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

Astronomy Club of Lompoc
Presents
The Sidereal Times

M1 Crab (see page 5)

Meeting *News:* The February meeting was held via Zoom Video. Vince Tobin gave a presentation on deriving Astronomical distances.

Reminder: ACL Friday March 11th club meeting will held at Manzanita School Teachers lounge at 7:00 Pm. Bring Masks.

Lunar Calendar:
New Moon 2nd
Full Moon 18th

Craig @ Figueroa Mt.

Presidents Message

Hello, Lompoc Astronomers and Friends,

Thank you, Vince Tobin, for the excellent program you delivered at our February meeting! Even through Zoom, you gave us an excellent sense of being in your Hancock astronomy class. And, like any good teacher, your lesson brought forth many good questions and discussion that has continued beyond that evening's forty minutes. We are very fortunate to have you in our fellowship.

Good news! Our March meeting on the 11th will be held in-person back in our old digs, the Teachers' Lounge at Manzanita Elementary School. Will be great to have everyone together again, in what appears to be the first of many future such meetings. Program for the evening, still in the planning at press time, to be announced.

With restrictions opening up in our area, there should be no reason we cannot start having Star Parties again. With New Moon on March 2nd and Last Quarter on the 26th, then Saturday the 5th and 26th should be perfect nights to get our scopes together at the Observatory. Hope all of you can make it. Invite friends and introduce them to the wonders of the night sky. Weather-pending, of course, dare I mention it. I am betting that Vahan will be able to join us for the 26th Star party!

Lastly, a personal note: I will be missing in action the month of April [and in all likelihood May]. Unbelievably, an injury from high school track over fifty years ago left scarred muscle tissue deep in my left calf that has blossomed recently into a benign mass that has to come out. Surgery at Stanford is scheduled for March 30th, with a projected twelve weeks of recovery and rehab. Our Vice President Jana Hunking will conduct meetings in my absence. Thank you very much, Jana!

Skyward,
Tom

Events

March 5th 12th and 26th ***Star Party at the Observatory.***

Yes!

March 20 March Equinox occurs at 15.24 UTC. The Sun will shine directly on the Equator and there will be nearly equal amounts of day and night throughout the world. This is also the first day of Spring (Vernal Equinox) in the Northern hemisphere and the first day of Fall (Autuminal Equinox) in the Southern Hemisphere.

The dark side of the moon is a myth.
In reality both sides of the Moon see the same amount of sunlight however only one face of the Moon is ever seen from Earth. This is because the Moon rotates around on its own axis in exactly the same time it takes to orbit the Earth, meaning the same side is always facing the Earth. The side facing away from Earth has only been seen by the human eye from spacecraft.

A day on Mars lasts 24 hours and 37 minutes.

One year on Mars is 687 days long. That's 1.9 Earth years. This is because Mars is further away from the sun so it takes longer to orbit it.

The tilt on the axis of Mars is 25 degrees which means that the planet experiences seasons like we do on Earth as different parts of the planet are closer to the sun at different times of its orbit.

Mars has a thin atmosphere made from 95.9% carbon dioxide and 2.7% nitrogen. The atmosphere is so thin that it's not thick enough to trap the sun's heat so it is very cold - ranging from -100°C in winter to 20°C in summer.

Mars has very weak gravity. Gravity on Mars is 37% less than on Earth. This means that on Mars you could jump 3x higher than on Earth.

Sun Reference Data

Diameter:	1.4 million km (870,000 miles)	Age:	4.6 billion years
Mass:	330,000 x Earth	Distance from Earth:	149.6 million km (93 million miles)
Density:	1.41 (water=1)	Distance to Nearest Star:	4.3 light years
Solar Wind Speed:	3 million km/hr	Luminosity:	390 billion billion megawatts
Solar Cycle:	8 - 11 years	Temperature at surface:	5,600° C (9,932° F)
Temperature at Core:	14 million° C (22.5 million° F)	Temperature of Sunspots:	4,000° C (7,232° F)
Rotation Period at Equator:	25 Earth days	Rotation Period at Poles:	36 Earth days

Star party's and Events

February 5, 12, 26 ***Star Party @ observatory, Cancelled due to weather.***

Nuts!

Astronomers call Jupiter a failed star, but that's not really an appropriate description. While it is true that, like a star, Jupiter is rich in hydrogen and helium, Jupiter does not have nearly enough mass to trigger a fusion reaction in its core. This is how stars generate energy, by fusing hydrogen atoms together under extreme heat and pressure to create helium, releasing light and heat in the process. This is made possible by their enormous gravity. For Jupiter to ignite a nuclear fusion process and become a star, it would need more than 70 times its current mass. If you could crash dozens of Jupiter's together, you might have a chance to make a new star. But in the meantime, Jupiter shall remain a large gas giant with no hopes of becoming a star.

