Website: https://acl.universeii.com 2, December 2021

Astronomy Club of Lompoc
Presents
The Sidereal Times

Messier 104 (see page 5)

Meeting *News* At the November club meeting we conducted some minor business and re-elected Tom as ACL President and Jana as ACLVice President and treasurer.

Reminder: ACL club meeting Friday December 10th 7:00 Pm. On Zoom Video, We will not gather at the Manzanita School Teachers Lounge.

Lunar Calendar:
New Moon 4th
Full Moon 19th

Presidents Message

Hello, Fellow Sky Watchers,

We had a very fun November meeting, especially since we had three new members attending. Tim Strickland has returned to us after several years living elsewhere; he enjoyed catching up on our activities. Kate and Steve Medvedoff first attended our October meeting and showed they are putting in the work to learn more about astronomy and deciding what type of telescope is best for their interests.

A big decision was made at the meeting: our January meeting, or New Year's Party, will return to Mi Amore Pizza! Many factors came into play related to the room, the cost, and tastiness of their pizza… and those chicken wings! More about that at our December meeting.

Regarding our December 10th meeting: Dr. Joe Bassi returns for another fun and informative, anecdote-rich science/history presentation. This time Joe will be looking at our "Father of Telescopic Astronomy," Galileo. His focus will be getting to the truths of the great astronomer's life, clearing up many myths that have augmented his story down through the years. At Joe's request, we will host this meeting VIA ZOOM. Look for your invitation via email soon. We will NOT gather at the Teachers' Lounge; Zoom only.

In closing, I thank you all for your vote of confidence in sending Jana and me into another year as leaders of your Astronomy Club of Lompoc. Between the lack of outreach events, nearly constant nightly fog, and a deadening malaise from the limits imposed upon us by the pandemic, the past year has been very hard for me personally, motivation-wise. But I will do my best to keep ACL a viable part of our region and an enriching experience for each of you. With your involvement and creativity, we will prevail and grow into the Club's full potential.

Merry Christmas, Happy Holidays, and Peace to you all.

Skyward,

Tom

Events

December 4th Total Solar Eclipse will be limited to Antarctica and the Southern Atlantic ocean. A partial eclipse will be visible throughout much of South Africa.

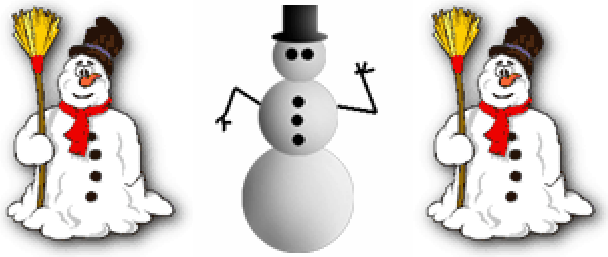
December 13 & 14 Geminids Meteor Shower is the king of meteor Showers. It can produce up to 120 multi colored meteors per hour at its peak. It is produced by debris left behind by an Asteroid known as 3200 Phaethon. It peaks this year on the night of the 13th and morning of the 14th. Meteors will radiate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

December 21 December Solstice occurs at 15:50 UTC. The South Pole of the Earth will be tilted toward the Sun which 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.

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

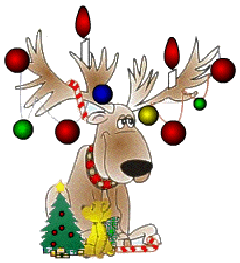
December 4th 11th ***Star Party at the Observatory***

Yes!



Star party's and Events

November 6 , 13 Star Party at the Observatory. Poor weather no star party. Uugh!



