

Skywatchers

Newsletter of the China Lake Astronomical Society

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June 24, 2021

July 5th, 2021 CLAS Meeting

This Newsletter is being sent out 8 days before our meeting because I will be leaving and traveling to Florida early this week. Our meeting on July 05th will be held at the Maturango Museum and consist of virtual and in person. At this time I do not have any information on the program contents. When that is finalized a follow up email will be sent out. Thank you. *Editor*

August Calendar Event Finally Star Viewing at Red Rock State Park Perseid Meteor Shower



Source: Shutterstock. Taken at Joshua Tree National Park

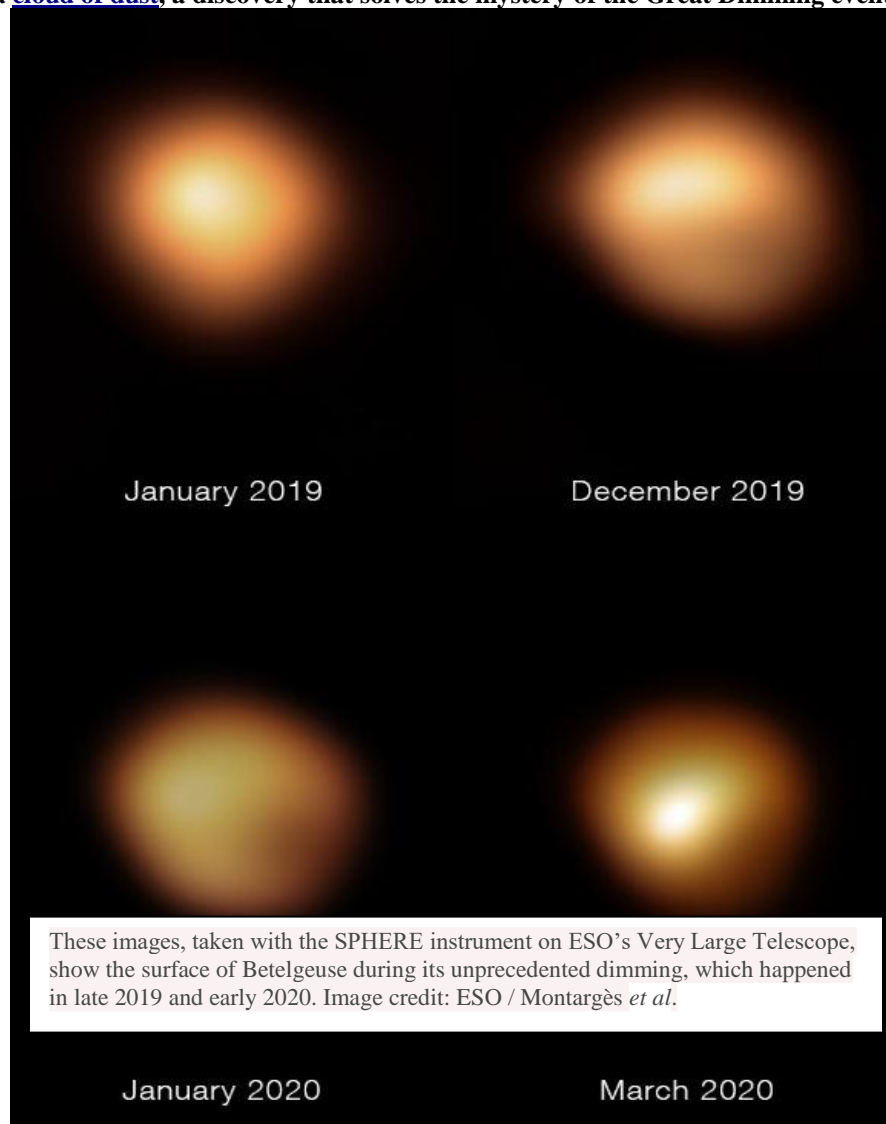
The China Lake Astronomical Society will be conducting a Star Party and Perseid Meteor Shower Watch on the night of August 11th (Wednesday Night-Thursday AM). Observing will begin at sunset and last till the early morning on August 12th.

