepared for our club's visit. It's a tempting invitation and I may just volunteer to do it...it was that much fun for me to see these enthusiastic and energetic girls get excited about the night sky like we are.

I've been bemoaning the lack of enthusiasm for astronomy in school aged kids in general and in girls in particular. Bringing the night sky to the Girl Scout camp is an obvious way to instill in some of them a lifetime of wonder and enjoyment in astronomy.

Laura Jaoui



How Does It Work?

Thousands of years ago man began to rely on the sun, moon and stars to navigate as they migrated from place to place. As agriculture became an important food source, the sky was looked to for guidance as to when to plant. Early on it was noticed that five of the stars seemed to wander. Later we recognized that these were planets. Thus in early lore the number seven (sun, moon and wandering stars) became the heart of mysticism in many cultures.

The first astronomy records we have are Egyptian and Chinese. But the Mayan and Olmec cultures of Meso-America weren't far behind. Each culture organized the sky as we do with constellations. But, of course, they didn't use the same stars. Unfortunately, we have lost the identity of the ancient constellations.

A lot has been said of the Mayan calendar which ends in 2012. Most of what has been said is from people with no background in the Mayan culture, much less an understanding of the calendar. Nothing in what we have remaining from the Mayans indicates that they expected anything other than the beginning of the next cycle.

Only five written fragments remain, called codices, which tell us of the Mayan astronomy. The first date in the "long count" is thought to be August 11, 3114 B.C. There is no evidence of "Mayans" being around at that time, so it is thought that this was the calculated beginning of a very important cycle. Our own calendar has changed many times since 3114 B.C. So the match between them isn't perfect and is still debated.

The Mayan day was called a "kin." There were 360 days in one "tun." Then 7,200 days made a "katun" and 144,000 days made a "baktun." The first baktun begins in 3114 B.C. We will reach the end of the thirteenth baktun and the beginning of the fourteenth in December 2012. The current baktun started 398 years ago in 1612. But the Mayan civilization had begun to collapse by the time the Spanish arrived in the early 16th century. The Mayans had forecast the cycles of the next baktun, the one we are in now. It isn't surprising that they didn't go further. After all, I have a calendar for this year but I don't expect the world to end when the calendar does on December 31, 2010.

The Mayans apparently revered Venus as a goddess. They observed the moon closely also. They found that the two were in the same position in the night sky every 52 years. That was an important cycle. Our current value for the period of the moon is 29.53059 days. In Copan it is recorded as 29.53020 days and at Palenque it is 29.53086 days. This is typical of the accuracy found in all the records. Eclipses were recorded and predicted. The positions of the planets were watched. A retrograde of a planet from one constellation back to another and then back again was considered especially important.

The Mayan priests were astronomers and astrologers. All important events were timed to be favorable according to the night sky. They observed cycles and were convinced of the need to respect them. Religious rituals, based on these cycles, were performed to please the gods. But the end of one cycle was just the beginning of the next one.

Ken Crowder

Wolf-Rayet stars

Wolf-Rayet stars (often referred to as WR stars) are evolved, massive stars (over 20 solar masses), which are losing mass rapidly by means of a very strong stellar wind, with speeds up to 2000 km/s. While our own Sun loses approximately 10-14 solar masses every year, Wolf-Rayet stars typically lose 10-5 solar masses a year.

Wolf-Rayet stars are very hot, with a surface temperature in the range of 25,000 K to 50,000 K.

Observation history

In 1867, astronomers using the 40 cm Faucault telescope at the Paris Observatory, discovered three stars in the constellation of Cygnus (now designated HD191765, HD192103 and HD192641), that displayed broad emission bands on an otherwise continuous spectrum. The astronomers' names were Charles Wolf and Georges Rayet, and thus this category of stars became named Wolf-Rayet (WR) stars. Most stars display absorption bands in the spectrum, as a result of overlaying elements absorbing light energy at specific frequencies. The number of stars with emission lines is quite low, so these were clearly unusual objects.

