VAAS Website: www.vaas.universeii.com/ 2, December 2017

Vandenberg Amateur Astronomical Society presents The Sidereal Times

Andromeda Galaxy (see page 5)

Meeting *News:*

At the November meeting we had nominations for club Officers for operating year 2018. We also reviewed the events for the month of October. Bring a snack to the meeting to share celebrating the Christmas holiday.

Reminder: VAAS club meeting Dec 8th 7:00 PM at Manzanita school Teachers lounge.

Lunar Calendar:

New Moon 18th
Full Moon 3rd

Claibourne Churchill Event Oct. 21st 2017

Presidents Message

Hello, Sky Watchers!

Sometimes THE BEST things come our way with no anticipation, no planning. Last Thursday wound up being a doubleheader for me, thanks to my wife Molly's community involvement and good newspaper scanning. First, there was the Lompoc Chamber of Commerce monthly lunch gathering. Thanks to Molly, we were invited to hear Nick Miller, Vehicle Integration Manager of SpaceX, give an excellent talk, accompanied with amazing powerpoint slides and videos, on the history, mission, and future of Elon Musk's company. Did you know that those Falcon 9 rockets are transported by semi trucks in the middle of the night from Hawthorne by way of Hwy 166!? The containers are too big to clear the Gaviota Tunnel. Hopefully, we can bring Nick to a future meeting so that all of you can experience this.

Then, Molly caught eye of an ad in the "Santa Barbara Independent": the Los Cumbres Observatory hosted Dr. Alan Stern, Mission Leader of the New Horizons Pluto Project, in an astounding overview of this probe. He took us through the entire history of the mission, from its origins in the Voyager missions, through the incredible process of getting it funded [timing and planning had a lot to do with that], its first images of Pluto and its moons, and future goals of its ongoing flight through the Kuiper Belt. Dr. Stern is a physicist who, from his early childhood was fascinated by math, the beauty of problem-solving. Look where that indefatigable curiosity led him.

Wishing you all had a bountiful day of Thanks, with at least one quiet moment of solitary reflection on the vastness of the skies that surround us, and the tools we are given, including our own innate curiosity, to seek, discover, and grow in knowledge.

Looking forward to seeing all of you at our December 8th meeting. Bring Goodies, celebrate the Christmas Holiday Season. Maybe we will get to enjoy a special musical treat by one certain member of our crew?
Skyward,
Tom

Events

Dec 9th ***Star party at the observatory.***
Yea!

Dec 13th & 14th Geminids meteor shower is the king of meteor showers producing up to 120 multicolored meteors per hour at peak. It is produced by debris left behind by Asteroid 3200 Phaethon. It Peaks on the night of the 13th and morning of the 14th. Best viewing is just after midnight. Meteors radiate from the constellation of Gemini but can appear anywhere in the sky.

Dec 16th ***Star party at the observatory.***
Yea!

Dec 21st The December Solstice occurs at 16:28 UTC. The South Pole of Earth will be tilted toward the Sun which will have reached its Southern most position in the sky and will be directly over the Tropic of Capricorn at 23.44 degrees South latitude. This is the first Day of Winter in the Northern hemisphere and the first day of Summer in the Southern hemisphere.

Dec 21st & 22nd Ursids meteor shower is a minor shower producing only about 5 to 10 meteors per hour. It is produced by dust grains left behind by Comet Tuttle. Meteors will radiate from constellation Ursa Minor but can appear anywhere in the sky.

Dec 23rd ***Star Party at the observatory.***
Yea!

