Website: http://acl.universeii.com 2, December 2020

Astronomy Club of Lompoc
Presents
The Sidereal Times

Messier 42 (see page 5)

Meeting *News:* At the November meeting we had a very fine presentation about the Solar probe by Dr. Joe Bassi. We also discussed nomination and election of ACL Officers.

Reminder: ACL Friday December 11th club meeting will held on Zoom video 7:00 Pm due to Covid-19 virus.

Lunar Calendar:
New Moon 14th
Full Moon 30th

Presidents Message

Hello, Skywatchers,

Let me say of 2020 a simple thank you to each of you for hanging in with our little club as we navigated this time of being apart, but still active and sharing with each other however possible. Our meeting attendance via Zoom has stayed at a consistent level nearly equal to our in-person meetings and emails and phone calls have kept us up to date with each other in between.

Our last meeting was especially memorable. Dr. Bassi was at his best in concisely educating us about the complexities of the Parker Solar Mission. Good questions were thrown his way and his answers were lessons in themselves. One interesting aspect that Dr. Bassi pointed to was the expense of the mission, questioning whether or not the knowledge to be gained will justify the money spent. Two days later an article announced that New Horizons, the Pluto mission now deep in the Kuiper Belt, had detected a pervasive light in the universe, independent of visible stars. We never know what expanded insights these missions will bring us, even outside the scope of their original intent, or to what discoveries they may lead future researchers.

A year ago, the month of November brought us a transit of the sun by tiny Mercury, an event some of us were able to witness despite clouds racing to close off our view. The last quarter of this year brings us another rare celestial event. On December 21st, Solstice to be exact, we will be treated to the visual delight of a conjunction of Saturn and Jupiter, so closely aligned that their apparent separation will seem roughly one-fifth the diameter of the full moon (0.1 degree). A conjunction this close of these two planetary giants has not happened since 1623 and their next conjunction in March, 2080, will not be nearly as close.

I look forward to seeing all of you at our December Zoom meeting. Ebbe will lead us in a discussion of the ever-increasing humanmade dangers afflicting the crowded space outside the earth's atmosphere. Take a look at roadside litter, think near-earth orbit, and you will be well on your way to joining the chat.

With words that are a variation on a theme from a year ago, I bid you all:

Merry Christmas and Happy Holidays. Thank you for sending me into 2021 as your President. May peace and good health be with us all and may our skies be clear more nights than not.

Skyward into the New Year,
Tom

Events

Dec 13 & 14 Geminids Meteor shower is the king of meteor showers. It produces up to 120 meteors per hour at its peak. It is produced by debris left behind by an asteroid known as 3200 Phaethon. It peaks this year on the night of the 13th and morning of the 14th. Meteors will radiate from the constellation of Gemini but can appear anywhere in the sky.

Dec 14th Total Solar Eclipse. The path of totality will only be visible in parts of Southern Chile and Southern Argentina. A partial eclipse will be visible in most parts of South America, the southeastern Pacific Ocean and the Southern Atlantic Ocean.

Dec 21st December Solstice occurs at 10:02 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° South latitude. This is the first day of Winter in the Northern hemisphere and the first day of Summer in the Southern hemisphere.

Dec 21 & 22nd Ursids Meteor Shower is a minor meteor shower producing about 5 to 10 meteors per hour. It is produced by dust grains left behind by comet Tuttle. It peaks this year on the night of the 21st and morning of the 22nd. Best viewing will be just after midnight. Meteors will radiate from the constellation of Ursa Minor but can appear anywhere in the sky.

Dec 21st Rare conjunction of Jupiter and Saturn will take place. This Rare conjunction of these two planets is known as the Great Conjunction. The last one occurred in the year 2000. The two bright Planets will appear only 7 arc minutes of each other in the night sky. They will be so close they will appear to make a bright double planet. Look to the West just after sunset for this impressive and rare Planetary pair.

Dec 5th 12th and 19th ***Star Partys at the Observatory***. Cancelled Due to Covid –19 virus.

Star party's and Events

Nov 7th, 14th 21st Star Party @ observatory, Cancelled due to Covid -19 virus.


Nuts!

