

Skywatchers

Newsletter of the China Lake Astronomical Society

Volume 57 No. 10

October 03, 2020

NEXT MEETING 7:30 p.m., Monday, October 05, 2020
~~Maturango Museum, 100 East Las Flores Avenue, Ridgecrest, California.~~

PROGRAM FOR THE October 05, 2020 7:30 PM MEETING

Professor Scott Cameron of Cerro Coso College will be discussing the Starlink constellation of satellites, which SpaceX is constructing to deliver global broadband internet coverage. The constellation will consist of thousands of mass-produced small satellites in low earth orbit (LEO), working in combination with ground transceivers SpaceX also plans to sell some of the satellites for military, scientific, or exploratory purposes.

Time: Oct 05, 2020 07:30 PM Pacific Time

Join Zoom Meeting

<https://us02web.zoom.us/j/6727499334?pwd=VWhuVGZ3aFphL283THRKNUNoZ0RSZz09>

Meeting ID: 672 749 9334

Passcode: 9V8FQM

One tap mobile

+14086380968,,6727499334#,,,,,0#,,562029# US (San Jose)

+16699006833,,6727499334#,,,,,0#,,562029# US (San Jose)

Dial by your location

+1 408 638 0968 US (San Jose)

+1 669 900 6833 US (San Jose)

+1 253 215 8782 US (Tacoma)

+1 346 248 7799 US (Houston)

+1 301 715 8592 US (Germantown)

+1 312 626 6799 US (Chicago)

+1 646 876 9923 US (New York)

Meeting ID: 672 749 9334

Passcode: 562029

Find your local number: <https://us02web.zoom.us/j/keA8HEm1mp>

STAR PARTY SCHEDULE FOR THE 2020 SEASON:

Star Parties will be held on the dates listed below. Star Parties are an activity where members and guests come together to view the skies. If you have a telescope, bring it; if not, come and look through someone else's. They are held at a site in the open desert south of Ridgecrest. To reach the site from Ridgecrest, go south on China Lake Boulevard 6.5 miles from its intersection with Ridgecrest Boulevard. Continue straight across Highway 395 and you will be on Brown Road (Old Highway 395). Follow Brown Road as it curves to the right and goes west. After 2.3 miles, there will be a 30-inch orange cone on the left. Turn left and follow the dirt road marked by 12-inch cones. The CLAS star party is south 0.5 mile along this road. Signs and cones will be put out about a half hour before viewing starts. All viewing is weather dependent.

Call Roger Brower 760-446-0454, 760-677-1143 or Keith Weisz 760-375-9114, for more information.

The star parties for the rest of 2020 have been cancelled due to the need to share equipment. Star parties for the future have also been cancelled until further notice.

Fri,	Sept 18th	Signs out at 7:00 p.m., Star viewing at 7:30 p.m. (New Moon + 1 Day) (TBA)
Sat,	Sept 19th	Red Rock Canyon Visitors Center, Star viewing at Sundown (TBA)
Sat,	Oct 10th	Red Rock Canyon Visitors Center, Star viewing at Sundown (TBA)
Fri,	Oct 16th	Signs out at 6:30 p.m., Star viewing at 7:00 p.m. (New Moon) (TBA)
Sat,	Oct 17th	Red Rock Canyon Visitors Center, Star viewing at Sundown (TBA)
Sat,	Nov 07th	Red Rock Canyon Visitors Center, Star viewing at Sundown (TBA)
Fri,	Nov 13th	Signs out at 6:00 p.m., Star viewing at 6:30 p.m. (New Moon - 2 days) (TBA)
Sat,	Nov 14th	Red Rock Canyon Visitors Center, Star viewing at Sundown (TBA)

Next CLAS Meeting: October 5th, 2020 at 7:30 PM.



MOUNT WILSON, Calif. (KABC) -- The firefighters that battled for days to save the famed Mount Wilson Observatory from the raging Bobcat Fire were treated to a view of the stars over the weekend.

The observatory hosted the crew from the Ventura County Fire Department at its large telescope, bestowing them breathtaking views of our solar system.

Those at the observatory said it was just a small way to thank firefighters for their valiant efforts in repeatedly defending the historic site from the flames.

Firefighters [described the work they did](#) and said backfires were set while taking advantage of reduced winds, lower temperatures and higher humidity to carve out a containment line after flames came within 500 feet of the landmark.

