Website: https://acl.universeii.com 2, May 2022

Astronomy Club of Lompoc
Presents
The Sidereal Times

Messier 104 (see page 5)

<u>Meeting *News*</u> At the April club meeting at Mi Amori Pizza was cancelled and the meeting was held on Zoom video. Jana presented a very informative history on astronomy by the Chinese.

<u>Reminder:</u> ACL club meeting Friday May 13th 7:00 Pm Manzanita School Teachers lounge. Masks!

<u>Lunar Calendar:</u>
New Moon 30th
Full Moon 16th

Mi Amore Pizza Time (No)

<u>Presidents Message</u>

Hello, Fellow Star Dust,

ACL had an excellent meeting via Zoom on the 11th thanks to the strong turn-out and excellent management and program by Jana. Thank you, Jana! Your survey of Chinese astronomy/astrology was fascinating, and brought up some fun discussion.

The big news from the meeting was the unanimous vote to hold a "Pizza Picnic" in June to make up for our long-lost Pizza Party. Details will follow in the June Newsletter. This will be a wonderful opportunity for us to gather and celebrate our sticking together despite all the long months of limited access to our normal activities. Credit for the Pizza Picnic goes entirely to Jana, who has kept this idea alive since the first cancellation.

We have a Total Lunar Eclipse on the night of May 15th. The Moon will move into Earth's shadow while still below our eastern horizon. When the Moon rises at 7:40 PST, we will see that Totality is just beginning. The whole show will be over at 11:40 PST, after an evening of Full Moon, dimmed to a dusty orange. (Eclipse bonus: until the Moon moves from behind Earth's shadow, general observing will not have to compete with "Full Moon wash-out.") Lunar Eclipses are always a treat, when we are lucky enough to catch one, and thus is the subject of this month's "Astronomy Highlights" column in the "Lompoc Vision," complete with photo by a certain ACL member from his backyard observatory.

Ever Skyward,
Tom

Events

May 7th 21st 30th ***Star Party at the Observatory***

Yes!

May 6 &7 Eta Aquarids Meteor Shower is an above average shower capable of producing 60 meteors per hour at its peak. It is produced by dust particles left behind by Comet Halley. Meteors will radiate from the constellation Aquarius but can appear anywhere in the sky.

May 16 Total Lunar Eclipse. The eclipse will be visible Throughout all of North America, Greenland the Atlantic Ocean and parts of Western Europe and Western Africa.

The Moon is a spherical rocky body, probably with a small metallic core, revolving around Earth in a slightly eccentric orbit at a mean distance of about 384,000 km (238,600 miles). Its equatorial radius is 1,738 km (1,080 miles), and its shape is slightly flattened in a such a way that it bulges a little in the direction of Earth. Its mass distribution is not uniform—the centre of mass is displaced about 2 km (1.2 miles) toward Earth relative to the centre of the lunar sphere, and it also has surface mass concentrations, called mascons for short, that cause the Moon's gravitational field to increase over local areas. The Moon has no global magnetic field like that of Earth, but some of its surface rocks have remanent magnetism, which indicates one or more periods of magnetic activity in the past. The Moon presently has very slight seismic activity and little heat flow from the interior, indications that most internal activity ceased long ago.

Jupiter's familiar stripes and swirls are actually cold, windy clouds of ammonia and water, floating in an atmosphere of hydrogen and helium. Jupiter's iconic Great Red Spot is a giant storm bigger than Earth that has raged for hundreds of years.

Star party's and Events

APRIL 9, 23, 30 Star Party at the Observatory.

About 4.6 billion years ago, a giant cloud of dust and gas known as the solar nebula collapsed in on itself and began to form what would eventually become the solar system's sun and planets. Meteorites, or pieces of space rock that have fallen to Earth, have helped scientists figure out the age of the solar system. Some of these small pieces have broken off of moons or planets and can yield interesting scientific information about the chemistry and history of their home body. Others have been traveling around the solar system since its beginning, before the planets even existed. The Allende meteorite, which fell to Earth in 1969 and scattered over Mexico, is the oldest known meteorite, at 4.55 billion years old.

The Moons surface is actually dark compared to the night sky it appears very bright with a reflectance just slightly higher than that of worn asphalt. Its gravitational influence produces the ocean tides, body tides and the slight lengthening of the day.