Perseids Peak night: August 11–12, 2021 While the [Perseids](#) are not the strongest shower of the year (that title goes to the Geminids in December), they are the most popular because they fall on warm summer

nights. Active between July 17 and August 26, 2021, the Perseids will max out the night of August 11, 2021. The moon will only be 13 percent full and will set just as the meteors start to appear, so expect to see around 50 to 75 meteors per hour on the peak night.

Dust Cloud Caused Betelgeuse's Great Dimming Event, Astronomers Say

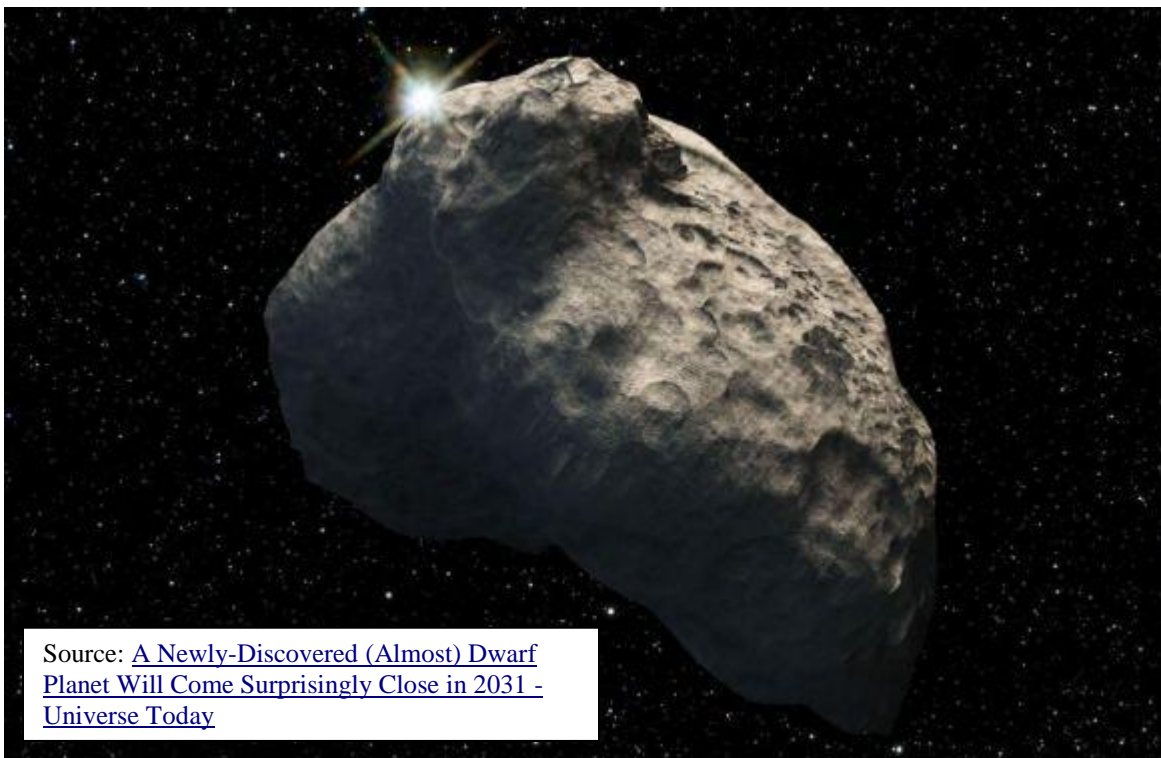
Betelgeuse, which is located roughly 724 light-years away in the constellation of Orion, is the second-closest red supergiant to Earth. From November 2019 to March 2020, this star [experienced](#) a historic dimming of its visible brightness. Usually having an apparent magnitude between 0.1 and 1, its visual brightness decreased to 1.6 magnitudes around 7-13 February 2020 — an event referred to as Betelgeuse's Great Dimming. [New research](#), published in the journal *Nature*, reveals that the star was partially concealed by a [cloud of dust](#), a discovery that solves the mystery of the Great Dimming event.