The nature of the emission bands in the spectra of a Wolf-Rayet star remained a mystery for several decades, Edward C. Pickering theorized that the lines were caused by an unusual state of hydrogen, and it was found that this "Pickering series" of lines followed a pattern similar to the Balmer series, when half-integral quantum numbers were substituted. It was later shown that the lines resulted from the presence of helium; a gas that was discovered in 1868.

By 1929, the width of the emission bands was being attributed to the Doppler effect, and hence that gas surrounding these stars must be moving with a velocities of 300-2400 km/s along the line of sight. The conclusion was that a Wolf-Rayet star is continually ejecting gas into space, producing an expanding envelope of nebulous gas. The force ejecting the gas at the high velocities observed in radiation pressure.

In addition to helium, emission lines of carbon, oxygen and nitrogen were identified in the spectra of Wolf-Rayet stars. In 1938, the International Astronomical Union classified the spectra of Wolf-Rayet stars into types WN and WC, depending on whether the spectrum was dominated by lines of nitrogen or carbon-oxygen respectively.

Description

Wolf-Rayet stars are a normal stage in the evolution of very massive stars, in which strong, broad emission lines of helium and nitrogen ("WN" sequence) of helium, carbon, and oxygen ("WC" sequence) are visible. Due to their strong emission lines they can be identified in nearby galaxies. About 300 Wolf-Rayets are cataloged in our own Milky Way Galaxy. This number has changed during the last years as the result of very deep photometric and spectroscopic surveys dedicated to discovering this kind of objects in the Galactic plane. Additionally, about 100 are known in the Large Magellanic Cloud, while only 12 have been identified in the Small Magellanic Cloud, and few more in the galaxies in the Local Group, and nearby galaxies (M83, NGC300, etc.).

Several astronomers, among which Rublev (1965) and Conti (1976) originally proposed that the WR stars as a class are descended from massive O-stars in which the strong stellar winds characteristic of extremely luminous stars have ejected the unprocessed outer H-rich layers. The characteristic emission lines are formed in the extended and dense high-velocity wind region enveloping the very hot stellar photosphere, which produces a flood of UV radiation that causes fluorescence in the line-forming wind region. This ejection process uncovers in succession, first the nitrogen-rich products of CNO cycle burning of hydrogen (WN stars), and later the carbon-rich layer due to He burning (WC &WO stars), Most of these stars are believed finally to progress to become supernovae of Type lb or Type Ic. A few (roughly 10%) of the central stars of planetary nebulae are, despite their much lower (typically ~0.6 solar) masses, also observationally of the WR-type; i.e., they show emission line spectra with broad lines from helium, carbon and oxygen. Denoted [WR], they are much older objects descended from evolved low-mass stars and are closely related to white dwarfs, rather than to the very young, very massive stars that comprise the bulk of the WR class.

Evolution

It is possible for a Wolf-Rayet star to progress to a "collapsar" stage in its death throes: This is when the core of the star collapses to form a black hole, pulling in the surrounding material. This is thought to be the precursor of a long gammaray burst.

The best known (and most visible) example of a Wolf-Rayet star is Gamma 2 Velorum which is a bright star visible to those located south of 40 degrees northern latitude. One of the members of the star system (Gamma Velorum is actually at least six stars) is a Wolf-Rayet star. Due to the exotic nature of its spectrum (bright emission lines in lieu of absorption lines) it is dubbed the "Spectral Gem of the Southern Skies".

Retrieved from http://en.wikipedia.org/wike/Wolf-Rayet_star and submitted by ***John Bratton Sr.***

There's a marvelous story of technology and consultants gone wild, developing the Fisher Space Pen. The story goes that the U.S. Government spent millions of dollars of taxpayer's money developing a space pen—a pen that the astronauts could take to the moon that would operate in the harsh conditions of weightlessness, extreme heat and cold. Technology rushes to the rescue, and develops a miracle pen that can write upside down in a boiling toilet.

The Russians, by comparison, decided to use a pencil.