Mount Wilson Observatory played a key role in advancing 20th century astrophysics since it was founded in

1904. Mount Wilson is also home to an estimated \$1 billion worth of transmission towers, a key site for TV, radio and government agencies. [Source: KABC News](#)

Salty lakes found beneath Mars' surface

New research adds fresh evidence for salty lakes below the Red Planet's south pole

By [Mark Zastrow](#) | Published: Monday, September 28, 2020



The potential underground salt lake reported by the Mars Express spacecraft in 2018 is located near the planet's permanent south polar ice cap.

USGS Astrogeology Science Center, Arizona State University, INAF

Looking salty

In 2018, [an Italian team of researchers announced evidence](#) of salt water beneath the southern polar cap of Mars: the radar sounder of the ESA Mars Express orbiter had detected unusually bright, reflective patches below the ice. This, the researchers argued, could be a lake of liquid water 12 miles (20 kilometers) across that melted from the ice cap and was trapped beneath it, over a kilometer beneath the surface. On Earth, similar lakes form beneath glaciers, where heat from the ground and the pressure of the glacier above melt some of its ice. And although Mars is too cold for pure water to remain in liquid form below its glaciers, it could do so if it were extremely salty with a much lower freezing point, the team says. This briny mixture might be filled with salts called perchlorates, dissolved from rocks. But it wasn't a slam-dunk case. Mars is not very geologically active, and it's not clear whether the planet's interior can supply the amount of heat to create a lake of that size. Now, the team is back with a new study, published September 28 in [Nature Astronomy](#), that they say bolsters their argument.

Two years ago, planetary scientists were abuzz with the potential discovery of a subsurface lake on Mars — buried deep beneath layers of ice and dust at the planet's south pole. Now, new research adds more weight to that possibility, suggesting there is not just one but several briny lakes. These aquifers would represent the first known martian bodies of liquid water — albeit extremely salty water. Taken with other recent discoveries — such as lakes beneath the surface of the [dwarf planet Ceres](#) — it is part of a growing picture that liquid water is more widespread in the solar system than previously thought. The team returned to data from the Mars Express radar sounder, called MARSIS (Mars Advanced Radar for Subsurface and Ionospheric Sounding). This time they analyzed a dataset of 134 radar profiles, compared to 29 in their previous study. They also brought a new approach, adapting radar

techniques used by satellites orbiting Earth to image buried geological features. Their analysis looks not just at how bright an area is but other metrics as well, such as how the signal strength varies, indicating how smooth the reflecting surface is. Previously, this method has found subglacial lakes in Antarctica, Greenland, and the Canadian Arctic. By running their analysis on sounding data collected by the spacecraft over the previously-identified bright area and comparing it to surrounding regions, the team could see major differences in their characteristics that suggested the presence of liquid water, strengthening the evidence that the original bright patch is indeed a salty lake. In addition, they spotted other, smaller areas that met their detection criteria for liquid water — or came close, suggesting they're ponds or mucky sediments.