Saturn has 18 known satellites, made mostly of ice and rock. The largest, Titan, orbits Saturn every 16 days and is visible through a good-sized amateur telescope. Titan, which is larger than the planet Mercury, has a thick atmosphere that obscures its surface. Though researchers aren't sure how many moons Saturn has, the total is likely at least 20, and may be much higher.

Saturn data (averages):
Diameter: 74,900 miles
Time to rotate: 10 hours, 39 minutes
Orbit: 29.5 years

Dave & Vahan @ Figueroa Mt.

March 2022 Moon

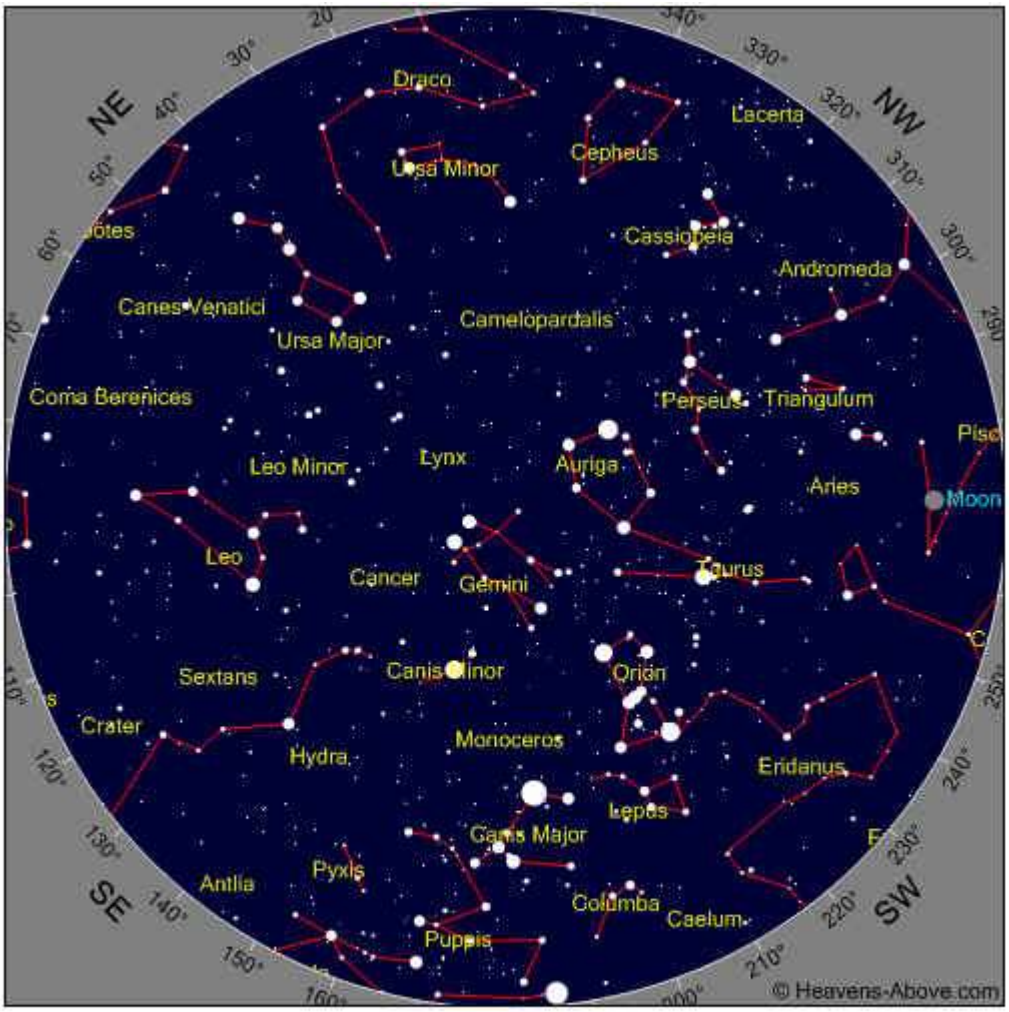
Full 18, New 2, Last Quarter 25 , First Quarter 10

Jon @ Figueroa Mt.