A marvelous tale of an inappropriate solution, except for one small problem. It's not true. Both the Russian and the U.S. astronauts used pencils at first, but there was a danger of the leads breaking and shorting out electric components, and the wood of the pencil itself was combustible as well. In a pure oxygen atmosphere, that's a really bad thing. The Fisher corporation realized this and, at its own cost, designed the Fisher Space Pen, which it then sold to NASA at reasonable cost. After the disastrous Apollo One fire, NASA made the Fisher pens mandatory.

The Art in Computer Programming - Andrew Hunt and David Thomas

October 9th Star Party with HiDAS at Afton Canyon

Afton Canyon is an hour and a half drive from the mouth of the Cajon Pass. Freeway miles all the way to the Afton off ramp and then only three miles along a fairly well maintained dirt road to the campground. That's an hour closer than Kelbaker Road sites and almost as dark. Probably the best spot at that distance from us and the weather in October will be hard to beat! Black velvet skies with stars all the way down to the southern horizon. The elevation is only around 1360' but atmospheric extinction doesn't seem very noticeable.

The campground itself has about twenty-six sites with tables and sun shelters. Pit toilets and very limited water. It's along the lines of the campground at Grandview where Ron Hoekwater likes to go. This is a very scenic and historic area where the Mojave River is forced to the surface. (Mosquito warning! Bring repellant!) It's often called the Grand canyon of the Mojave and it is very colorful. Rockhounding opportunities abound. An iron-truss bridge dominates the view with the occasional train passing by. At night the headlight misses us, but lights up the bridge in a most amazing way, a beautiful and delicate tracery. Big-horn sheep have been seen more than once. One time a quad got stuck on the tracks as it was crossing the bridge while (of course) a train was coming. Those trains just can't stop on a dime, and that was most exciting. If it only had another seventy-five feet to stop in...

Three clubs are joining together for this excursion into the dark; HiDAS (Apple Valley), SBVAA (San Bernardino), and PVAA. The various groups are about the same size, and we expect to see eight to ten individuals from each group. Off-roaders frequent the campground, but we will have a section to ourselves keeping the lights and campfires at bay, From here can be seen the Horsehead Nebula, which needs a very dark sky, and the Fornax galaxy group, requiring deep southern horizons. Stephen's Quintet will be nice, and NGC253 just unbelievable. As it is a little far for just the evening, come and camp. Most will be out Friday night as well A dark sky and good people make it worth the extra effort. It is planned that HiDAS will be having a hamburger fest Saturday night.

This is the second year that HiDAS have done this in October, and everyone that was there last year found it one of the highlights of the season. Bring your scope, binoculars and camp chairs. We're going to be doing a whole lot of astronomy!