Claibourne Churchill Event Oct 21st 2017

Star party's and Events

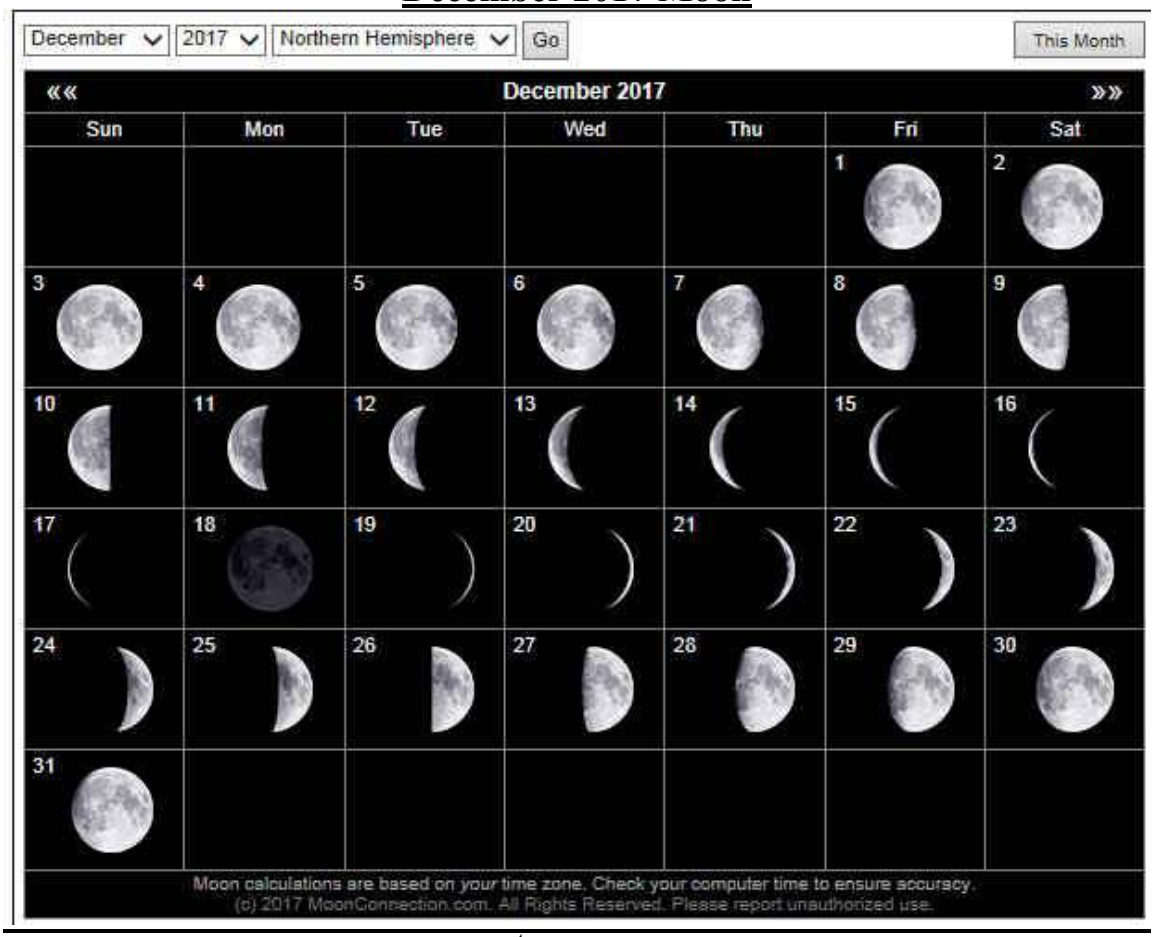
November 11th Star Party at the Observatory. Vince and Vahan on site began to model the sky using 7 stars. Andy and his daughter joined us for a while. We finished the alignment but the results were less than perfect. Some trouble was encountered during the test run like the system locked up and we lost control of the mount. Had to restart to continue with the modeling. The final results were not as good as we hoped. We might have to recheck polar alignment. Weather closed in so we secured and departed at 8:45 Pm.
Ha!

November 18th Star Party at the Observatory. Vince, Dave, Vahan and Joel and daughter on site about 5:00Pm. Sky clear. Performed a polar alignment on the mount about 10 iterations of same. Looked at several objects, M13, M2, and a few others. The mount pointing accuracy was fair. Very cold this evening with little or no wind. Seeing was good. Vahan left about 7:45, the cold was getting to his old bones. The others left a bit later. It was a good night under the stars.
Yea!

November 25th Star Party at the Observatory. Dave, Vince Craig and Vahan on site around 5:00PM. Craig was setting up for some Astrophotography. Dave Vince and Vahan prepared the Observatory for sky modeling and polar alignment. Performed a model and then a polar alignment. The polar alignment ended up with errors so we had to redo the sky modeling several times and then a polar alignment. The end result was we finally had a fair sky model and when selecting several objects to view they appeared in the field of view of the main optics. Weather was good, had a half moon, no wind, no bugs and lots of coyotes howling in the night. It was a good night under the stars.
Yea!