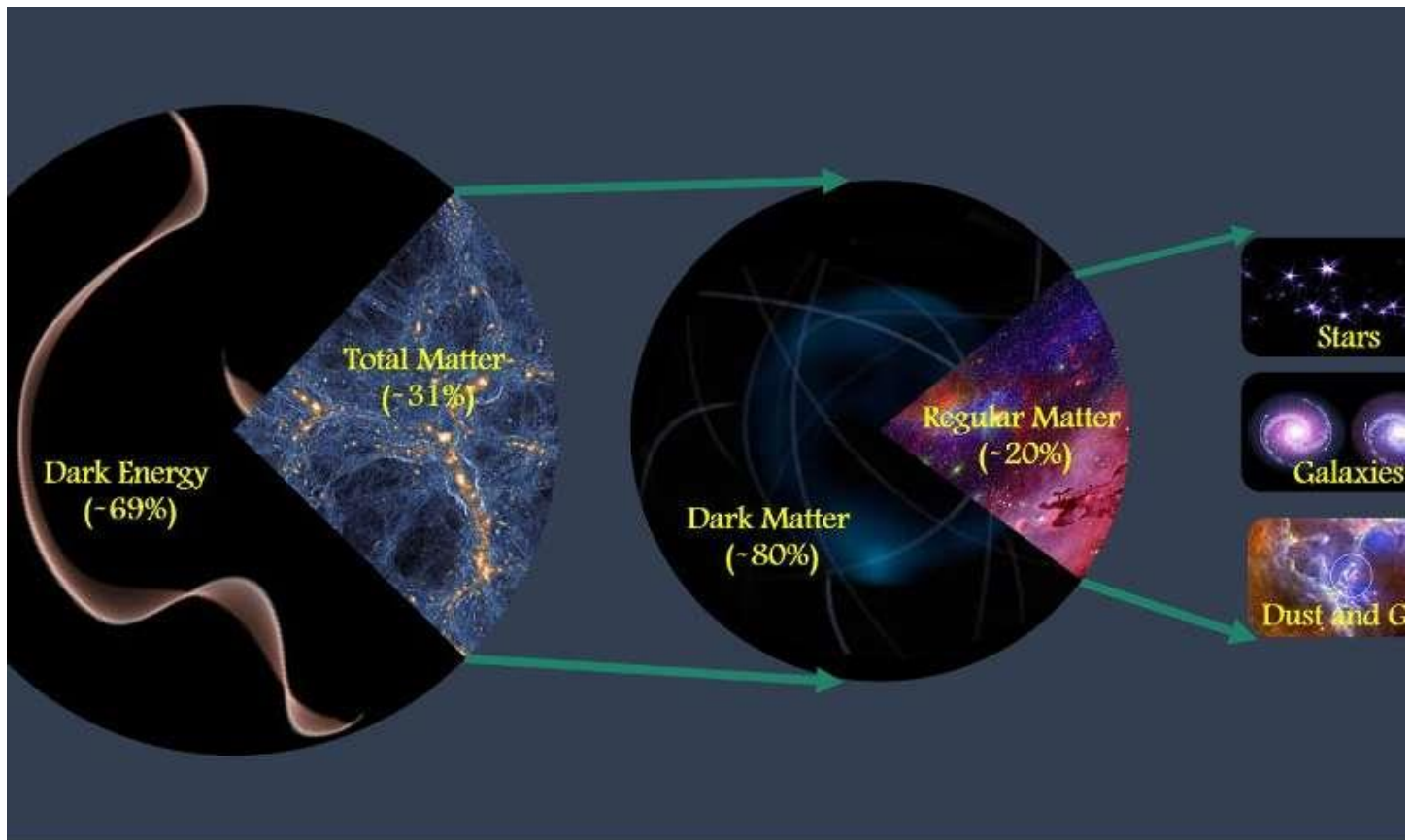
Life below Mars?

The prospect of these underground, salty lakes also add an intriguing wrinkle to the debate about whether life could exist on Mars today. The extreme salt content doesn't sound hospitable for life, but [some researchers think it could be possible](#). A recent paper by a pair of researchers at Harvard University and the Florida Institute of Technology (FIT) also addressed the possibility of life in underground environments on Mars and even the Moon. "Extremophilic organisms are capable of growth and reproduction at low subzero temperatures," said Harvard's Avi Loeb, one of the study authors, in a [press release](#). "They are found in places that are permanently cold on Earth, such as the polar regions and the deep sea, and might also exist on the Moon or Mars. "In their paper, published September 20 in [The Astrophysical Journal Letters](#) they calculate that even without the addition of salt, liquid water is possible on Mars several miles deep. And although any life at those depths would be subjected to crushing pressures from the rock above, some [known single-celled organisms](#) can survive them. One thing is certain: actually searching for such life will require drilling technology far beyond what we are capable of sending into space at the moment. But, write Loeb and his coauthor Manasvi Lingam of FIT, NASA's Artemis program could pave the way for such subsurface exploration by returning humans to the moon — beginning as soon as 2024. Source: <https://astronomy.com/news/2020/09/salty-lakes-found-beneath-mars-surface>

SEPTEMBER 28, 2020

Scientists precisely measure total amount of matter in the universe

by Iqbal Pittalwala, [University of California - Riverside](#)



The team determined that matter makes up about 31% of the total amount of matter and energy in the universe. Cosmologists believe about 20% of the total matter is made of regular -- or "baryonic" matter -- which includes stars, galaxies, atoms, and life, while about 80% is made of dark matter, whose mysterious nature is not yet known but may consist of some as-yet-undiscovered subatomic particle. Credit: Mohamed Abdullah, UC Riverside.

