Website: http://acl.universeii.com 2, February 2021

Astronomy Club of Lompoc Presents The Sidereal Times

NGC 7293 (see page 5)

Meeting *News:* At the January meeting we. Took care of Some club business and viewed many astro photos by ACL Members. We also confirmed ACL Officers for operating Year 2021..

Reminder: ACL Friday February 12th club meeting will held on Zoom video 7:00 Pm due to Covid-19 virus.

Lunar Calendar:

New Moon 11th

Full Moon 27th

Presidents Message

Hello, Fellow Stargazers:

Thank you to all who have renewed your ACL memberships! Having funds on hand makes it easier to throw our next picnic or pay advance fees to participate in such public functions as the Old Town Market. It may not seem that such an event will ever happen again, but it will and will we ever be ready! But if you got busy and forgot to renew, Jana will still happily accept your check.

A BIG expression of gratitude to everyone who has continued participating in the Astronomy Club of Lompoc over the course of the past year. February-- a year ago-- was the last time we gathered together in person. A year ago! We had a lively meeting, highlighted by Vahan distributing ACL buttons that he had commissioned for each of us. A year ago.... Across the intervening months, however, we have hung together by email exchanges, phone calls, and through the magic of Zoom gatherings. And now your patience and diligence are keeping us moving forward. Thank you!

Let's have a strong turn-out February 12th on Zoom. Dr. Joe Bassi returns to share about DART [Double Asteroid Redirection Test], the next interplanetary mission to launch from Vandenberg. DART will demonstrate the feasibility of changing an asteroid's path away from a collision with earth. The probe will make a minute but detectable change to the orbit of a moonlet circling the asteroid Didymos. From science fiction to space reality; you do not want to miss Joe's presentation!

I do hope everyone took advantage of the amazingly clear nights we finally were able to enjoy over the past few weeks. The winter night sky holds some of our most dramatic constellations, star clusters, and nebulas, and a telescope is not required to get lost in the wonders "out there." While searching out the Beehive Cluster recently, I was struck to see a consistent dimming and brightening satellite. A little research revealed it to be an Atlas Centaur upper stage; since the last of these went aloft in the early 1990s, that big fella has been circling the earth for a long time, tumbling end over end, reflecting the sun's light like a beacon. You never know what you may discover for yourself among the stars above, so come a clear night, always keep your eyes...

Skyward,

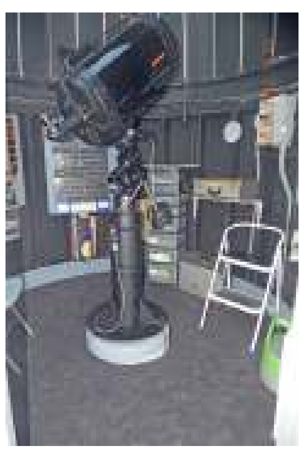
Tom

Events

Feb 6th 13th and 20th ***Star Partys at the Observatory. Cancelled Due to Covid –19 virus.***

Feb 11th New Moon will be located on the same side of the earth as The Sun and will be visible in the night sky. This phase occurs at 19:o8 UTC. This is the best time to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

Feb 27th Full Moon. The moon will be located on the opposite side of the Earth as the Sun and its face will be fully illuminated. This phase occurs at 08:10 UTC. This full Moon was known by native American tribes as the straw Moon because the heaviest snows usually fell this time of year. Since hunting is difficult this Moon also has been known by some tribes as the hunger Moon since the harsh weather make hunting difficult.



Star party's and Events

Jan 9th, 16th 23rd ***Star Party @ observatory, Cancelled due to Covid -19 virus.***