River Park VAAS BBQ 2014

December 2017 Moon



Full 3rd, New 18th, 1st Quarter 26th, Last Quarter 9th

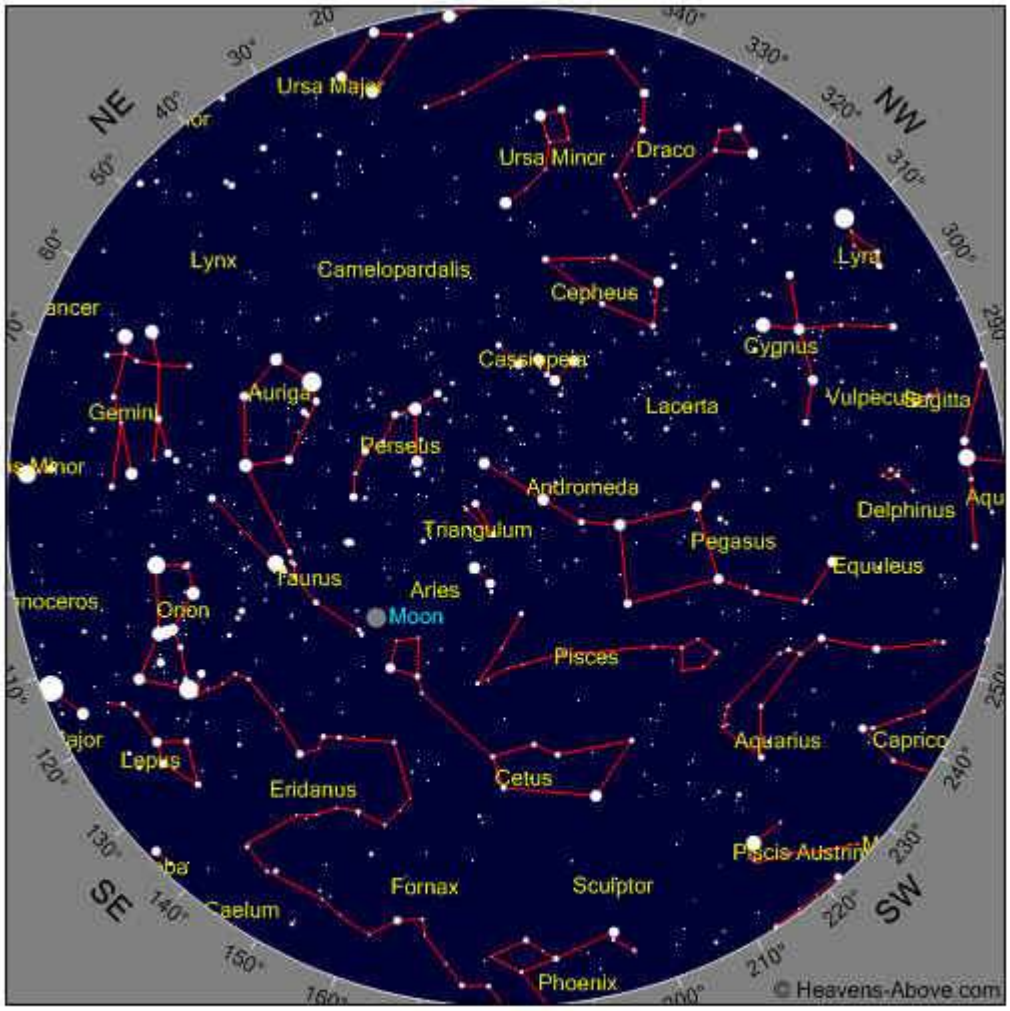
Moon Facts

The crust on the far side of the **moon** is thicker than the crust on the near side. The far side highlands appear to have formed early in the **moon's** history, when a magma ocean (shaped by tides caused by Earth's gravity) heated the **moon's** floating crust non-uniformly. Since then, the magma ocean has solidified.