Betelgeuse's dip in brightness led an international team of astronomers to point ESO's Very Large Telescope (VLT) towards the star in 2019. Led by Dr. Miguel Montargès from the Observatoire de Paris and the KU Leuven's Institute of Astronomy, the team used the Spectro-Polarimetric High-contrast Exoplanet REsearch (SPHERE) instrument on VLT to directly image the stellar surface, alongside data from the GRAVITY instrument on ESO's Very Large Telescope Interferometer (VLTI), to monitor the star throughout the dimming. An image from December 2019, when compared to an earlier image taken in January of the same year, showed that the southern hemisphere of Betelgeuse was darker than usual in the visible spectrum. The astronomers continued observing the star, capturing two other images in January and March 2020. By April 2020, the star

had returned to its normal brightness. “For once, we were seeing the appearance of a star changing in real time on a scale of weeks,” Dr. Montargès said. “The images now published are the only ones we have that show Betelgeuse’s surface changing in brightness over time.” The researchers found that Betelgeuse’s Great Dimming was caused by a dusty veil shading the star, which in turn was the result of a drop in temperature on its surface. Betelgeuse’s surface regularly changes as giant bubbles of gas move, shrink and swell within the star. The scientists concluded that some time before the Great Dimming, the star ejected a large gas bubble that moved away from it. When a patch of the surface cooled down shortly after, that temperature decrease was enough for the gas to condense into solid dust. “We have directly witnessed the formation of stardust,” Dr. Montargès said. “The dust expelled from cool evolved stars, such as the ejection we’ve just witnessed, could go on to become the building blocks of terrestrial planets and life,” added Dr. Emily Cannon, an astronomer at the KU Leuven’s Institute of Astronomy. “Betelgeuse is a unique star. It is enormous and nearby and we are observing material directly leaving the surface of the supergiant,” said Dr. Andrea Dupree, an astronomer at the Harvard and Smithsonian’s Center for Astrophysics. “How and where material is ejected affects our understanding of the evolution of all stars!” Source: [Dust Cloud Caused Betelgeuse’s Great Dimming Event, Astronomers Say | Astronomy | Sci-News.com](#)