A top goal in cosmology is to precisely measure the total amount of matter in the universe, a daunting exercise for even the most mathematically proficient. A team led by scientists at the University of California, Riverside, has now done just that. Reporting in the *Astrophysical Journal*, the team determined that matter makes up 31% of the total amount of matter and energy in the universe, with the remainder consisting of dark energy. "To put that amount of matter in context, if all the matter in the universe were spread out evenly across space, it would correspond to an average mass density equal to only about six hydrogen atoms per cubic meter," said first author Mohamed Abdullah, a graduate student in the UCR Department of Physics and Astronomy. "However, since we know 80% of matter is actually dark matter, in reality, most of this matter consists not of hydrogen atoms but rather of a type of matter which cosmologists don't yet understand."

Abdullah explained that one well-proven technique for determining the total amount of matter in the universe is to compare the observed number and mass of galaxy clusters per unit volume with predictions from numerical simulations. Because present-day galaxy clusters have formed from matter that has collapsed over billions of years under its own gravity, the number of clusters observed at the present time is very sensitive to cosmological conditions and, in particular, the total amount of matter. Like Goldilocks, the team compared the number of galaxy clusters they measured with predictions from numerical simulations to determine which answer was "just right." Credit: Mohamed Abdullah, UC Riverside. "A higher percentage of matter would result in more clusters," Abdullah said. "The 'Goldilocks' challenge for our team was to measure the number of clusters and then determine which answer was 'just right.' But it is difficult to measure the mass of any galaxy cluster accurately because most of the matter is dark so we can't see it with telescopes." To overcome this difficulty, the UCR-led team of astronomers first developed "GalWeight", a cosmological tool to measure the mass of a galaxy cluster using the orbits of its member galaxies. The researchers then applied their tool to observations from the Sloan Digital Sky Survey (SDSS) to create "GalWCat19," a publicly available catalog of galaxy clusters. Finally, they compared the number of clusters in their new catalog with simulations to determine the total amount of matter in the universe. "We have succeeded in making one of the most precise measurements ever made using the galaxy cluster technique," said coauthor Gillian Wilson, a professor of physics and astronomy at UCR in whose lab Abdullah works. "Moreover, this is the first use of the galaxy orbit technique which has obtained a value in agreement with those obtained by teams who used noncluster techniques such as cosmic microwave background anisotropies, baryon acoustic oscillations, Type Ia supernovae, or gravitational lensing." "A huge advantage of using our GalWeight galaxy orbit technique was that our team was able to determine a mass for each cluster individually rather than rely on more indirect, statistical methods," said the third coauthor Anatoly Klypin, an expert in numerical simulations and cosmology. By combining their measurement with those from the other teams that used different techniques, the UCR-led team was able to determine a best combined value, concluding that matter makes up $31.5 \pm 1.3\%$ of the total amount of matter and energy in the universe. The research paper is titled "Cosmological Constraints on Ω_m and σ_8 from Cluster Abundances using the GalWCat19 Optical-spectroscopic SDSS Catalog. Source:

<https://phys.org/news/2020-09-scientists-precisely-total-amount-universe.html>

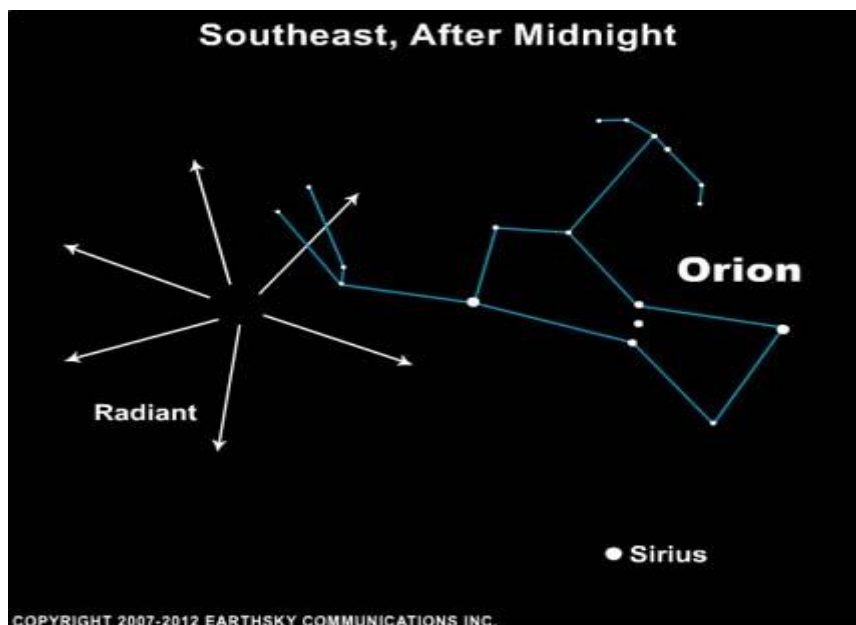
The Orionid Meteor Shower for October 20-21, 2020





Joe Randall created this composite shot of 2014's Orionid meteor shower.