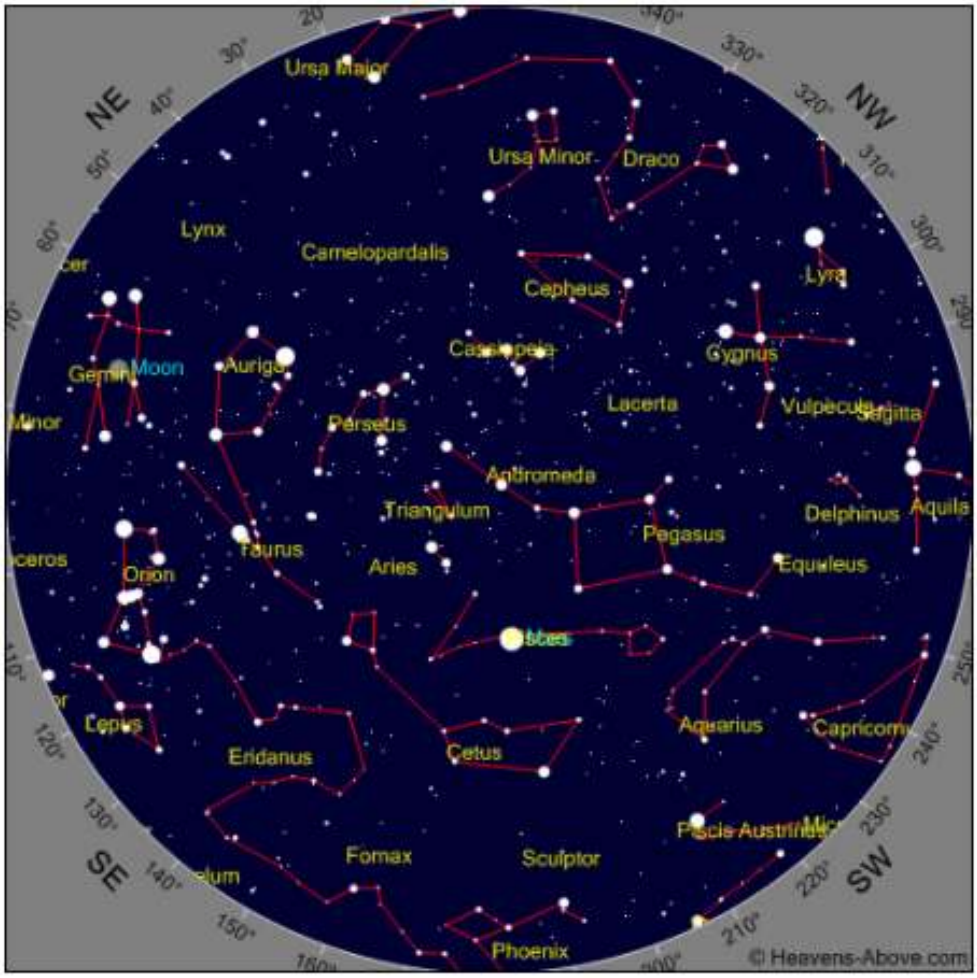
Christmas party meeting (2015.)