A Newly Discovered Dwarf Planet will come Surprisingly Close In 2031



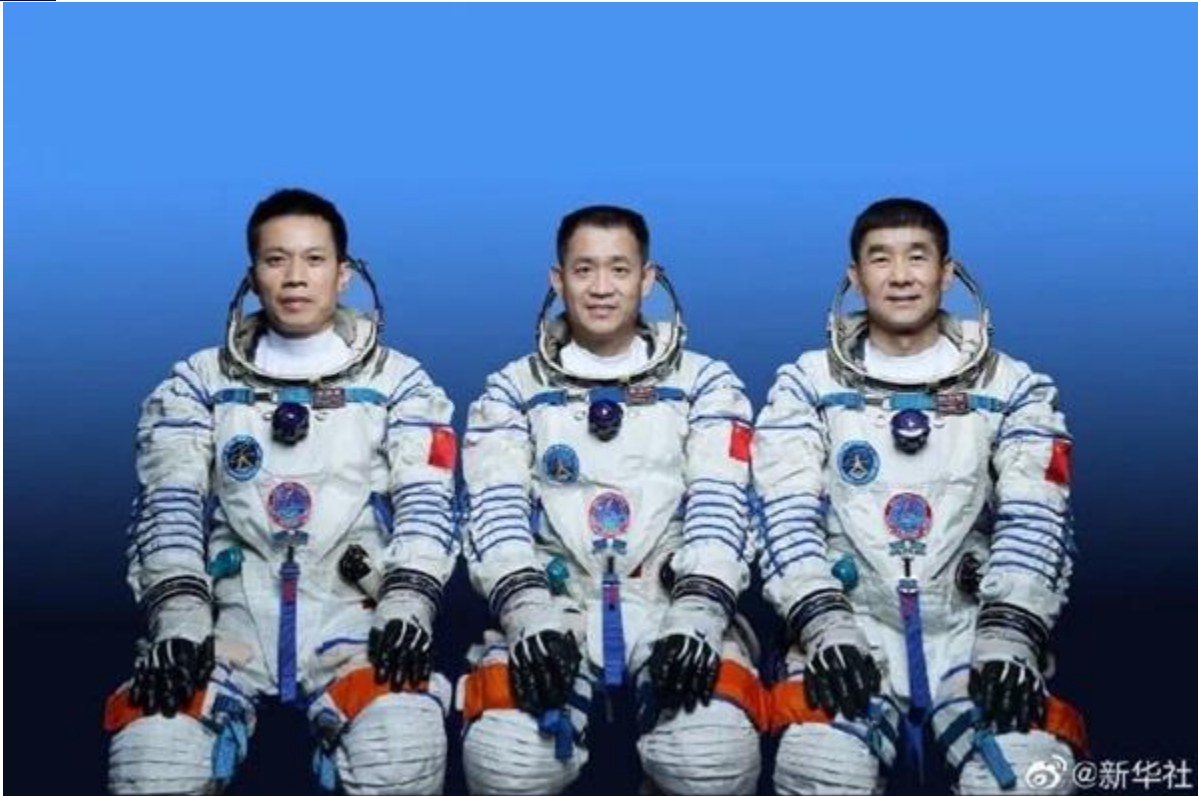
It’s good to remember how little we know about the outer solar system. Humans only really began observing it within the past 100 years, and given the constraints on that observations there are still plenty of things we don’t know about. For example, researchers recently found an object almost the size of a dwarf planet that is inbound to the inner solar system, with an estimated orbital period of over 2 million years, more than six the lifetime of the modern human species. The object, known as 2014 UN271 (Bernardinelli-Bernstein), was originally observed in 2014 but first noted on June 19th, 2021 by [Pedro Bernardelli and Gary Bernstein](#), and now has its own Wikipedia page. The data on the object was collected by the Dark Energy Survey over the course of 4 years, but now new observing platforms are being brought to bear on this novel object. With those additional observational platforms come additional insights. Right now, 2014 UN271 is expected to reach its perihelion just outside the orbit of Saturn before returning to the depths of the Oort cloud for another spin around the sun. Its size is estimated to be between 100 and 370 km wide, making it possibly the biggest Oort cloud object ever observed. Having already passed Neptune’s orbit, 2014 UN271 is well on its journey into the inner solar system. As it draws closer to the sun, astronomers expect it to get the coma and tail characteristic of comets, as its surface starts to evaporate in the heat. Unfortunately, it likely won’t be bright enough to present a spectacular display like other well known comets. But it will be closely observed now that its presence is more

widely known. There is already talk of potentially sending a mission to rendezvous with it when it reaches its perihelion point in 2031. Whatever resources are eventually brought to bear on it, its mere existence will serve as an important reminder of how little we know about what's out there.

China successfully launches astronauts to new space station

The Shenzhou-12 spacecraft soared into space, ferrying three Chinese astronauts, and docked to the fledgling Tiangong space station.

By [Caitlyn Buongiorno](#) | Published: Thursday, June 17, 2021. Source: [China successfully launches astronauts to new space station | Astronomy.com](#)



Earth is on the cusp of gaining another orbiting laboratory.

Early Thursday morning, Beijing time, the China National Space Administration launched three astronauts to rendezvous with the core module of a new space station. This is the third launch of 11 missions planned to China's space station — named Tiangong, meaning Heavenly Palace — before the end of next year.

The Shenzhou-12 spacecraft blasted off from the Jiuquan Satellite Launch Center in the Gobi Desert at 9:22 a.m. on June 17. Aboard the rocket were three astronauts: Nie Haisheng, Liu Boming, and Tang Hongbo. About six and a half hours later, at 3:54 p.m., Beijing time, they became the first Chinese astronauts — or taikonauts — to enter to enter the Tiangong space station via the Tianhe core model, which [launched at the end of April](#).

Who are the crew?

While none of the crew was aboard China's first manned space flight in 2003, Nie was a backup for the mission. He later joined the crews of two more Chinese missions: Shenzhou 6 in 2005 and Shenzhou 10 in 2013. At 56 years old, Nie is now the oldest taikonaut to venture to space.