Dave @ Observatory

March sky 2022

Some Objects of interest, M1, M42, C14



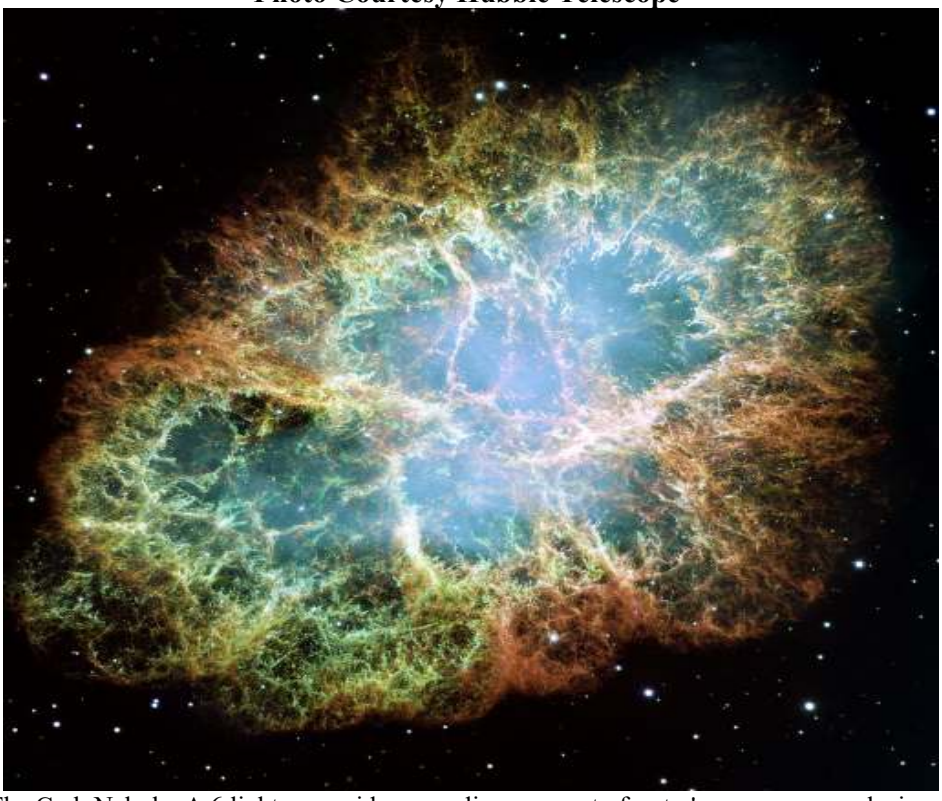
Time

Year 2022 Month 3 Day 5 Hour 20 Minute 10

Public School display team

YMCA Astronomy outing

Photo Courtesy Hubble Telescope



Messier 1 – The Crab Nebula. A 6 light year wide expanding remnant of a star's supernova explosion. Japanese and Chinese astronomers recorded this violent event nearly 1000 years ago in 1054. The orange filaments are the tattered remains of the star and consist mostly of hydrogen. The rapidly spinning neutron star embedded in the center of the nebula is the dynamo powering the nebula's eerie interior bluish glow. The blue light comes from electrons whirling at nearly the speed of light around magnetic field lines from the neutron star. The neutron star's rotation like a lighthouse, ejects twin beams of radiation that appear to pulse 30 times per second due to the neutron star's rotation. A neutron star is the crushed ultra-dense core of the exploded star. The explosion of the progenitor star produced a large shell of filaments that has continued to expand ever since and will eventually disperse and disappear into the surrounding space. The nebula filaments contain ionized gas which is responsible for the nebulas glow. The electrons found in the gas move at speeds close to the speed of light emitting synchotron radiation and makes the nebula visible in radio wavelengths.

The filaments of the nebula is what is left of the progenitor star's atmosphere and they mainly consist of ionized hydrogen and helium along with other elements including oxygen, carbon, iron, nitrogen sulfur and neon. The temperatures of the filaments are typically in the range from 11,000 to 18,000K. Based on reports the nebula was visible in the sky for 23 days. Historical records revealed that the supernova reached a peak magnitude of –7 and could even be seen in daylight. It was the brightest object in the sky second only to the Moon and it remained visible to the naked eye for 653 days after its discovery.

Type: Supernova remnant

Designations: Messier 1, M1, Crab Nebula, NGC 1952.

Features: Optical Pulsar.

Constellation: Taurus.

Distance: 6500 light years.