Times to Solar System (Earth Centered)

Object	Distance (Miles)	Light Time
Sun	93,000,000	8 min 18 sec
Moon	240,000	1.2 seconds
Mercury	48,000,000	4 min 29 sec
Venus	25,000,000	2 min 23 sec
Mars	35,000,000	3 min 13 sec
Jupiter	365,000,000	33 min
Saturn	746,000,000	1 hour 11 min
Uranus	1,600,000,000	2 hours 18 min
Neptune	2,680,000,000	4 hours
Pluto	2,660,000,000	3 hours 9 min

1 light second = 186,000 miles /sec
1 Light Year = 5.866 x 10^12 approx. 6 trillion miles

Note: A light year easy to visualize……
If Earth and Sun were 1 inch apart and that distance
Represents Earth Sun distance of 93,000,000 miles
Then 1 light year would be a mile away.

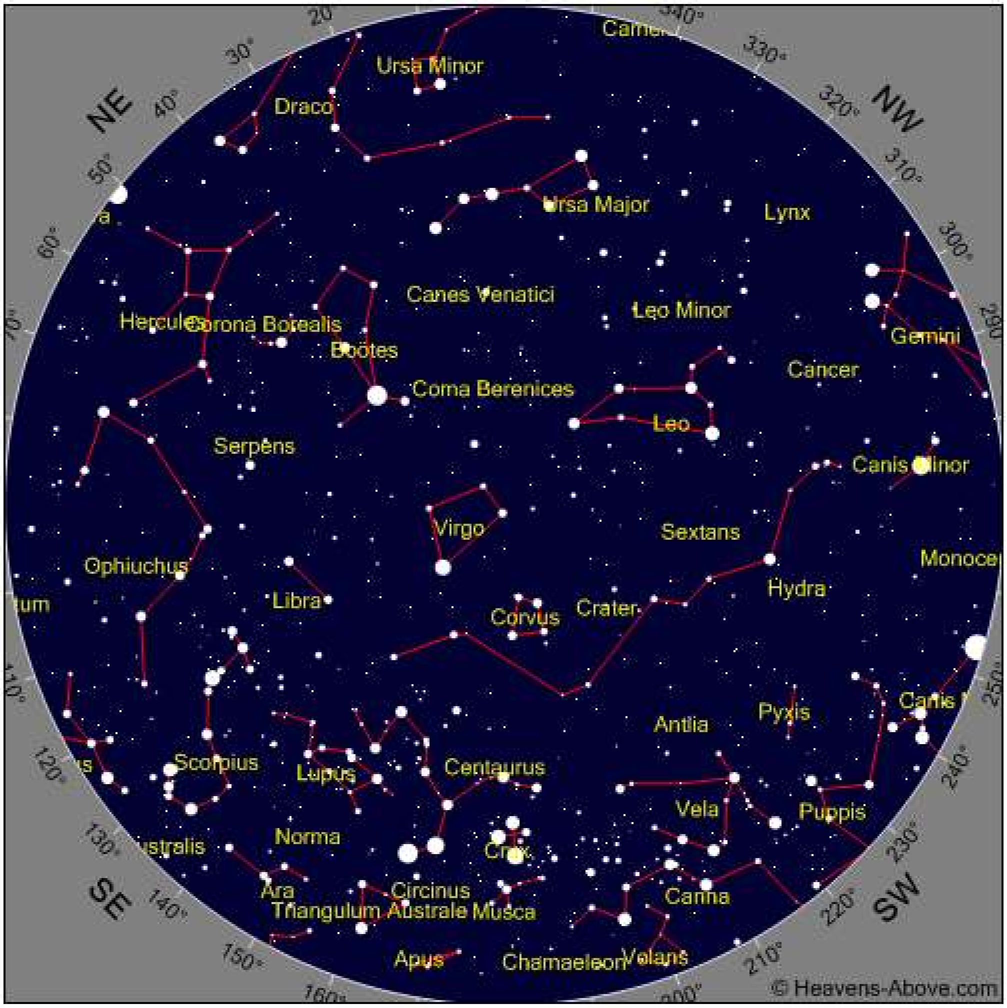
May 2022 Moon

<u>Full 16th , New 30th , Last Quarter 22nd , First Quarter 9th</u>

Show & Tell at the park

May 2022 Sky

Some Objects of interest, M13



Time

Year 2022 Month 5 Day 2 Hour 21 Minute 57

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

When it comes to astronomy, you will find the term "arc second" used in three ways: (1) to express a given distance in declination on a star chart, (2) as a given unit of an astronomical object's size, and (3) as an expression of telescope's resolving power. Let's take a look at each use of the term in more detail. First, we'll examine how an arc second is expressed when applied to a star chart and to the visible night sky. Picture the entire dome of the night sky as the face of a clock. The clock is divided into hours, minutes, and tiny seconds. Much like this imaginary clock, the celestial dome is divided into degrees and each degree is comprised of arc minutes and arc seconds. There are 60 arc minutes in each degree, and each arc minute is made up of 60 arc seconds. But, just how big would that be? Let's use the full Moon as an example. It covers approximately 1/2 a degree of night sky - which equals 30 arc minutes or 1800 arc seconds. These measurements are abbreviated into a type of astronomical shorthand. Terms for the Moon's apparent size would read 30' for arc minutes or 1800" for arc seconds. When you look at a star chart, you'll see degrees of declination - measurements from north to south - marked along the edge. Each degree of sky contains 60 arc minutes, or 3600 arc seconds. When using an astronomical catalog or observing instructions, you'll be provided with an "address" of coordinates to celestial objects which utilizes arc seconds. This address may read something like RA 12h 22m 13s - Dec +22° 44' 11". Look at the second set of numbers. This means your object is located twenty-two degrees, forty-four arc minutes, eleven arc seconds north of the celestial equator. Although a single arc second would be too small to visually determine when looking at the sky, it is very important to celestial surveys and catalogs. It is like assigning a celestial "house number" to a specific target and allows astronomers to locate targets with precision. When expressing the size of an astronomical object, it is often given in terms of angular diameter as seen from Earth - not its true size. Most of the time, these angular diameters are very small since most objects are very far away from Earth, so they are expressed as arc minutes, or more frequently as arc seconds. An astronomical catalog or observing guide