This year the Orionid Meteor Shower radiant rises at 10:36 pm in the N.E. on the night of October 20-21st some 5 days after the New Moon. Its Zenith Hourly rate is about 20 and its members should be easily seen in a dark sky location. Orionid meteors fly each year between about October 2 to November 7. That's when Earth is passing through the stream of debris left behind by [Comet Halley](#), the parent comet of the Orionid shower. The Orionids usually put out the greatest number of meteors in the few hours before dawn, and the expected peak morning is October 21. Best yet, the waxing crescent moon will set at early-to-mid-evening, providing dark skies for the 2020 Orionid meteor shower. The term *meteor shower* might give you the idea of a rain shower. But few meteor showers resemble showers of rain. The Orionids aren't the year's strongest shower, and they're not particularly known for storming (producing unexpected, very rich displays). From a [dark location](#), in a year when the moon is out of the way, you might see 10 to 20 Orionids per hour at their peak. Will you see that many in 2020? Well ... maybe. There's always the element of uncertainty and possible surprise when it comes to meteor showers. If you do see any Orionids in 2020, note that they're known to be extremely fast meteors, plummeting into the Earth's atmosphere at about 66 kilometers – 41 miles – per second. The meteors in this shower are on the faint side. But they make up for that; maybe half of the Orionid meteors leave *persistent trains*, or ionized gas trails that last for a few seconds after the meteor itself has gone. , sometimes, an Orionid meteor can be exceptionally bright and break up into fragments. Again, the peak morning is likely October 21. Do start watching in the days ahead of the peak, though. You might catch an Orionid meteor or two before dawn over the coming days. How will you know it's an Orionid? You'll know because it'll come from the shower's radiant point. See the chart below.



Orionid meteors radiate from constellation Orion. Meteors in annual showers are named for the point in our sky from which they appear to radiate. The radiant point for the Orionids is in the direction of the famous constellation Orion the Hunter, which you'll find ascending in the east in the hours after midnight. Hence the name Orionids. You don't need to know Orion, or be staring toward it, to see the meteors. The meteors often don't become visible until they are 30 degrees or so from their radiant point. And, remember, they are streaking out from the radiant in all directions. They will appear in all parts of the sky. However, if you do see a meteor – and trace its path backward – you might see that it comes from the Club of Orion. And, if so, that meteor will be an Orionid. You might know Orion's bright, ruddy star Betelgeuse. The radiant is north of Betelgeuse. So ... in which direction do you look? No particular direction. It's best to find a wide-open viewing area. Sometimes friends like to watch together, facing different directions. When somebody sees one, that person can call out *meteor!* **Orionid meteors stem from Comet Halley.** Meteors are fancifully called *shooting stars*. Of course, they aren't really stars. They're debris left behind by comets, burning up in the Earth's atmosphere. The Orionid meteors are debris left behind by Comet Halley, arguably the most famous of all comets, which last visited Earth in 1986. This comet leaves debris in its wake that strikes Earth's atmosphere most fully around October 20-22, while Earth intersects the comet's orbit, as it does every year at this time. Particles shed by the comet slam into our upper atmosphere, where they vaporize at some 60 miles (100 km) above Earth's surface. Even one meteor can be a thrill. But you might want to observe for an hour or more, and in that case the trick is to find a place to observe [in the country](#). Bring along a blanket or lawn chair and lie back comfortably while gazing upward. Source: <https://earthsky.org/?p=27937>