Claibourne Churchill Event Oct 21st 2017

December 2017 Sky

Some Objects of interest M 31, M42, M1, Moon

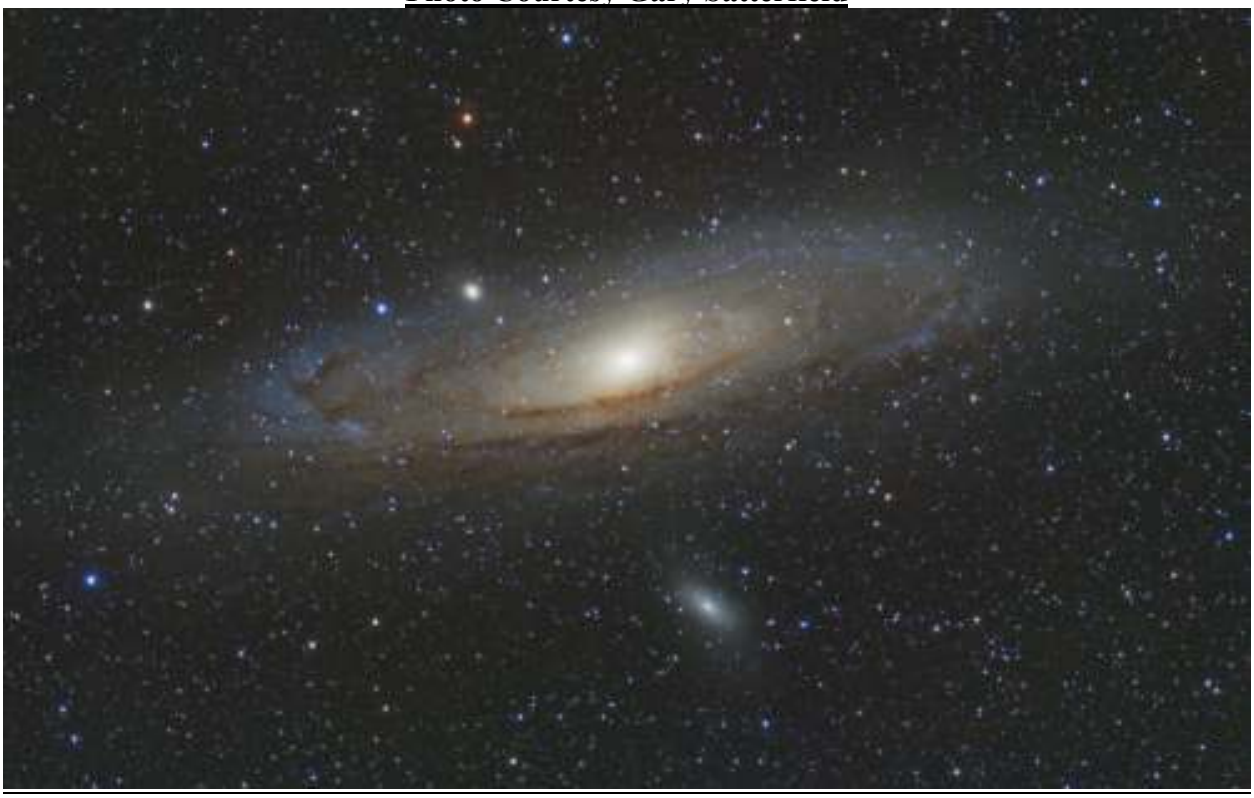


Time

Year	Month	Day	Hour	Minute
2017	12	1	20	59

Some VAAS Past Events

Photo Courtesy Gary Satterfield



The Andromeda Galaxy also known as Messier 31**,** M31**,** or NGC 224**,** is a spiral galaxy approximately 780 kiloparsecs (2.5 million light years) distant. It is the nearest major galaxy to the Milky Way and was often referred to as the Great Andromeda Nebula in older texts. It received its name from the area of the sky in which it appears, the constellation of Andromeda, which was named after the mythological princess Andromeda. Andromeda is approximately 220,000 light years across, and it is the largest galaxy of the Local Group, which also contains the Milky Way, the Triangulum Galaxy, and other smaller galaxies. Despite earlier findings that suggested that the Milky Way contains more dark matter and could be the largest in the grouping, the 2006 observations by the Spitzer Space Telescope revealed that Andromeda contains one trillion stars at least twice the number of stars in the Milky Way, which is estimated to be 200–400 billion. The mass of the Andromeda Galaxy is estimated to be 1.5×10^{12} solar masses while the Milky Way is estimated to be 8.5×10^{11} solar masses. The Milky Way and Andromeda galaxies are expected to collide in 4.5 billion years, eventually merging to form a giant elliptical galaxy or perhaps a large disc galaxy. The apparent magnitude of the Andromeda Galaxy, at 3.4, is among the brightest of the Messier objects making it visible to the naked eye on moonless nights, even when viewed from areas with moderate light pollution**.** Image capture by an AT65EDO scope w/modded Canon 500D on a Hypertuned CGEM mount and ImagesPlus Camera Control guiding with a mini Borg50 & SBIG ST-I mono using PHD2. The CGEM is controlled with NexRemote and a wireless Logitech Rumble Pad. Image data: 54 x 600 sec frames @ ISO 200. Bias, Flats and Darks x24ea. 97.385% processing with PixInsight. Touch ups in Adobe Lightroom.