December 2020 Moon

Full 30th, New 14th, Last Quarter 8th , First Quarter 21st

December 2020 Sky

Some Objects of interest, M42, Mars, M31, M27



Time

Year	2020	Month	12	Day	2	Hour	20	Minute	32

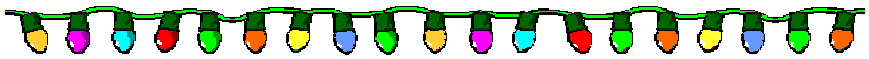




Photo courtesy Vahan Yeterian

Messier 42 (M42), the famous Orion Nebula, is an emission-reflection nebula located in the constellation Orion the Hunter. With an apparent magnitude of 4.0, the Orion Nebula is one of the brightest nebulae in the sky and is visible to the naked eye. It lies at a distance of 1,344 light years from Earth and is the nearest stellar nursery to Earth. The nebula has the designation NGC 1976 in the New General Catalogue. Messier 42 occupies an area of 65 by 60 arc minutes of apparent sky and its spatial diameter measures 24 light years. The nebula has a mass 2,000 times that of the Sun and contains associations of stars, reflection nebulae, neutral clouds of dust and gas, and ionized gas. It is part of the Orion Molecular Cloud Complex, a larger region of nebulosity that also includes the famous Horse head the Flame, and the emission nebula Barnard's Loop. The Orion Molecular Cloud Complex covers an area of more than 10 degrees, which is more than half of the Orion constellation. The Orion Nebula is a place of massive star formation and one of the most studied deep sky objects in our vicinity as it allows astronomers to study the process of stars forming from clouds of dust and gas and the photo-ionizing effects of massive young stars that are responsible for the nebula's glow. New stars are forming throughout the nebula. The temperature in the central region is up to 10,000 K and considerably lower around the edges. The stars in the Trapezium Cluster emit ultraviolet radiation, heating the surrounding gas and illuminating the nebula. Theta-1 Orionis C, is the most massive of the four bright stars in the Trapezium Cluster and one of the most luminous stars known. Theta-1 Orionis C has the spectral classification O6peV and the highest surface temperature (40,000 K) of any star visible to the naked eye, Messier 42 contains hundreds of very young stars, less than a million years old, and also proto stars still embedded in dense gas cocoons. The nebula is home to about 700 stars in different stages of formation. The Hubble Space Telescope has observed more than 150 protoplanetary disks, or proplyds, within M42. These are systems in the first stages of solar system formation. In about 100,000 years, most of the nebula will be gone and leave behind a bright, young open cluster of stars surrounded by wispy remains of the former nebulosity, similar to the Pleiades. Image capture, AstroTech AT80EDT f/6 ED refractor, Canon T3 Rebel /Baader modified, integration time .5 hours ISO 800, Celestron AVX GEM mount.

For What its Worth

What Light, Dark, Bias and Flat frames do in Astrophotography

Light Frames

Light frames contain the actual image data of the object you are photographing. There are many imperfections in light frames that need to be removed before they can be stacked. The stacking itself should reduce the random noise in the light frames, however, there are other non random imperfections that need to be dealt with. Some examples are thermal noise, vignetting, dust, bias signal and hot pixels to name a few. Fixing these problems are the job of the Dark, Bias and Flat frames. After the Light frames have been calibrated they can be aligned and stacked to produce a final image.

Dark Frames

The purpose of taking Darks is like zeroing a scale. Each pixel on the camera is different, some read the signal hotter and some read the signal colder. Dark frames are taken with a cap over the aperture of the telescope so no light can get in. This way you have a picture of what black / nothing should look like. However, dark frames are not purely black. They still contain the hot pixels, thermal signal and what ever non random is present in your image. By subtracting the dark frames from the light frames you are in a sense zeroing them. Dark frames also contain random noise like the light frames. When you subtract a dark frame the random noise also gets subtracted from the light frame which adds noise to the final image. This is why multiple dark frames should be taken so they can be stacked together to reduce the effect of the noise. It is important that dark frames are taken at the same thermal temperature as lights since the thermal signal is dependent on temperature. They should also have the same ISO and exposure length.

Bias Frames

Bias frames are used to remove the readout signal from your camera sensor. Even when a pixel has not received any sort of signal there is still variation on how the camera reads data off the sensor. Bias frames can be subtracted from lights, darks and flats to remove this variation. To capture the bias signal pictures need to be taken at zero exposure length or as close as possible and with the lens cap on. They are not dependant on temperature but should be taken at the same ISO. Note: bias frames are also contained in the dark frames but removing the bias signal from the darks can help programs like Deep Sky Stacker optimize the dark frames. If bias frames are used they will be subtracted from all other images at the start of the stacking process.

Flat Frames

Just like with darks flats are zeroing the image but this time flats are correcting optical imperfections. Most telescopes do not distribute light evenly across the camera sensor. This causes images to be brighter in the center and darker toward the edges. There is also dust on the camera sensor and dust on the telescope optics that causes dark blotches to appear. Flats correct for this by taking a picture of what a blank evenly illuminated surface should look like. The flats are then stacked together and the lights are divided by them. This evens out the illumination throughout the light frame. Flats need to be taken with the same focus, camera orientation and optical setup as the lights. There are many ways to take flats such as using the evening sky, a light box or pointing the telescope at a white computer screen. To take the flats drape and tape a white "T" shirt over the telescope aperture and image the evening or morning sky or computer screen and take images about 10 or 20, let the camera decide the correct exposure.

Image Processing Software

There are several image processing programs on the market or the WEB. One very good program is Deep Sky Stacker, it is a freeware program that can be downloaded from the Web. Another good one that is available is Pixinsight but is not free.

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Serf / Minion Vahan Yeterian

ACL Webmaster
Serf / Minion David McNally

Club Meeting

Reminder **ACL** Club meeting Dec 11th 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