A Galaxy has been Found That's as Bright as a Quasar... But it's Not a Quasar

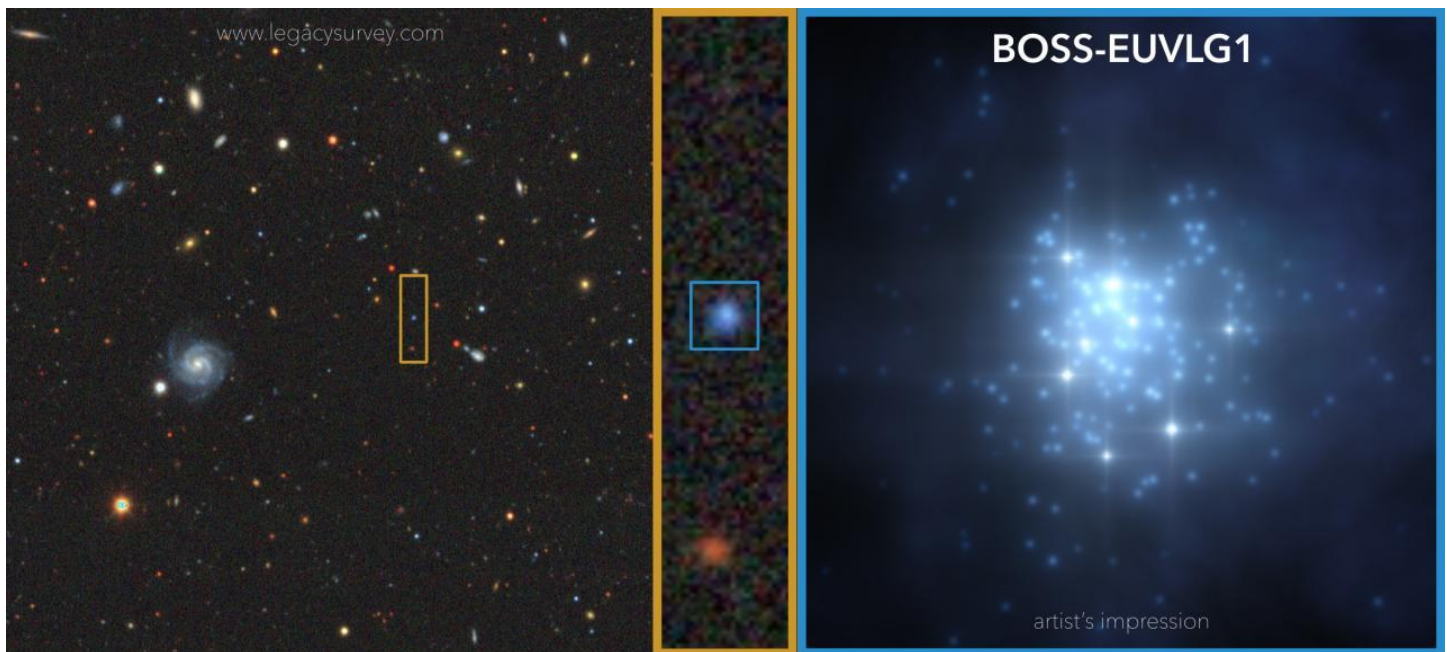


Image of the region of the sky containing BOSS-EUVLG1 and artist's drawing of the burst of star formation in BOSS-EUVLG1. Credit: DESI Legacy Imaging Surveys/Gabriel Pérez Díaz, SMM (IAC).

Astronomers have found a new type of galaxy that is very old, very distant and very bright in ultraviolet light. This is somewhat an unusual combination, and so when this bright galaxy was first detected, the team of researchers who found it first thought it was a quasar. But detailed study revealed it was actually a galaxy with some other unusual features, which contributes to its brightness: it is busy with star formation, it has almost no dust. As of now, this galaxy – with the license plate-type name of BOSS-EUVLG1 – appears to be the only one of its kind. “BOSS-EUVLG1 seems to be dominated by a burst of formation of young, very massive stars, with hardly any dust, and with a very low metallicity,” said Rui Marques Chaves, a researcher at the Center for

Astrobiology (CAB) in Madrid, Spain, lead author on an article published in the journal Monthly Notices of the Royal Astronomical Society Letters.

BOSS-EUVLG1 was discovered during analysis of half a million galaxies and quasars in the BOSS project of the Sloan Digital Sky Survey (SDSS). The Baryon Oscillation Spectroscopic Survey (BOSS) was designed to measure the expansion rate of the Universe, and it's been mapping the spatial distribution of luminous red galaxies (LRGs) and quasars. The team used a variety of telescopes to study BOSS-EUVLG1: the Gran Telescopio Canarias (GTC), at the Roque de los Muchachos Observatory, (Garafía, La Palma, Canary Islands), and with the ATACAMA Large Millimetre/submillimetre Array (ALMA), in Chile.