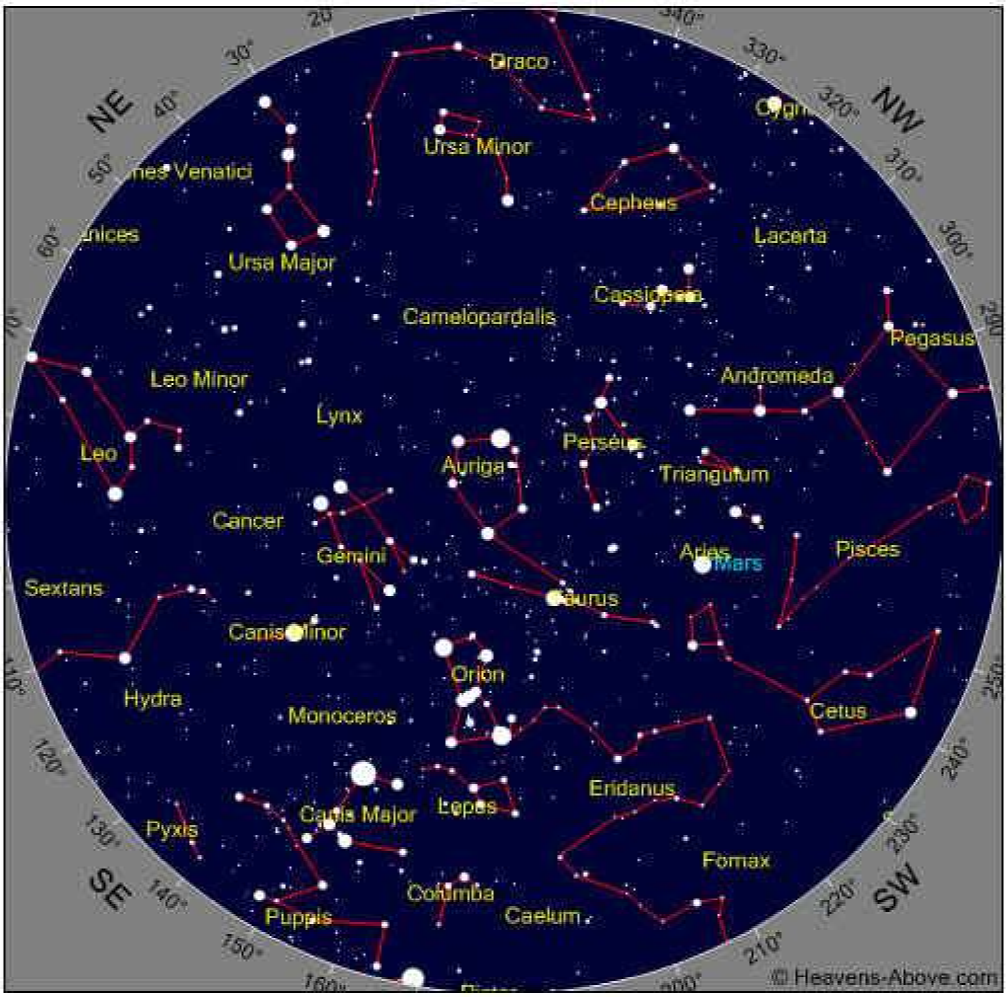
Grrr!

February 2021 Moon

Full 27th, New 11th, Last Quarter 4th , First Quarter 19th

February 2021 Sky

Some Objects of interest, M42, M1



Time

Year 2021 Month 2 Day 2 Hour 20 Minute 20

Photo Courtesy (my friend) **Steven**

This object, called the Helix nebula, lies 650 light-years away, in the constellation of Aquarius. Also known by the catalog number NGC 7293, it is a typical example of a class of objects called planetary nebulae. Discovered in the 18th century, these cosmic works of art were erroneously named for their resemblance to gas-giant planets. Planetary nebulae are actually the remains of stars that once looked a lot like our sun. These stars spend most of their lives turning hydrogen into helium in massive runaway nuclear fusion reactions in their cores. In fact, this process of fusion provides all the light and heat that we get from our sun. Our sun will blossom into a planetary nebula when it dies in about five billion years.

When the hydrogen fuel for the fusion reaction runs out, the star turns to helium for a fuel source, burning it into an even heavier mix of carbon, nitrogen and oxygen. Eventually, the helium will also be exhausted, and the star dies, puffing off its outer gaseous layers and leaving behind the tiny, hot, dense core, called a white dwarf. The white dwarf is about the size of Earth, but has a mass very close to that of the original star; in fact, a teaspoon of a white dwarf would weigh as much as a few elephants!

The glow from planetary nebulae is particularly intriguing as it appears surprisingly similar across a broad swath of the spectrum, from ultraviolet to infrared. The Helix remains recognizable at any of these wavelengths, but the combination shown here highlights some subtle.

The intense ultraviolet radiation from the white dwarf heats up the expelled layers of gas, which shine brightly in the infrared.

GALEX has picked out the ultraviolet light pouring out of this system, shown throughout the nebula in blue, while Spitzer has snagged the detailed infrared signature of the dust and gas in yellow A portion of the extended field beyond the nebula, which was not observed by Spitzer, is from NASA's all-sky Wide-field Infrared Survey Explorer (WISE). The white dwarf star itself is a tiny white pinprick right at the center of the nebula.

The brighter purple circle in the very center is the combined ultraviolet and infrared glow of a dusty disk circling the white dwarf (the disk itself is too small to be resolved). This dust was most likely kicked up by comets that survived the death of their star.

Before the star died, its comets, and possibly planets, would have orbited the star in an orderly fashion. When the star ran out of hydrogen to burn, and blew off its outer layers, the icy bodies and outer planets would have been tossed about and into each other, kicking up an ongoing cosmic dust storm. Any inner planets in the system would have burned up or been swallowed as their dying star expanded.

