

Vandenberg Amateur Astronomical Society presents The Sidereal Times



Nebulas (see page 5)

Meeting News:

At the January meeting we held VAAS meeting at the Solvang Brewing Co. Lompoc for our New years Pizza party.

Reminder: VAAS club meeting Friday February 8th Manzanita school teachers lounge 7:00 PM.



Lunar Calendar:

New Moon 4th
Full Moon 19th

New Years Party 2019



Presidents Message

Hello, Fellow Stargazers:

Well, the total lunar eclipse of 2019 certainly brought a wave of popular excitement to the world of astronomy. All the media hype [how many names did that “moon” have?!] sent a lot of people out of their houses who probably would have “totally” missed the phenomenon. Frustrating for VAAS members, however, were-- surprise-- the passing clouds that made our viewing limited at best. Still, the glimpses that Molly and I had were lovely. We have only to wait until May of 2022 to experience another total lunar eclipse in our part of the world... weather cooperating, of course.

2019 opened with other astronomy news, our view of areas beyond the reach of even the best ground-based telescopes having gotten huge boosts. The New Horizons deep space probe gave us our first ever close-up look at a Kuiper Belt object. Nicknamed Ultima Thule [that name a media event in itself], the small world proved to be a binary contact object. Then, within days, China successfully landed a small rover on the far side of our Moon, giving us the opportunity to examine possibly the oldest materials on the Moon’s surface. We will be learning so much from these two missions alone!

Your Vice President, Jana, and I were delighted to visit recently with Rhonda Coleman and her friend Patty. In town on personal business, Rhonda lives in Bend, OR, but grew up in Lompoc and was a student of Jana’s first year teaching. Rhonda organized the Airstream group viewing of 2017’s Solar Eclipse in Madras, Oregon, which Jana and I attended. Rhonda is a “Totality Chaser” and entertained us with tales of her encounters all over the world. She was unaware of the Delta IV Heavy launch, and joined Jana and me at Saint Mary’s Church for an excellent view of its ascent.

Looking forward to seeing all of you at our February 8th meeting!
Skyward,
Tom

Events

February 2nd *Star Party at the Observatory.*

😊 Yea!

February 4th New Moon will be located on the same side of the Earth as the Sun and will not be visible in the night sky. This phase occurs at 21:03 UTC. Best time to observe faint objects such as galaxies and clusters.

February 9th *Star Party at the Observatory.*

😊 Yea!

February 19th Full Moon Super Moon. The Moon will be Located on the opposite side of the Earth and Sun and the face will be fully illuminated. This phase occurs at 15:53 UTC. This full Moon was known by native American tribes as the Full Snow Moon because the heaviest snows usually fell during this time of year. The Moon will be at its closest approach to the Earth and may look slightly larger and brighter than usual.

February 23rd *Star Party at the Observatory.*

😊 Yea!

February 27th Mercury at greatest Eastern elongation of 18.1 degrees from the Sun. This is the best time to observe Mercury since it will be at its highest point above the horizon in the evening sky. Look for the planet low in the Western sky just after sunset.

New Years Party 2019



Star party's and Events

January 5th Star Party at the Observatory cancelled due to rain.



Nuts!

January 12th Star Party at the Observatory cancelled due to Weather.



Nuts!

January 26th Star Party at the Observatory. No input this NL.

New Years Party 2019



February 2019 Moon



Full 19th, New 4th, Last Quarter 26th, First Quarter 12th.

