VAAS Website: home.comcast.net/~vaas/ October 2, 2014

Vandenberg Amateur Astronomical Society presents The Sidereal Times

Planet Saturn (see page 5)

Meeting *News:*

At the September meeting we discussed various outreach Events. Welcomed a new member Jim VanCura and watched a video about Our Night Sky, thanks Dave. Also have another new member Craig Fair, welcome Craig.
Also recapped events of Summer break.

Reminder: ***VAAS meeting October 10th at 7:00 PM Manzanita school.***

Lunar Calendar:

New Moon 24th
Full Moon 9th

A little Humor: Pavlov is sitting in a pub enjoying a pint, the phone rings and he jumps up shouting, "Oh crap, I forgot to feed the dog!"

Presidents Message

The month of October will bring longer nights and, hopefully, better chances for clear skies. In the early evening sky the planets (in order after sunset): Saturn, Mars, Neptune and Uranus are visible. By late October Saturn will set just about sunset and won't be able to view it in the evening for a while. The Great Andromeda Galaxy will be visible about 8PM and for those who can wait until about midnight the Great Orion Nebula will be visible.

Early October the Space Station should be visible in the evening between 7 and 8PM. On the 06 and 07 October it should be very bright as it passes over head. Check out the website Heavens Above for specific times and directions.

Take note of the date, 8 October. There will be a total lunar eclipse that evening across most of North America as well as a minor meteor shower; the Draconids (expect approximately 10 per hour). Suggest finding a reasonably dark viewing site such as the observatory to watch the eclipse and the meteor shower.

Finally, October's meeting is the time that we normally take nominations for new VAAS officers. So please consider if you might want to be the next President, Vice-President, Treasurer and Editor. The current officers of VAAS wish to thank the membership for their support. It makes the job much easier if all the membership help pitch in to organize the various events and activities.

As always, have fun and clear skies

Dave

Events

October 4th Star Party at the Observatory and is also Astronomy Day part 2. This event is to interact with the general public. The theme is, "Bring astronomy to the public".

October 7th Uranus at opposition. This blue-green planet will be at Its closest approach to Earth. Best time to view but it will appear as a tiny blue-green dot in all but the most powerful telescopes.

October 8th Total Lunar eclipse. The eclipse occurs when the Moon passes completely through Earth's dark shadow. During the eclipse the Moon will gradually get darker and take on a blood-red color. The eclipse will be visible throughout North America.

October 8th and 9th Draconids meteor shower. It is a minor meteor shower producing about 10 meteors per hour. It is produced by dust grains left behind by 21P Giacobini-Zinner. It peaks on the night of the 8th and the morning of the 9th. Best viewing will be just after midnight. Full Moon will block out all but the brightest Meteors.

October 18th Star Party at the Observatory, see you there.

October 22nd and 23rd Orionids meteor shower. It is an average shower producing about 20 meteors per hour. It is produced by dust grains left behind from comet Halley. It peaks on the morning of the 22nd.

October 23rd Partial solar eclipse occurs when the Moon covers Only part of the Sun. It will be visible throughout North America.

October25th Star Party at Figueroa Mountain site 1.5, try to attend.

Figueroa Mountain Site 1.5

Star Party and Events

September 13th Star Party at Observatory Vahan and Dave on site. Marine layer moved in Star Party cancelled.


Nuts!

September 20th Star Party Figueroa Mtn. Vince, Vahan, Dave and Géza Kurczveil (not a member) gathered at the site after sundown. The condition was clear with fair transparency limited by the haze but otherwise good conditions. Vince and Dave did only visual work looking at the bright planets and many deep sky objects. Vahan did some wide view sky photography. Vince brought an old 8" Celestron scope from Alan Hancock College for Vahan to help collimate. It turned out to be more than just a mis-aligned secondary mirror. The secondary mirror was rattling inside the scope such that the main mirror received some damage along the edges. So…Vahan wiped out his surgery tools and performed a field repair in less than ½ an hour. In order to retrieve the secondary mirror and put it back where it belongs, meant that the front corrector lens had to be removed. Vahan did a preliminary collimation and Vince then performed fine tuning of the collimation on a few bright stars. Vince later reported that the collimation was successful and was able to split some double stars. Not bad for a field repair job in the dark (yes flash lights were used but not for very long)! Most of us left about midnight.

September 26th Orcutt Academy in Los Alamos

Vince Tobin and Dave Covey arrived about 6:30PM under partly cloudy skies. Approximately 20 to 30 individuals were in attendance consisting of the children, parents, Alan Hancock College representatives and the Orcutt Academy staff. We started setting up our telescopes about 7:15PM and within a short time folks were gathering around us before we were finished setting up. In spite the bright lights almost all around, we picked out a few bright objects such as the Moon and Mars. Later we picked out a few deep sky objects that were not in the direction of the bright lights. All of the folks were very engaged and well behaved. The school's principal, several parents and children expressed their thanks for our efforts. We packed up and left about 9:45PM.