For What It's Worth

Kupier Belt a brief account

Dr. Mike Brown is a professor of planetary astronomy at Caltech. We asked him to help us explain this unusual region of our solar system. Soon after Pluto was discovered in 1930, astronomers began to theorize that Pluto was not alone in the outer Solar System. In time, they began to postulate the existence of other objects in the region, which they would discover by 1992. In short, the existence of the Kuiper Belt – a large debris field at the edge of the Solar System was theorized before it was ever discovered. The Kuiper Belt (also known as the Edgeworth–Kuiper belt) is a region of the Solar System that exists beyond the eight major planets, extending from the orbit of Neptune (at 30 AU) to approximately 50 AU from the Sun. It is similar to the asteroid belt, in that it contains many small bodies, all remnants from the Solar System's formation but unlike the Asteroid Belt, it is much larger – 20 times as wide and 20 to 200 times as massive: *The Kuiper* Belt is a collection of bodies outside the orbit of Neptune that, if nothing else had happened, if Neptune hadn't formed or if things had gone a little bit better, maybe they could have gotten together themselves and formed the next planet out beyond Neptune. But instead, in the history of the solar system, when Neptune formed it led to these objects not being able to get together, so it's just this belt of material out beyond Neptune. Shortly after discovery of Pluto, astronomers began to ponder the existence of a Trans-Neptunian population of objects in the outer Solar System. The first to suggest this was Freckrick C. Leonard, who began suggesting the existence of "ultra-Neptunian bodies" beyond Pluto that had simply not been discovered yet. That same year, astronomer Armin O. Leuschner suggested that Pluto "may be one of many long-period planetary objects yet to be discovered." In 1943, in the *Journal of the British Astronomical Association*, Kenneth Edgeworth further expounded on the subject. According to Edgeworth, the material within the primordial solar nebula beyond Neptune was too widely spaced to condense into planets, and so rather condensed into a myriad of smaller bodies. In 1951, in an article for the journal *Astrophysics*, that Dutch astronomer Gerard Kuiper speculated on a similar disc having formed early in the Solar System's evolution. Occasionally one of these objects would wander into the inner Solar System and become a comet. The idea of this "Kuiper Belt" made sense to astronomers. Not only did it help to explain why there were no large planets further out in the Solar System, it also conveniently wrapped up the mystery of where comets came from. A Canadian team of astronomers ran a number of computer simulations and determined that the Oort cloud could not account for all short-period comets. the simulations matched observations.

.In their 1988 paper, Tremaine and his colleagues referred to the hypothetical region beyond Neptune as the "Kuiper Belt", apparently due to the fact that Fernández used the words "Kuiper" and "comet belt" in the opening sentence of his paper. While this has remained the official name, astronomers sometimes use the alternative name Edgeworth-Kuiper belt to credit Edgeworth for his earlier theoretical work. There have been more than a thousand objects discovered in the Kuiper Belt, and it's theorized that there are as many as 100,000 objects larger than 100 km in diameter. Given to their small size and extreme distance from Earth, the chemical makeup of KBOs is very difficult to determine.. However, spectrographic studies conducted of the region since its discovery have generally indicated that its members are primarily composed of ices: a mixture of light hydrocarbons (such as methane), ammonia, and water ice – a composition they share with comets. Initial studies also confirmed a broad range of colors among KBOs, ranging from neutral grey to deep red. This suggests that their surfaces are composed of a wide range of compounds, from dirty ices to hydrocarbons. In 1996, Robert H. Brown et al. obtained spectroscopic data on the KBO 1993 SC, revealing its surface composition to be markedly similar to that of Pluto, as well as Neptune's moon Triton, possessing large amounts of methane ice.Water ice has been detected in several KBOs, including 1996 TO66, 38628 Huya and 20000 Varuna. In 2004, Mike Brown et al. determined the existence of crystalline water ice and ammonia hydrate on one of the largest known KBOs, 50000 Quaoar. Both of these substances would have been destroyed over the age of the Solar System, suggesting that Quaoar had been recently resurfaced, either by internal tectonic activity or by meteorite impacts. The fact that surveys of other solar systems indicate that our Solar System isn't unique. Since 2006, there have been other "Kuiper Belts" (i.e. icy debris belts) discovered around nine other star systems. These appear to fall into two categories: wide belts, with radii of over 50 AU, and narrow belts (like our own Kuiper Belt) with radii of between 20 and 30 AU and relatively sharp boundaries. According to infrared surveys, an estimated 15-20% of solar-type stars are believed to have massive Kuiper-Belt-like structures. Most of these appear to be fairly young, but two star systems – HD 139664 and HD 53143, which were observed by the Hubble Space Telescope in 2006 – are estimated to be 300 million years old. Vast and unexplored, the Kuiper Belt is the source of many comets, and is believed to be the point of origin for all periodic or short-period comet (i.e. ones with an orbit lasting 200 years or less). The most famous of these is Halley's Comet, which has been active for the past 16,000–200,000 years. We call it a belt, but it's a very wide belt. It's something like 45 degrees in extent across the sky – this big swath of material that's just been churned and churned by Neptune. And these days, instead of making a bigger and bigger body, they're just colliding and slowly grinding down into dust. If we come back in another hundred million years, there'll be no Kuiper Belt left.

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 March 11th 7:00 PM
Manzanita School Teachers Lounge Wear your Mask.

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