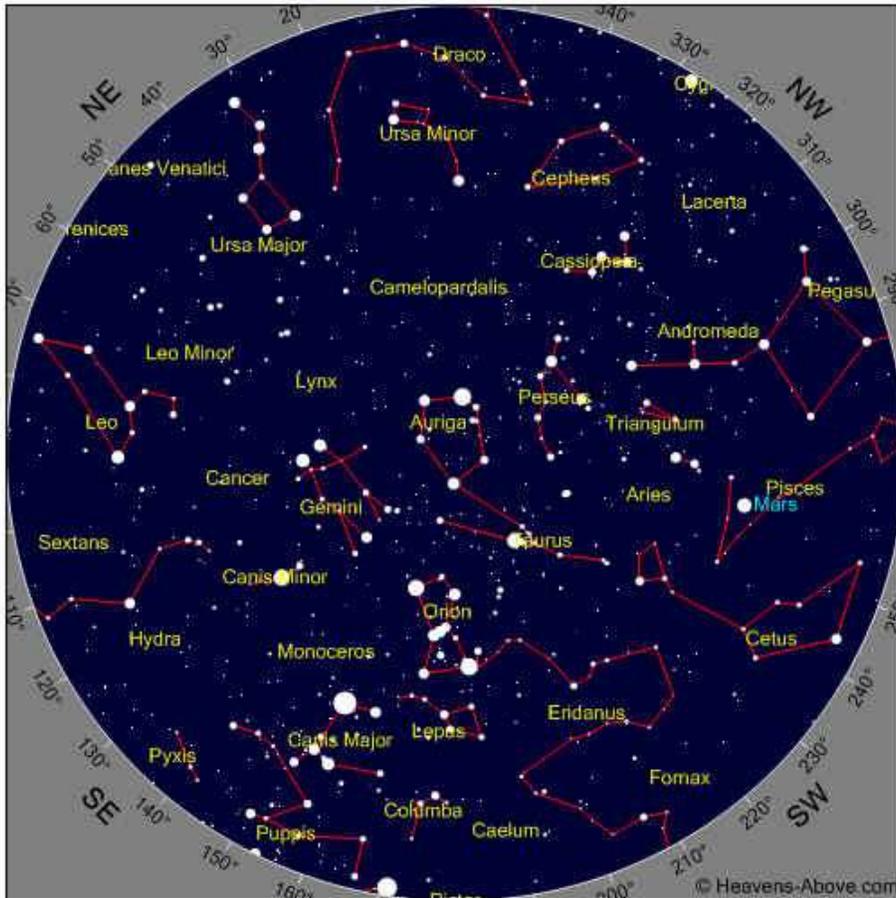
Moon Facts

The Moon is drifting way from Earth.

The Moon is moving approximately 3.8 cm away from our planet every year. It is estimated that it will continue to do so for around 50 billion years. By the time that happens the Moon will take around 47 days to orbit the Earth instead of the current 27.3 days.

February 2019 Sky

Some Objects of interest, M42, M1, Mars



Time

Year	2019	Month	2	Day	5	Hour	20	Minute	22
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YMCA Camp Out Support 2018



Photo Courtesy Vahan Yeterian



Flame and Horse head Nebulas

The Flame nebula NGC 2024 is an emission nebula in the constellation of Orion and is about 900 to 1500 light years distant. The bright star Alnitak shines energetic ultraviolet light into the Flame and this knocks electrons away from the great clouds of hydrogen that reside there. Much of the glow results when the electrons and ionized hydrogen recombine. Additional dark gas and dust lies in front of the bright part of the nebula and this is what causes the dark network that appears in the center of the glowing gas. The Flame nebula is part of the Orion Molecular Cloud Complex, a star forming region that includes the famous Horsehead nebula. At the center of the Flame nebula is a cluster of formed stars 86 % of which have circumstellar disks. X-ray observations show several hundred young stars out of a population of 800 stars. X-ray and infrared images indicate that the youngest stars are concentrated near the center of the cluster.

The Horsehead nebula known as Bernard 33 is a dark nebula in the Orion constellation. The Horsehead nebula is approximately 1500 lightyears distant. The shape of the swirling dark dust and gasses bears some resemblance to a horses head when viewed from Earth. The dark cloud of gas and dust is known to be a stellar nursery and can contain over 100 kinds of organic and inorganic gasses as well as dust. The red or pinkish glow originates predominately from hydrogen gas behind the nebula ionized by the bright star Sigma Orionis. Magnetic fields channel the gasses leaving the nebula into streams shown as streaks in the background glow. The heavy concentrations of dust in the region and neighboring Orion nebula are localized resulting in sections of nearly complete opacity and transparency. The darkness in the Horsehead is caused by thick dust blocking the light of stars behind it. The gaseous complex is an active site of the formation of low-mass stars. Bright spots in their Horsehead nebula's base are young stars just in the process of forming.

Image capture, Astro-Tech AT80EDT f/6 ED refractor, Canon T3 Rebel /Baader modified, integration time .5 hours ISO 800, Celestron AVX mount. Software DSS 3.3.4

For What its Worth

A bit of History

In the 1700's Astronomers began to suspect that the Milky Way galaxy is a disk of stars that completely encircles us. However, for a long time astronomers believed that the Sun was at the center of the galaxy. Astronomers including Herschel and Kapteyn counted the stars in the Milky Way and there seemed to be equal numbers in every direction which led them to the conclusion that we are the center. What they did not account for was interstellar extinction; dust and gas throughout our galaxy was obscuring their view. This dust and gas acts like a fog and they were only actually observing the very nearest stars. The view through our galaxy is obscured by dust and gas but our view out of the plane of the galaxy has very little interstellar extinction. In 1920 an astronomer named Harlow Shapley was studying RR Lyre variable stars in the globular clusters that orbit our galaxy. He was able to use the RR variable stars to determine distances to 93 globular clusters and realized they were much farther than had been thought, with some as far away as 100,000 light years. He also realized that almost all of the globular clusters he was observing were in the direction of Sagittarius. He came to the conclusion that the globular clusters were orbiting the center of our galaxy which were not where Earth and Sun are but rather in the direction of Sagittarius.