December 2021 Moon

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

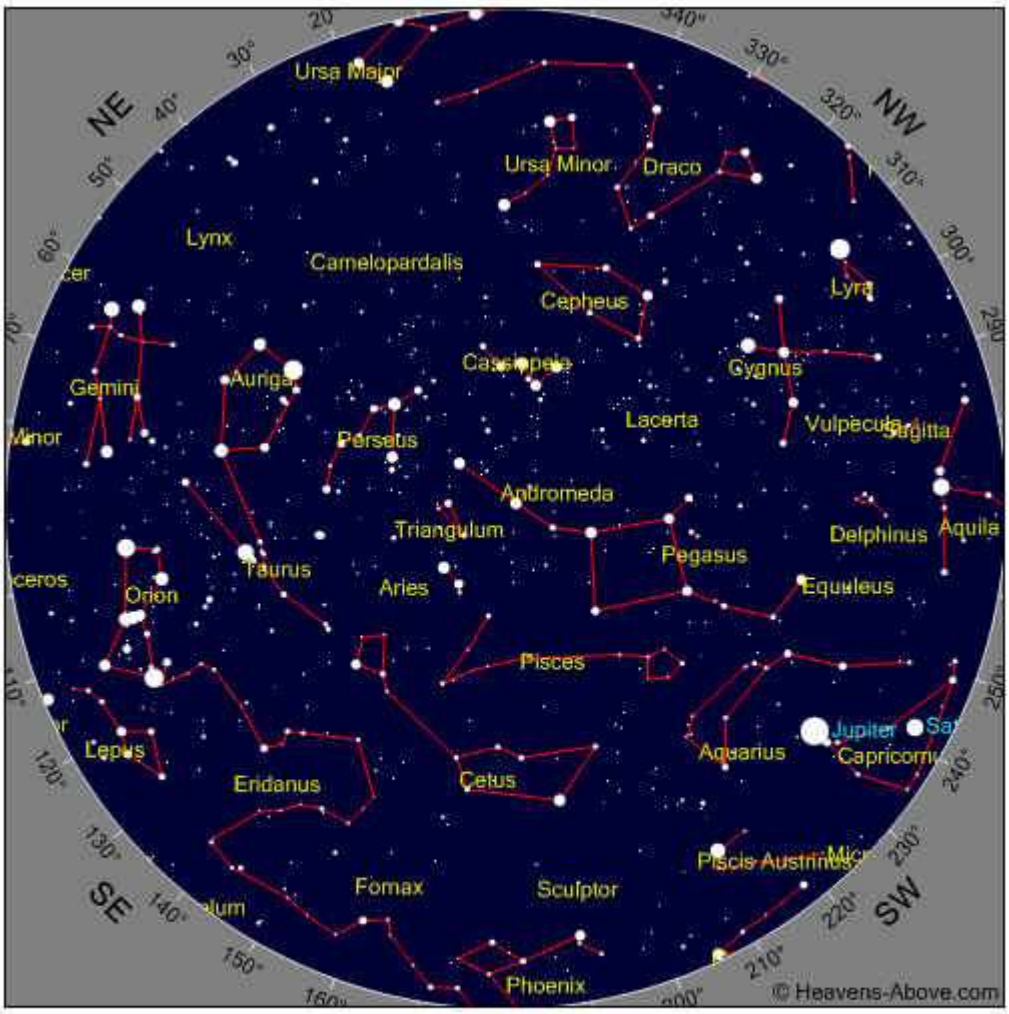
Moon Facts and Folklore

Earth is about 80 times the volume than the Moon, but both are about the same age

The footprints left by the Apollo astronauts will not erode as they would on earth, no rain or wind on the Moon

December 2021 Sky

Some Objects of interest, M42, M31, M27



Time

Year 2021 Month 12 Day 5 Hour 20 Minute 20

Photo Courtesy Gary Satterfield

Messier 104 spiral galaxy known as the “Sombrero" (the Mexican Hat) because of its particular shape. It lies a distance of approximately 30 million light years. This luminous and massive galaxy has a total mass of about 800 billion suns and is noted for its dominant nuclear bulge, composed mainly of mature stars and is nearly edge-on disk composed of stars, gas and dust. The complexity of this dust is apparent directly in front of the bright nucleus but is also evident in the dark absorbing lanes throughout the disc. A large number of small diffuse objects can be seen as a swarm in the halo of M104. Most of these are globular clusters similar to those found in our own Milky Way Galaxy but M104 has a much larger number of them ranging from 1200 to 2000. This galaxy also appears to host a super massive black hole of about 1 billion solar masses, one of the most massive black holes measured in any nearby galaxy and 250 times larger than the black hole in the Milky Way. Despite having such a massive black hole at the center the galaxy is rather quiet implying that the black hole is on a very stringent diet. The galaxy is receding from us at 1024 Km/s. Its enormous recession velocity was measured at Lowell observatory in 1912 and at the time it was the largest red shift ever measured in a galaxy. Equipment AT8RC on a CGEM mount with a Canon 500D DSLR, 7 min x 36 frames at ISO 800. Darks, Flats and Bias frames. Images Plus for calibration, stacking and DDP, CS2 for final adjustments.

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.

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 Aaron Anderson
(New Zealand)

Club Meeting

Reminder ACL Club meeting Friday December 10th 7:00 Pm on Zoom Video.

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

MERRY CHRISTMAS