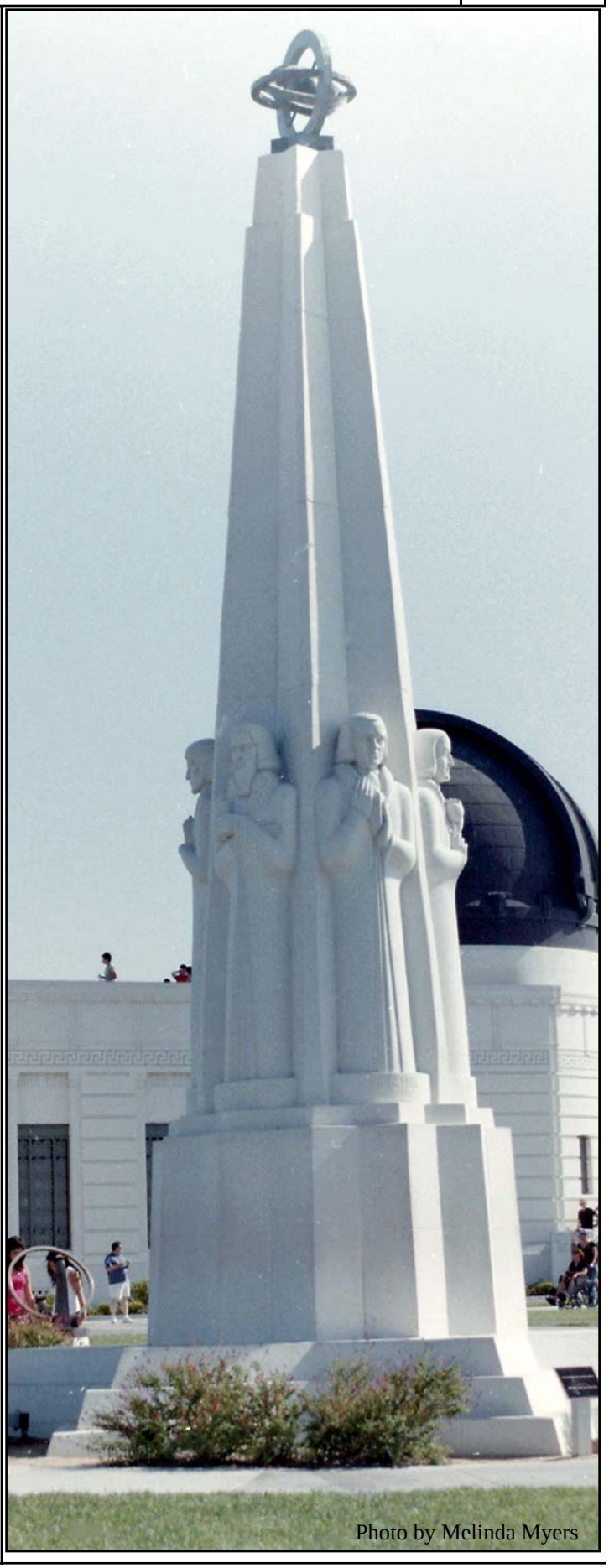


Photo by Melinda Myers

Riverside AstroImaging Workshop 2010

Tom Bash
Debra Ceravolo
Peter Ceravolo
Doug George
Don Goldman
Warren Keller
Kevin Nelson
Wolfgang Promper

September 17, 2010

PATS Weekend in Pasadena, California

Riverside AstroImaging Workshop returns in 2010 with world class imagers and special presentations for:

"General" with items of interest to all astroimagers, especially beginners.

and

"Advanced" for those with some experience and specialized hardware.

Planned topics include:

Getting the Colors Right
Robotic and Remote Imaging
Planning Your Imaging Session
Optimizing Optics for Imaging
Getting Good Image Data
Limiting Noise--Theory and Practice
Maximizing Data in Calibration
...and Many Processing Techniques

Friday, September 17, the day before and same location as PATS—the Pacific Astronomy and Telescope Show—in Pasadena, California. RAW2010 attendees may purchase PATS tickets at a discount.

Many imaging vendors will show off their wares at PATS, and you will want to be here.

Our small workshops provide time to visit with the presenters, ask questions, and share experiences informally with other imagers.

Registration can be done online at rivastro.org. Early-Bird registration costs $85 and ends September 1.

Register and Information: patsimage.org

Riverside Astronomical Society · Apogee Instruments Inc · OPT · Astrodon · QSI · FLI Finger Lakes Instrumentation · Woodland Hills Telescopes · Sky & Telescope · CeraVolo Optical Systems · Pacific Astronomy and Telescope Show PATS

The Riverside AstroImaging Workshop is produced by the Riverside Astronomical Society, which is solely responsible. The RAS and RTMC, Inc., which produces the Pacific Astronomy and Telescope Show (PATS) are wholly separate organizations. The background image of the Veil Nebula is from Debra and Peter Ceravolo and used by permission .

Being Close Makes The Moon More "Romantic"

Judy and I were watching the bright yellow moon rise over the horizon. "Oh, look at that big, beautiful moon," she whispered. “Isn't that romantic!”