September 27th Star Party at the observatory. Vahan and Dave on site. Partial Cloud Cover but quickly became solid overcast. Star Party cancelled.


Nuts

October Moon

October 2014 Northern Hemisphere Go This Month

«« October 2014 »»

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Moon calculations are based on *your* time zone. Check your computer time to ensure accuracy.

Full 9th, New 24th, First Quarter 1st, Last Quarter 15th

Moon Folklore

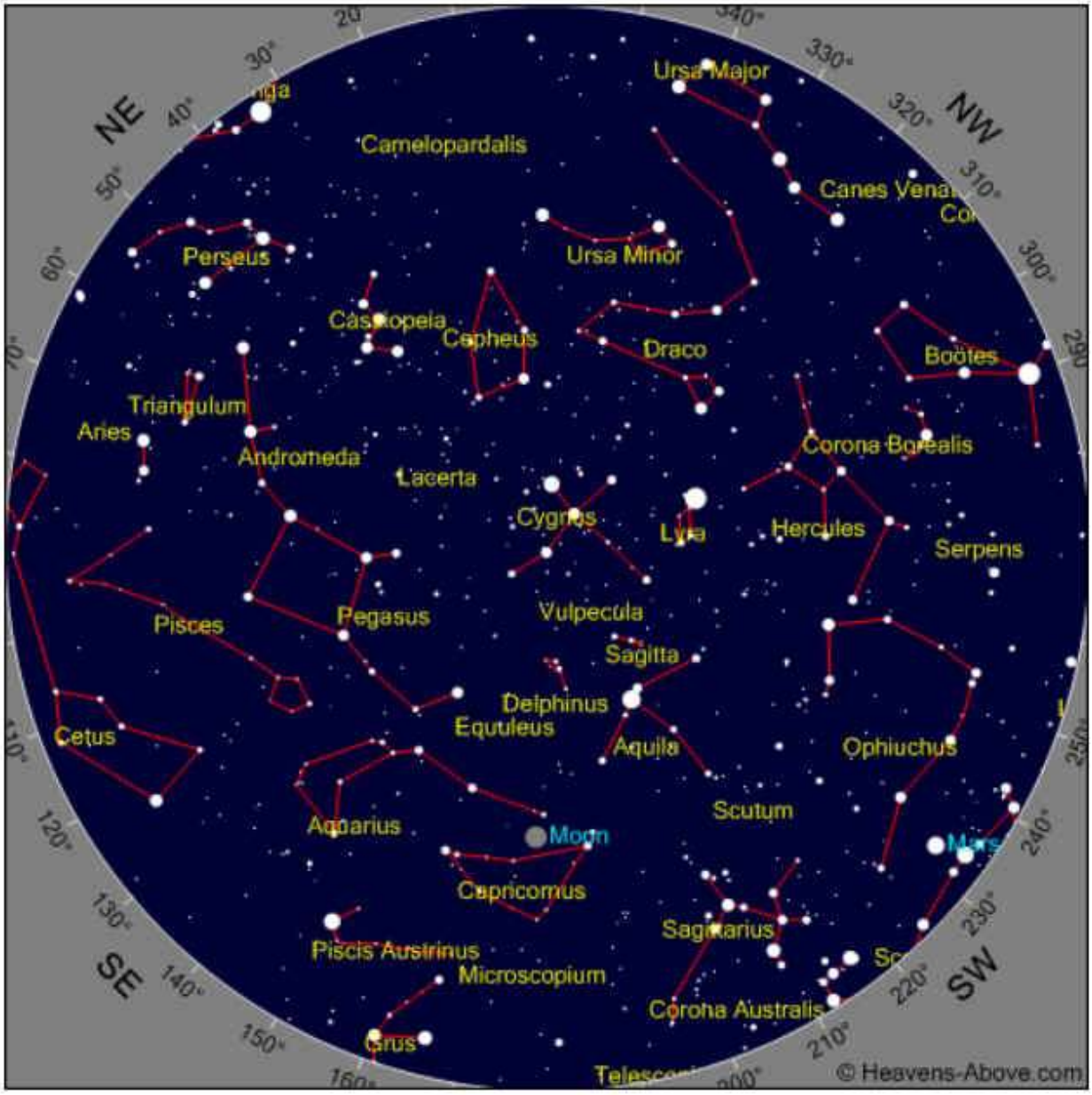
Set eggs to hatch on the Moon's increase but not if a South wind blows.

Castrate and dehorn animals when the Moon is waning for less bleeding.

Dig your Horseradish in the full Moon for best flavor.