Liu is also a veteran astronaut, having previously flown to space as part of the Shenzhou 7 mission in 2008. During that mission, another crew member performed China's first spacewalk, while Liu handed him a flag to wave for viewers — making Liu the second taikonaut to touch space. Today's flight is Tang's first trip to space. However, since being selected to China's astronaut program in 2010, he has been training for the opportunity.

Building history

Nie, Liu, and Tang will remain on board Tiangong for about three months to continue preparing the space station for full operations. Their work will mainly involve installing equipment and testing vital functions like waste management and life support. They are also scheduled to conduct two spacewalks. "This flight mission is the first manned mission to the space station under construction," Nie said at a press conference before the flight. "We are challenged of course," the astronaut said while reflecting on their ambitious list of tasks. "My colleagues, Liu Boming and Tang Hongbo, would certainly agree that we will work together to conquer those difficulties."

Tiangong is expected to operate for at least a decade. Once built, the station will serve a similar role as the International Space Station, becoming an advanced orbiting laboratory for both China and partner countries. Already, nine of the planned experiments have international partners signed on. However, whether or not foreign astronauts will also join future taikonauts on the station is yet to be determined. Considering China's successful crewed launch today and the [historic Zhurong Mars rover landing](#), the country's young space program is certainly living up to the ambitious plans it has set for itself.

Exoplanets in 2,034 star-systems get cosmic front-row seat to see Earth



Scientists at Cornell University and the American Museum of Natural History have identified 2,034 nearby star-systems -- within the small cosmic distance of 326 light-years -- that could find Earth merely by watching our pale blue dot cross our sun.

That's 1,715 star-systems that could have spotted Earth since human civilization blossomed about 5,000 years ago, and 319 more star-systems that will be added over the next 5,000 years.

Exoplanets around these nearby stars have a cosmic front-row seat to see if Earth holds life, the scientists said in research published June 23 in *Nature*.

"From the exoplanets' point-of-view, we are the aliens," said Lisa Kaltenegger, professor of astronomy and director of Cornell's Carl Sagan Institute, in the College of Arts and Sciences.

"We wanted to know which stars have the right vantage point to see Earth, as it blocks the Sun's light," she said. "And because stars move in our dynamic cosmos, this vantage point is gained and lost."

Kaltenegger and astrophysicist Jackie Faherty, a senior scientist at the American Museum of Natural History and co-author of "Past, Present and Future Stars That Can See Earth As A Transiting Exoplanet," used positions and motions from the European Space Agency's Gaia eDR3 catalog to determine which stars enter and exit the Earth Transit Zone -- and for how long.

"Gaia has provided us with a precise map of the Milky Way galaxy," Faherty said, "allowing us to look backward and forward in time, and to see where stars had been located and where they are going."

Of the 2,034 star-systems passing through the Earth Transit Zone over the 10,000-year period examined, 117 objects lie within about 100 light-years of the sun and 75 of these objects have been in the Earth Transit Zone since commercial radio stations on Earth began broadcasting into space about a century ago.

"Our solar neighborhood is a dynamic place where stars enter and exit that perfect vantage point to see Earth transit the Sun at a rapid pace," Faherty said.

Included in the catalog of 2,034 star-systems are seven known to host exoplanets. Each one of these worlds has had or will have an opportunity to detect Earth, just as Earth's scientists have found thousands of worlds orbiting other stars through the transit technique.

By watching distant exoplanets transit -- or cross -- their own sun, Earth's astronomers can interpret the atmospheres backlit by that sun. If exoplanets hold intelligent life, they can observe Earth backlit by the sun and see our atmosphere's chemical signatures of life.

The Ross 128 system, with a red dwarf host star located in the Virgo constellation, is about 11 light-years away and is the second-closest system with an Earth-size exoplanet (about 1.8 times the size of our planet). Any inhabitants of this exoworld could have seen Earth transit our own sun for 2,158 years, starting about 3,057 years ago; they lost their vantage point about 900 years ago.