“Well,” I explained, “Many people think the moon is bigger when they see it near the horizon. It is called the “lunar illusion.” I went on to explain that the moon is really no larger when seen on the horizon than it is at zenith. I said you could prove this by holding your finger up to it on the horizon, and noting that it covers about half the width of your finger (about half a degree), and when the moon is high later, you could hold that finger at arm's length and see the moon was the same width. “Wow,” she sighed, “I'll look forward to doing that.”

I spent a few minutes explaining that the brain compares the moon on the horizon to the trees, hills, and houses in the foreground, and decides that the moon must be very far away, and therefore, must be really large. Conversely, some people cite a different mechanism using the same foreground contrast: the brain tells us (incorrectly) that the moon is the same distance as those objects, so must be really close, and therefore large. The newest theory, I continued, is that the lack of foreground objects when the moon is high makes the brain think the moon is isolated in the sky, and this makes it look smaller in the large sky. In short, I said, nobody has really explained the moon illusion.

Actually, I continued, the moon is ever so slightly larger when at zenith than when at the horizon. When viewing the moon at zenith, one must look at the earth surface-moon surface distance. But when viewing the horizon moon, one must add the distance from the observer to the earth surface directly under the moon--roughly 6300 kilometers. (I did not get into the exact angular geometry). So, a horizon moon is that distance further away than a zenith moon (1.6 per cent or so) and so slightly smaller. "Well," she murmured, "I still think it is pretty and bright."

"Actually," I said, "the albedo of the moon is only about 7 percent. That means most of the light is absorbed, and only 7% is reflected back to our eyes." I spent a few minutes explaining that the moon is about as bright as parking lot asphalt at noon, but considering that the rest of the sky is so dark, and our pupils are so dilated, looks really bright.

"Oh," said Judy. But I knew what she really meant, she wanted to know more about why the moon looked so big. Luckily, I had saved the best for last. The moon's apparent size that night really *was* larger than usual because the moon was so close to the earth. The closer an object is, the bigger it looks. The moon was, I told Judy excitedly, only about 361,247 kilometers away (94% it's average distance), and so appeared 6% larger than average. I told her that the size of the moon can appear to change as much as 14 percent depending on where it is in its orbit.

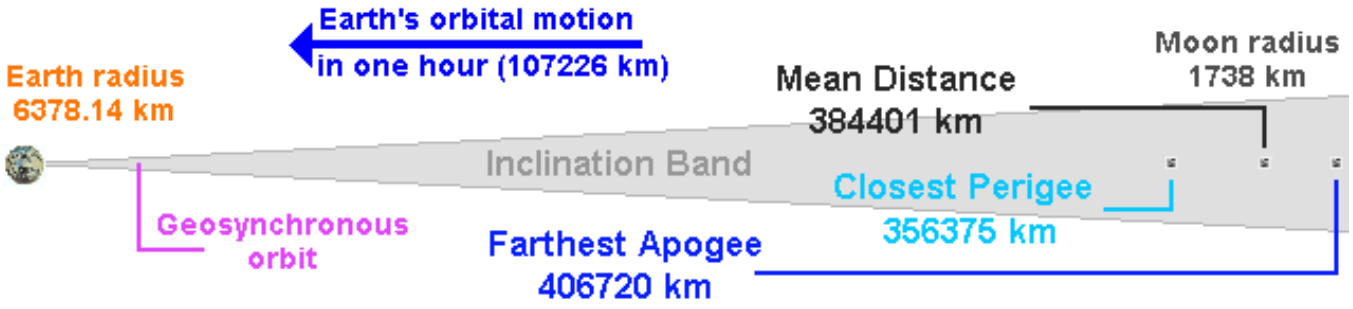
Judy's eyes seemed to be gazing over, probably from all the moon observing she was doing. But I just had to tell her about how the moon's orbit was never really circular, but instead a not quite round ellipse. This oval shape was about 5.49% longer than it was wide, and so the moon naturally would have times when it is closer (perigee) and further (apogee) from the earth. Then I explained that the sun also had a great tidal effect on the moon moving thorough space. The sun's gravity pulls the moon even further away from the earth when the moon was closer to the sun, and closer to the earth when the moon was further away from the sun. So, the distance of lunar apogee and perigee changes according to the relative position of the sun, moon, and earth.