Infrared data from Spitzer for the central nebula is rendered in green (wavelengths of 3.6 to 4.5 microns) and red (8 to 24 microns), with WISE data covering the outer areas in green (3.4 to 4.5 microns) and red (12 to 22 microns). Ultraviolet data from GALEX appears as blue (0.15 to 2.3

For What It’s Worth

Calculate what you need to know about your telescopes and, oculars

It is good to know how to calculate some of the numbers commonly mentioned by telescope owners and in telescope articles. Armed with a simple calculator and the following formulas you can work out the vital statistics of your telescopes and eyepieces. To illustrate the various formulas below, a telescope with a 100mm (4") clear aperture and a prime focal length of 1000mm will be used. The magnification of an astronomical telescope changes with the eyepiece used. It is calculated by dividing the focal length of the telescope by the focal length of the eyepiece (both in millimeters).

Telescope Focal Length / Eyepiece Focal Length = Magnification

For example, a telescope with a 1000mm focal length using a 10mm ocular is operating at 100 x magnification (1000/10=100).
The focal ratio, or f/stop, of any lens system (including telescopes), is computed by dividing the focal length by the clear aperture (usually expressed in millimeters). In other words, the focal ratio is the ratio of the focal length and clear aperture. Thus:

Telescope Focal Length / Clear Aperture = Focal Ratio

For example, a telescope with a focal length of 1000mm and a 100mm (4") clear aperture has a focal ratio of f/10
There are two ways to calculate the true field of view (FOV) in degrees of a telescope and eyepiece combination. The way to calculate FOV is to divide the apparent field of view (AFOV) of the ocular by the magnification of the system. The AFOV for almost all eyepieces is provided by the manufacturer and it is easy to derive the magnification of any telescope/ocular combination. Thus:

AFOV / Magnification = FOV

For example, a 25mm Plossl eyepiece generally has an AFOV of 50-degrees. Used in a telescope with a 2032mm prime focal length, the magnification is 40x. The true field of view is therefore 1.25-degrees (50/40=1.25).
The other formula for calculating FOV in degrees involves dividing the eyepiece field stop diameter by the prime focal length of the telescope and multiplying the result by the constant of 57.3. Unfortunately, most ocular manufacturers do not provide a field stop diameter for their eyepieces; one company that does is Tele Vue. Thus:

OCULAR FIELD STOP DIAMETER / TELESCOPE FOCAL LENGTH x 57.3 = FOV

A Tele Vue 25mm Plossl has a field stop diameter of 21.2mm. Used in our 1000mm focal length telescope this formula produces a FOV of slightly over 1.2 degrees (21.2/1000=0.0212x57.3=1.21476). The results produced by the two formulas are very similar, but not quite identical. I do not know which method is more accurate, but both are close enough for practical purposes.Power per Inch
This is good to know, because it is a truism among amateur astronomers that the power per inch (PPI) figure of a telescope and ocular should not exceed 50 PPI in excellent seeing conditions. In average seeing conditions, I figure about 30 PPI as a practical maximum.

PPI can be calculated by dividing the magnification of the telescope and eyepiece combination by the telescope's clear aperture in inches (1 inch = approximately 25mm). Thus:

For example, a 100mm clear aperture is approximately 4", so such a telescope operating at 100x magnification is at 25 PExit Pupil
The exit pupil is the diameter of the "light pencil" that emerges from the eyepiece. The pupil of fully dark-adapted human eye can dilate to about 7mm diameter, so an exit pupil in excess of 7mm is passing more light than the eye can accept. On the other hand, as the exit pupil decreases below 7mm, lack of light becomes the basic limiting factor to what you can see at night. Exit pupils of less than about 0.5mm are so small and pass so little light to the eye that they are functionally useless. Actually, I like exit pupils of at least 1.0mm for decent viewing.

Exit pupil can be calculated by dividing the telescope's clear aperture (in millimeters) by the magnification produced by the ocular in **use. Thus:**

APERTURE / MAGNIFICATION = EXIT PUPIL

For example, our 100mm clear aperture telescope with a 10mm ocular is operating at 100x magnification and therefore has a 1.0mm exit pupil (100/100=1)
Another way to calculate exit pupil is to divide the eyepiece focal length in millimeters by the telescope's focal ratio (f/stop).

OCULAR FOCAL LENGTH / TELESCOPE FOCAL RATIO = EXIT PUPIL

Thus, a 10mm ocular in our f/10 (100mm clear aperture and 1000mm focal length) telescope has a 1.0mm exit pupil (10/10=1). Either formula results in the same answer.PI (100/4=25).1000/100=10).
.

Astronomy Club Officers

President
Tom Gerald

Vice President &
Treasurer
Jana Hunking

ACL Support Personnel

ACL News letter Editor
Serf / Minion Vahan Yeterian

ACL Webmaster
Serf / Minion David McNally

Club Meeting

Reminder **ACL** Club meeting Feb 12th on Zoom video due to Covid-19 Virus.

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

Link to "Heavens Above" web site
http:// www.heavens-above.com/

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

ACL Club LOGO

ASTRONOMY CLUB OF LOMPOC