October Sky

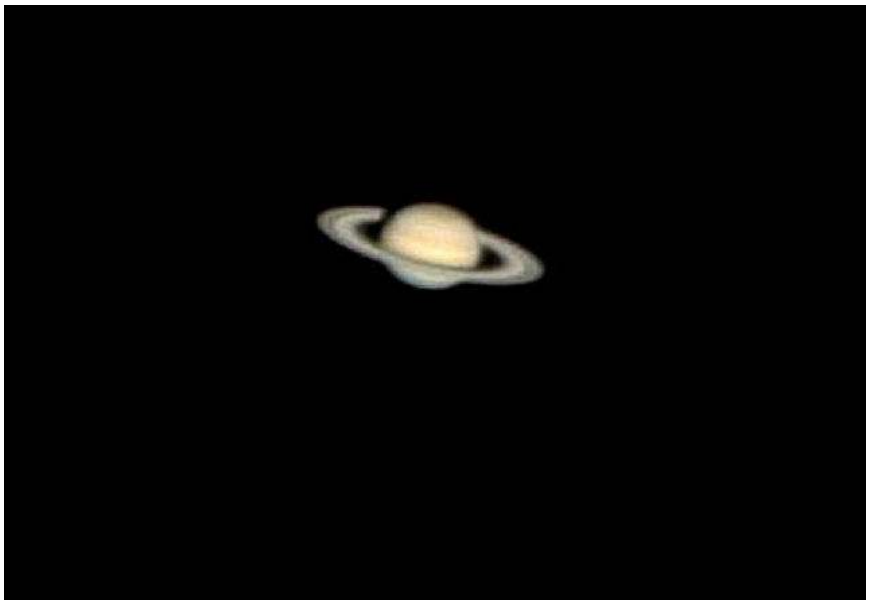
Objects of interest M31, M13, M92, M57,M27



Time

Year	2014	Month	10	Day	3	Hour	20	Minute	56

Photo Courtesy Vahan Yeterian



Saturn is the 6th planet from the Sun and is the second largest in the Solar System. Although the other gas giants have rings Saturn's are most extraordinary. In Roman mythology Saturn is the god of agriculture. The associated Greek god, Cronus, was the son of Uranus and Gala and the father of Zeus (Jupiter). Saturn is the root of the English word "Saturday". Saturn is a gas giant made up of hydrogen and helium. It is big enough to hold 700 Earths and is more massive than any other planet except Jupiter. It is roughly 95 times Earth's mass. However, it has the lowest density of all the planets and is only one less dense than water. If there were a bathtub big enough to hold Saturn it would float. Saturn is about 75% hydrogen and 25% helium with traces of water, methane, ammonia and "Rock" similar in composition of the primordial solar nebula from which the solar system was formed. The interior is similar to Jupiter consisting of a rocky core a liquid metallic hydrogen layer and a molecular hydrogen layer. Traces of various ices are also found. Saturn's interior is hot (12,000 Deg Kelvin at the core) and Saturn radiates more energy into space than it receives from the Sun. Most of the extra energy is generated by the Kelvin-Helmholtz mechanism as in Jupiter. This may not be sufficient to explain Saturn's luminosity, some additional mechanism may be at work, perhaps the "raining out" of helium deep in Saturn's interior. An interesting fact is that in 1675 Italian born astronomer Jean Dominique Cassini discovered a division between what is now called the A and B rings. It is now known that the gravitational influence of Saturn's moon Mimas is responsible for the division. The division (Cassini's division) is 3000 miles wide. Image capture was with a Meade 12 inch SCT and a Meade LPI CCD Camera and 2X Barlow lens. 10 images at 5 seconds each were stacked and processed in Gimp software.

For What it's Worth

Deriving Distances to Stars

A brief account

Secular Parallax

The method of parallax is the most reliable one for determining distances to stars but it can only be used for more nearby stars. The primary reason is the parallax shift angle is very small because the stars are very far away. The limitation on measuring the parallax angle is ultimately set by the length of the baseline that is used to measure the angle. This corresponds to the distance across the Earth's orbit that is 2 astronomical units. The sun is moving with respect to the local field of stars toward Vega at a speed of 20 Km/s. This means that over a year the sun moves a distance of a little over 4 AU. But this cannot be used to directly measure the distance to the stars because while the sun is moving over the distance in a year (taking the Earth with it) all the other stars are in motion too. Thus the position of any one star changes on the celestial sphere because of the sun's motion and because of the motion of the star. We can't disentangle the two without further information.

Measuring Average distance using Statistical Arguments

This method can be used to measure the average distance to a set of stars because for a set of stars, their motion with respect to the sun averages approximately to zero. Methods based upon this argument are to a set of stars and are called statistical methods. Secular and Statistical Parallax play an important part in estimating distances to stars that are too far for standard parallax methods.

Dynamical Parallax

The distance to a visual binary star may be estimated from the masses of its two components, the size of their orbits and the period of their revolution around one another. Dynamical parallax is an annual parallax that is computed from such an estimated distance.