Distance Estimate

Harlow estimated the distance to the center of our galaxy but because interstellar extinction was not well understood at the time he was off by a factor of 2. We now know the distance to the center of the galaxy to be about 26,000 light years + or - 3000 light years. Around this time the astronomical community was divided about the nature of what they called spiral nebulae. Harlow was a member of the group that said that these were structures within our galaxy. Others proposed that these nebulae were "Island Universes", rotating systems of stars much like our galaxy. It was not until Edwin Hubble discovered Cepheid variables in some of these spiral nebula that the question could be answered. Cepheid Variables like RR Lyrae variables can be used to measure distances in space. It turned out that these spiral structures were many millions of light years away and certainly not smaller structures within our galaxy.

Milky Way Galaxy

The galaxy we live in, called the Milky Way galaxy, is a barred spiral galaxy composed of at least 100 billion stars. It is approximately 100,000 light years across and about 1000 light years thick. It has a central bulge that is about 10,000 light years in diameter. Our solar system is about 1/3 of the way towards the edge of the galaxy from the central bulge. If the solar system were inside the bulge, at night we would be able to see a million stars as bright as Sirius. The night sky would be so bright that it would seem not different than the day. The Sun and solar system are within the 1000 light years thick disk and we are only about 95 light years from the central plane.

The disk of our galaxy appears blue because it has a large proportion of young, hot O and B main sequence stars. The disk contains gas and dust from which stars can form. The central bulge of our galaxy appears yellow or redish because it contains many red giants and red super giants, but not the short lived blue O and B stars. This shows that the central bulge does not have active star formation going on. The stars in the disk of the galaxy are generally younger, population I stars that orbit the central bulge along paths within the disk. The stars and globular clusters in the halo of our galaxy are very old population II stars. They orbit the galaxy along paths tilted at random angles to the disk. Many of the single stars in the halo orbit the galaxy at very high speeds, relative to the Sun and are called high-velocity stars.

Galaxy Center

At the center of the galaxy is a super massive black hole. The region where the black hole is located is called Sagittarius A* (pronounced "A Star"). The black hole itself cannot be observed because it emits no light and partly because there is too much gas and dust between that and that region for us to be able to observe it. The stars around Sagittarius A* move at such great speeds that astronomers know that it must be incredibly massive. Estimates show that it must be at least 3.7 million times more massive than our Sun. However it is very compact and at most 45 AU (6.7 billion kilometers) across.

Extra Mass

Astronomers believe that only about 10% of the mass of our galaxy comes from stars, gas and dust. They suspect there must be more matter than we can see because the way the galaxy rotates. If all the stars in our galaxy were orbiting a massive object in the center, the way planets orbit the Sun in our solar system, then stars closer to the edge of the galaxy should be orbiting more slowly than stars closer to the center, the same way our outer planets orbit more slowly than the inner ones. Instead stars near the edge of our galaxy orbit at nearly at the same speed as the stars nearer the center. To produce this kind of motion the galaxy must contain much more mass than we can see. Astronomers theorize that this extra mass is dark matter. This matter is not visible, emits no electromagnetic radiation and has so far eluded detection. There are some alternative theories to dark matter being investigated. These theories propose that there is no extra matter but that our understanding of gravity is incomplete or inadequate on large scales and the motion of stars within our galaxy can be explained this way. So far none of the alternative theories have been able to explain the observations as cleanly as dark matter and dark matter is the more widely accepted theory.

Rotation

The Galaxy disk rotates with all of the stars and dust in the disk traveling at a fairly uniform speed. Because of this Stars inside the Sun's orbit complete trips around the bulge more quickly than we do. Stars outside the Sun's orbit complete the journey more slowly. Our galaxy is not like a rotating CD or DVD where different points travel at different speeds, but always complete a rotation in the same amount of time. In our galaxy stars in the disk travel at nearly the same speed so stars closer to the edge will take longer to orbit the galaxy since they have farther to travel. The spiral arms in our galaxy may be density waves similar to the way ripples form when a stone is dropped in a pool of water. The spiral arms are areas of greater density of gas, dust and stars and are regions where star formation happens.

Galaxy Size

The Milky Way galaxy is the second largest member of a cluster of over 30 called the Local group. The largest member of the local group is the Andromeda galaxy, and the third largest is the Triangulum Galaxy. Most of the other galaxies in the local group are much smaller dwarf spheroidal and dwarf elliptical galaxies. Our local group is a member of the Virgo Supercluster which contains over 100 galaxies and clusters and is over 1 million light years across. Our supercluster is traveling about 600 Km/sec towards a very massive supercluster called The Great Attractor. Generally superclusters are not bound to each other gravitationally and are moving away from each other due to the expansion of the universe.

New Years Party 2019



New Years Party 2019



Club Officers



President
Tom Gerald

Vice president
& Treasurer
Jana Hunking



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 Friday February 8th 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](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/](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://skysurvev.org/>

Dave McNally is the VAAS Web Site Serf/Minion

Dave