By the way, I added, that little extra closer the moon also affected the moon's brightness a little. Since the moon was closer to the earth, and intensity falls off as the square of distance, the moon actually appeared brighter than usual. (I did not go into the fact that the clear weather we were having probably had more to do with it because I did not want to spoil the moment. Besides, I was just getting going on orbital dynamics.)

Sometimes, I continued, because the earth's orbit is also elliptical, the earth-moon system is closer to the sun, and therefore, the tidal effect is even greater. So, a full moon at perigee in July (when the earth is closest to the sun--Perihelion) is just that much bigger than one at apogee in January when the earth is farthest from the sun--Aphelion.)

And of course, I answered Judy's next question before it was even asked. Due to the movement of the lunar orbit, the point at which the perigees and apogees take place actually rotate around the earth in about a nine year cycle, and the period between one perigee (or apogee) and the next is about twenty seven and a half days (an anomalistic month). Of course, I then had to explain the different kinds of "months". And all this means that the apparent size of the full moon changes constantly. Wow!

"Well," I thought, "it's great, spending an evening under the full moon together." By now the moon had risen high overhead and Judy wasn't saying much (actually she had apparently already gone in). I cannot wait until this month when the full moon will be only 357,295 kilometers away, or October when it will be only slightly further off. Imagine how big that thing will look then! I just can’t wait to see it!



ELECTION OF PVAA OFFICERS

Once again it's election time for the Pomona Valley Amateur Astronomers**.** The board asks that you mark your ballot in the prescribed manner so that it might be counted. Your ballot is important as it will help decide the next slate of officers. Select the nominee of your choice by marking an "**X**" in the appropriate box, and on unapposed nominees mark each office with an "**X**" in the yes box to elect the nominee or a n "**X**" in the no box to reject the nominee. Remember every ballot carries the same weight in this election.

Rules for voting

Please follow the rules accordingly so that your ballot is validated and counted in the election. Ballots will be distributed in the August newsletter to the membership eligible to vote (according to paid dues). Additional ballots can be obtained at the general meeting in August. In the event that a member submits more than one ballot, the last ballot received by the treasurer prior to "closing of the polls" will be counted with all previous ballots being destroyed. Any ballots submitted at the August meeting will supercede any mailed ballots with the mailed ballots being destroyed prior to counting.
Each ballot must be returned to the treasurer of the P.V.A.A. either by mail (as described below) or by personal delivery at the August meeting. Nothing is to be written on the ballot other than selection markings. Do not sign the ballot or add any additional notes or comments or the ballot will be declared invalid.

Ballots returned by mail must be sent to:

P.V.A.A. - Attention treasurer
P.O. Box 162
Upland Ca 91785

Official ballot of the Pomona Valley Amateur Astronomers for the term of officers 2009-2010

		YES	NO
President	Shall _____be elected President of the P.V.A.A.	☐	☐
Vice President	Shall Joe Hillberg be elected Vice President of the P.V.A.A	☐	☐
Secretary	Shall Claire Stover be elected Secretary of the P.V.A.A.	☐	☐
Treasurer	Shall Ludd Trozpek be elected Treasurer of the P.V.A.A.	☐	☐
V P Facilities	Shall Bob Akers be elected V P of Facilities	☐	☐

Board members at large serving a two year term

Shall Lee Collins be elected as a board member at large	☐	☐
Shall Ray Magdziarz be elected as a board member at large	☐	☐

PVAA Membership Renewal for September 1, 2010 to August 31, 2011

_____ $30 - Individual Membership

_____ $40 – Family Membership

_____ $12 – Student Under age 18 Membership

Name: _____

Email address for Newsletter delivery:_____

Address: _____

City: _____ State: ____ Zip:_____