The Trappist-1 system, at 45 light-years from Earth, hosts seven transiting Earth-size planets -- four of them in the temperate, habitable zone of that star. While we have discovered the exoplanets around Trappist-1, they won't be able to spot us until their motion takes them into the Earth Transit Zone in 1,642 years. Potential Trappist-1 system observers will remain in the cosmic Earth transit stadium seats for 2,371 years.

"Our analysis shows that even the closest stars generally spend more than 1,000 years at a vantage point where they can see Earth transit," Kaltenegger said. "If we assume the reverse to be true, that provides a healthy timeline for nominal civilizations to identify Earth as an interesting planet."

The James Webb Space telescope -- expected to launch later this year -- is set to take a detailed look at several transiting worlds to characterize their atmospheres and ultimately search for signs of life.

The Breakthrough Starshot initiative is an ambitious project underway that is looking to launch a nano-sized spacecraft toward the closest exoplanet detected around Proxima Centauri -- 4.2 light-years from us -- and fully characterize that world.

"One might imagine that worlds beyond Earth that have already detected us, are making the same plans for our planet and solar system," said Faherty. "This catalog is an intriguing thought experiment for which one of our neighbors might be able to find us." The Carl Sagan Institute, the Heising Simons Foundation and the Breakthrough Initiatives program supported this research. Source: [Exoplanets in 2,034 star-systems get cosmic front-row seat to see Earth -- ScienceDaily](#) 6/23/2021

NASA engineers are working to reboot the Hubble Space Telescope after an unexpected anomaly.



NASA's iconic Hubble Space Telescope has hit a spot of trouble, though the end is not yet nigh (we hope). After more than 30 groundbreaking years of discovery, the workhorse telescope [ran into difficulties](#) earlier this month when a computer shutdown forced the telescope into safe mode. Now, engineers are sorting through options and possible solutions. The current spate of troubles began on June 13th, when the telescope's main payload computer unexpectedly shutdown. The team suspected a degraded memory module as the culprit and planned to switch over to one of three other backup modules. However, several attempts to switch over on June 16th and 17th were not successful, and the telescope remains in safe mode. As with all space missions, Hubble's payload computer represents flight-proven and radiation-hardened tech available at the time of launch and repair. Hubble's original NASA Standard Spacecraft Computer-1 (NSSC-1) and its subsequent replacement are from the late 1980s, complete with four separate 64K Complementary Metal-Oxide Semiconductor (CMOS) memory modules. The system also has a complete backup payload computer for redundancy. The NSSC-1 is located in the [Science Instrument Command and Data Handling Unit \(SI C&DH\)](#), and both were replaced in May 2009 during the final repair mission of the space shuttle era. The original SI C&DH unit failed in 2008. To date, the backup unit has yet to be powered on since initial installation in 2009, though it was thoroughly tested on the ground prior to launch. "The backup payload computer was thoroughly tested on the ground prior to installation," says Claire Andreoli (NASA-Goddard). "If there is a problem with it, the same process to identify the source of the problem and a potential fix would be initiated." For now, the team is looking to see if the problem lies in the Standard Interface (STINT) software or the Central Processing Module (CPM) itself. The team is working on procedures for a possible switchover to the backup which, if necessary, will take several days of checkouts to attain operational status. "The team is currently designing tests that will be run in the next few days to attempt to further isolate the problem and identify a solution," says Andreoli. "If the problem can't be fixed, then the backup payload hardware will be turned on and it will take several days to assess the computer performance and restore normal science operations."

HUBBLE'S LEGACY

Launched on STS-31 space shuttle *Discovery* and released from the shuttle's payload bay on April 25, 1990, Hubble has been pushing back the boundaries of our understanding of the universe ever since.