To calculate a dynamical parallax the angular semi-major axis of the orbit of the stars around each other is observed together with their apparent brightness, and Newton's generalization of Kepler's third law, which states that the total mass of a binary system multiplied by square of its orbital period is proportional to the cube of its semi-major axis. Together with the mass-luminosity relationship the distance to the binary star can then be determined. Once distance is found the distance away can be found via the arc subtended in the sky thus giving a preliminary distance measurement. From the measurements the apparent magnitudes and luminosity of both stars can be found and by using the mass- luminosity relationship the masses can be derived. The process is iterated several times for accuracy. The mass –luminosity relationship can also be used to determine the lifetime of stars by noting that lifetime is proportional - More massive stars live shorter lives.

Spectroscopic Parallax

This is an method for measuring the distances to stars. Despite its name it does not rely on the apparent change in the position of the stars. This technique can be applied to any Main Sequence star for which a spectrum can be recorded. The method depends on the star being sufficiently bright to provide a measure of spectrum but limits its range to about 10,000 parsecs (1 parsec=3.26 light years).

Trigonometric Parallax

Trigonometric Parallax is only accurate for nearby stars (within 500 to 1000 parsec's).

I have included a drawing that will give you an idea of how it is done. In the drawing below a relatively nearby star is seen against a background of distant stars. The difference in position of the star when seen by an observer on the Sun and an observer on the Earth at E is the instantaneous value of parallax....Pi. The value of Pi can be determined when the earth is at E and again six months later when the Earth is at the opposite side of its orbit. In practice in a year's time the star will appear to trace out an ellipse on the celestial sphere. So the value of the semi-major axis of the ellipse is the Annual Parallax of the star. Then the value of "a" is known as the astronomical unit. For example Proxima Centauri's parallax is 0.76 second of arc corresponding to a distance of 1.32 parsec or 4.25 light years.

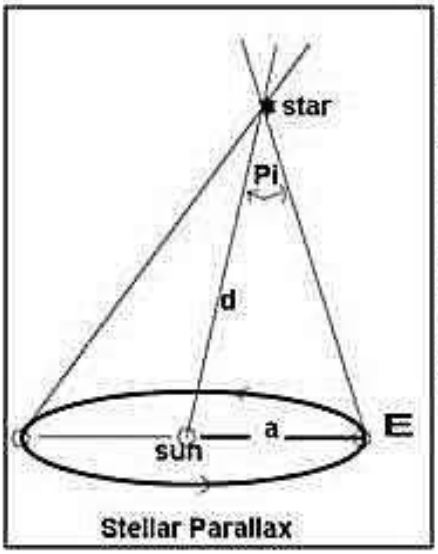
Standard Candles

Almost all of the physical distance indicators are Standard Candles (SC). These are objects that belong to some class that have a known brightness. By comparing the known luminosity of the latter to its observed brightness the distance to the object can be computed using the Inverse Square Law. These objects of known brightness are termed as Standard Candles. The brightness of an object is given in terms of its absolute magnitude. This quantity is derived from the logarithm of its

luminosity as seen from a distance of 10 parsecs. The apparent magnitude or magnitude as seen by the observer can be used to determine the distance D to the object in kilo parsecs (where 1 kpc equals 10^3 parsecs) as follows

$$5 \cdot \log_{10} \frac{D}{\text{kpc}} = m - M - 5,$$

Where m is the apparent magnitude and M is the absolute magnitude. For this to be accurate both magnitudes must be in the same frequency band



Stellar Parallax

and there can be no relative motion in the radial direction. Some means of accounting for interstellar extinction, which also makes objects appear faint and more red, is also needed. The difference between absolute and apparent magnitudes is called the Distance Modulus. Astronomical distances, especially intergalactic ones are sometimes tabulated in this way.

Vahan

VAAS fun Headquarters

Club Officers

"Astronomy compels the soul to look upward, and leads us from this world to another". (Plato)

Club Meeting

Club meeting October 10th 7 PM
Manzanita school, Hope to see you there…

Star Parties (as always weather permitting)

Other Astronomy Club Meetings

Central Coast Astronomical Society
Link to web site…
http://www.centralcoastastronomy.org/

Santa Barbara Astronomical Unit
Link to web site…
http:// www.sbau.org/#AU_EVENTS_Calendar

Night Time Bright Objects (no scope required)

Link to "Heavens Above" web site
http:// www.heavens-above.com/
(Iridium Satellite)
(ISS Visible Pass)
Be sure to set the nearest location from their pull-down menu.

The web site link below will take you to some Great Milky Way interactive images and how It was developed. (Type it in the search box.)
http://skysurvey.org/

VAAS.

Dave McNally is the VAAS Web Site Serf/Minion.