will provide an object's size to help observers better understand what to expect from a target before they try to locate it with a telescope. This is helpful if you have never seen a particular object. Let's use two samples to illustrate this concept - a globular cluster and a double star. For example, globular cluster M80 is listed as 10' (ten arc minutes) in size. A good star chart will show this object printed to scale in relationship to the stars around it. This makes identifying it from the surrounding stellar patterns seen in the eyepiece much easier. You knew in advance the cluster would cover a certain amount of distance between identifiable stars. However, the angular distance measurement between double stars is much smaller and is always expressed as arc seconds. A good example is Polaris. The main bright star, Polaris A, is separated from small faint star, Polaris B, by 18" (eighteen arc seconds). By knowing a double star's separation in advance, you can test your telescope's ability to resolve small distances and aid you in determining sky conditions. Most general star charts don't print separations that small, so you'll need to rely upon your astronomy catalog as a resource for those numbers. Another place in which you will encounter arc seconds is in a telescope's specifications - the resolving power. This is your telescope's ability (under ideal observing conditions) to "see" or separate a given size or distance. While there are lengthy mathematical expressions used to determine arc seconds of resolution for telescopes, a simple way to understand is to use the known separation of a double star as an example. Let's return to Polaris. If a telescope has a stated resolving power of 1.0" that means it is capable of clearly resolving an object - or distance - of one arc second. That's just 1/18th the distance between Polaris and its companion! With this information, you know our example telescope with a resolving power of 1.0" (one arc second) will be able to "split" the double star Polaris under ideal observing conditions. While these measurements might seem a little confusing at first, you'll soon understand and appreciate them. Knowing an arc second's distance on a star chart will help you better locate objects by further refining their positions. Being able to add arc minute and arc second directional numbers to a telescope's computer aiming system will make it far more accurate. Understanding an arc second in size will assist you in relating what you see to others. For example, you might observe a comet and want to record its size in your notes. If you know a given object's size in arc minutes or arc seconds, you can compare the two and make a more accurate assessment. By knowing your telescope's resolving ability in arc seconds, you'll also know if you're able to "split" a given double star in advance - or know if your telescope is capable of "seeing" very small separations, such as revealing individual members in a star cluster. Arc seconds might be tiny, but they're very important

Astronomy Club Officers

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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 May 13th 7:00 Pm at Manzanita School Teachers lounge. Masks!

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