But first, Hubble had to overcome defects in its optics discovered only after it was deployed, problems that were corrected during the first repair mission in December 1993. Since that time, Hubble has been on-hand to witness astronomical events near and far, from the impact of [Comet Shoemaker-Levy 9](#) into Jupiter in 1994, to the discovery of the moons Styx, Nix, Kerberos, and Hydra around Pluto, to finding distant supernovae in other galaxies. Astronomers used the telescope to assemble our deepest views of the primordial universe, the [Hubble Deep Fields](#). More recently, its [Frontier Fields](#) mosaics of giant galaxy clusters have provided astronomers with their best views of the largest, naturally occurring magnifying lenses. Hubble also captured the public's imagination with some of the most iconic images of our generation, such as the [Pillars of Creation](#) nestled in the Eagle Nebula (Messier 16). And although Hubble is best known for its work at visual wavelengths, its capabilities extend into the infrared and ultraviolet as well. The last repair mission in 2009 almost *didn't* happen. One of the requirements for shuttle missions after the 2003 *Columbia* disaster was for orbiters to reach the International Space Station; Hubble is in a different, higher orbit. As a solution, NASA had a second orbiter (*Endeavour*) on standby during the STS-125 repair mission, should a rescue be needed. The end of the shuttle program in 2011 also marked the end of on-hand repair capability for Hubble, as NASA no longer has the means to reach and repair the space telescope. Astronauts did, however, install deorbit capability on Hubble during [STS-125](#), for the day when the space telescope's mission finally comes to an end. At this point, the team would only consider ending recovery efforts for Hubble "When we have exhausted all of the redundancy options," says Andreoli. "But there are still so many we have not yet tried, and it is extremely likely that one of these will work." If Hubble gets back up and running, its operational life may overlap with the James Webb Space Telescope, set to launch in [November this year](#). Often touted as the "successor to Hubble," JWST will work at infrared wavelengths. Unlike Hubble, the Webb telescope is headed to the Lagrange (L2) point beyond the orbit of the Moon, putting it out of reach for repair. If you live between latitudes 30°N and 30°S, you can routinely spot Hubble at dawn or dusk. When we lived in central Florida, Hubble was a familiar sight. Be sure to check [Heavens-Above](#) for passes. With any luck, Hubble will soon be open for business once again.

Source: [Hubble Trouble: NASA Works to Fix Space Telescope - Sky & Telescope - Sky & Telescope \(skyandtelescope.org\)](#)

JULY EVENTS:

1. The next club meeting July 5th. We will be having our meeting in the Maturango Museum. The time will be 7:30 PM. Current Covid requirements will be enforced. You can also join us on zoom.

Join Zoom Meeting

<https://us02web.zoom.us/j/83383244748?pwd=bHI2UVRHbG1tbUp1c3UwN0ZEMWILZz09>

JULY CELESTIAL CALENDAR:

1. Jupiter and Saturn move to the evening sky this month. Saturn rises in the east soon after midnight and Jupiter rises soon after. By the end of the month they will be close together in Capricornus.
2. Mars can be seen in the west soon after sunset but will become dimmer as the month progresses due to its declining altitude.
3. Venus remains in the evening sky look for it in the west soon after sunset.
4. Mercury remains in the morning sky this month where it reaches its brightest on the 12th. Look for it in the east before it fades into the sun by the end of the month.
5. The Delta Aquariid meteor shower peaks on July 30. The radiant point will be near Jupiter and Saturn.

INFORMATION:

Please visit us at our website ChinaLakeAstro.org.

For more information, contact the China Lake Astronomical Society at 760-446-0454 or 760-384-8666.

Roger Brower

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Basic CLAS dues are \$25.00 per year - due in January. [Students and Skywatchers Newsletter](#) are **FREE**.

Members also receive discounted rates for Astronomy Magazine and /or Sky and Telescope Magazine.

The fee schedule is as follows: Verify current magazine prices with Roger!

Basic membership \$25.00 per year.

Membership with Astronomy magazine is \$59.00 per year.

Membership with Sky and Telescope magazine is \$58.00 per year.

Membership with both S & T and Astronomy is \$92.00 per year.

Send your Check or Money Order to:

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Meetings of the China Lake Astronomical Society are held at the Maturango Museum at 7:30 p.m. on the first Monday evening of each month, except when the first Monday is a holiday.

WESTERN AMATEUR ASTRONOMERS WEB SITE <http://www.waa.av.org/>
New! CHINA LAKE ASTRONOMICAL SOCIETY WEB SITE <http://chinalakeastro.org/>