For what its Worth


Determining the age of a star

As stars grow older, their luminosity increases at an appreciable rate. Given the mass of a star, one can use this rate of increase in luminosity to determine the age of a star. As the star spends only about 1% of its total lifetime as a red giant this is an accurate method of determining age.

Knowing a stars age is important for many astronomical studies and in particular for planet hunters. The bountiful harvest from NASA's Kepler spacecraft adding to previous discoveries astronomers have found nearly 2000 planets orbiting distant stars. Now they want to use this zoo of planets to determine whether life might have evolved on these distant worlds.

The older the planet the more time has had to get started. Since stars and planets form together at the same time, if we know the stars age we know the age of the planets too. Learning a star's age is relatively easy when it is in a cluster of hundreds of stars that all formed at the same time. Astronomers have known for decades that if they plot the colors and brightness of stars in a cluster the pattern they see can be used to tell the clusters age. But this technique only works for clusters. For stars not in clusters (including all known to have planets) determining the age is much more difficult.

The unique capabilities of the Kepler space telescope has allowed astronomers to measure the rotation rates for stars in a 1-billion-year-old cluster called NGC 6811. This new work nearly doubles the age covered by previous studies of younger clusters. It also significantly adds to astronomers knowledge of how a stars spin rate and age are related.

If a relationship between stellar rotation and age can be established by studying stars in clusters then measuring the rotation period of any star can be used to derive its age – a technique called gyrochronology. For gyrochronology to work astronomers must first calibrate their new "clock".

They begin with stars in clusters with known ages. By measuring the spins of cluster stars they can learn what spin rate to expect for that age. Measuring the rotation of stars in clusters of different ages tells them exactly how spin and age are related. Then by extension they can measure the spin of a single isolated star and calculate its age.

To measure a stars spin, astronomers look for changes in brightness caused by dark spots on its surface the stellar equivalent of sunspots. Any time a spot crosses the stars face it dims slightly. Once the spot rotates out of view the stars light brightens again. By watching how long it takes a spot to rotate into view across the star and out of view again we learn how fast the star is spinning. The changes in a stars brightness due to spots are very small, typically a few percent or less and become smaller the older the star. Therefore, the rotation periods of stars older than about half a billion years can't be measured from the ground where Earth's atmosphere interferes. Fortunately this is not a problem for the Kepler spacecraft. Kepler was designed specifically to measure stellar brightness very precisely in order to detect planets (which block a star's light ever so slightly if they cross the stars face from our point of view).

To extend the age-rotation relationship to NGC 6811 astronomers face a herculean task. They spent four years painstakingly sorting out stars in the cluster from unrelated stars that just happened to be seen in the same direction. This preparatory work was done using a specifically designed instrument (Hectochelle) mounted on the MMT telescope on Mt. Hopkins in southern Arizona. Hectochelle can observe 240 stars at the same time allowing them to observe nearly 7000 stars over four years. Once they knew which stars were the real cluster stars they used Kepler data to determine how fast those stars were spinning. They found rotation periods ranging from 1 to 11 days (with hotter more massive stars spinning faster) compared to the 30 day spin rate of our Sun. More importantly they found a strong relationship between stellar mass and rotation rate with a little scatter. This result confirms that gyrochronology is a promising new method to learn the ages of isolated stars.

Astronomers plan to study other older star clusters to continue calibrating their stellar "clocks". Those measurements will be more challenging because older stars spin slower and have fewer and smaller spots meaning the brightness changes will be smaller and more drawn out. This work is a leap in our understanding of how stars like our Sun work. It may also have an important impact on our understanding of planets found outside our solar system.

Club Officers

President
Tom Gerald

Vice President
Jana Hunking

Treasurer
Vince Tobin

News Letter Editor
Vahan Yeterian

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

Club Meeting

Reminder Club meeting Dec 8th at 7:00Pm
Manzanita school Teachers Lounge.

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

Dave