BOSS-EUVLG1, has a red-shift of 2.47, which means that we are seeing it when the universe was about 2 thousand million years old, or around 20% of its present age. The red-shift is a measure of the reddening of the light coming from the galaxy, and can be used to find its distance: the further away the galaxy, the greater the value.

The team said that the large values of redshift and luminosity of BOSS-EUVLG1 caused it to be originally classified as a quasar. High luminosity in quasars is due to the activity around the supermassive black holes in their nuclei. However, from the observations made with the OSIRIS and EMIR instruments on the GTC, and with the millimeter wave telescope ALMA, the researchers have shown that it is not a quasar but in fact a galaxy with "extreme, exceptional properties." The team's study revealed that the high luminosity of BOSS-EUVLG1 is due to the large number of young, massive stars in the galaxy. The rate of star formation in this galaxy is very high, around a thousand solar masses per year, around a thousand times higher than that in the Milky Way, although BOSS-EUVLG1 is 30 times smaller. "This rate of star formation is comparable only to the most luminous infrared galaxies known, but the absence of dust in BOSS-EUVLG1 allows its ultraviolet and visible emission to reach us with hardly any attenuation," said Ismael Pérez Fournon, an IAC researcher and a co-author of the article. The team said their research suggests that BOSS-EUVLG1 is an example of the initial phases of the formation of massive galaxies. In spite of its high luminosity and star formation rate, its low metallicity shows that the galaxy has hardly had time to enrich its interstellar medium with dust and newly formed metals. But the team wrote that eventually the galaxy will evolve towards a dustier phase, and its high luminosity in the UV will last only a few hundred million years, a very short period in the evolution of a galaxy. "This would explain why other galaxies similar to BOSS-EUVLG1 have not been discovered," said Claudio Dalla Vecchia, a researcher at the IAC, and another co-author. Source: <https://www.universetoday.com/148106>

ASTRONOMY COLUMN

OCTOBER CELESTIAL CALENDAR:

1. Venus rises in the east about 3 hours before sunrise all month.
2. Mercury moves to the evening sky this month where it can be seen in the west the last few days of the month.
3. Jupiter and Saturn are in the evening sky all month where they can be seen close together in the south after the sun sets.
4. Mars reaches opposition on the 13th so it can be seen all night moving from the east to west.
5. The Orionid meteor shower peaks on the 21st.
6. There will be a blue moon (a second full moon in a month) on the 31st.

October 1	Full Moon
	Mercury Greatest Eastern Elongation E 26°
October 3	Venus 0.09° S of Regulus
	Mars 0.7° North of Moon. Occultation
October 4	Uranus 4° North of Moon
October 6	Mars at closest approach
October 8	Draconid Meteors peak
	Moon 0.02° South of M 35
October 10	Last Quarter Moon
October 13	Mars at Opposition
October 14	Zodiacal Light visible in North Latitude in the east before morning twilight
	For the next 2 weeks
	Venus 4° South of the Moon
October 16	New Moon
October 17	Moon at Perigee (Large Tides)
	Double Shadow Transit on Jupiter
October 21	Orionid Meteors Peak
October 22	Jupiter 2° North of the Moon
October 23	Moon at First Quarter
	Saturn 3° North of the Moon
October 31	Venus at Perihelion
	Uranus 3° North of the Moon
	Full Moon
	Uranus at Opposition

Roger Brower

2020 ROYAL ASTRONOMICAL SOCIETY HANDBOOKS AND CALENDARS

The group rate price for a single copy if you buy **in person** from CLAS is \$27.00 for the handbook and \$10.00 for the calendar. Calendar and Handbook are sold together for the combined price of \$35.00. **Available NOW.**

MEMBERSHIP INFORMATION

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:

Roger Brower, Treasurer, China Lake Astronomical Society, P.O. Box 1783, Ridgecrest, CA 93556.

PRESIDENT – Ralph Paonessa – 760-384-8666 (email rp15@rpphoto.com)

VICE-PRESIDENT – Keith Weisz – 760-375-9114 (email kerniew@gmail.com)

SECRETARY – Ted Hodgkinson - 661-754-0561 (email ghodkinson@sbcglobal.net)

TREASURER – Roger Brower - 760-446-0454 (email brower@iwvisp.com)

NEWSLETTER EDITOR – Ted Hodgkinson – 661-754-0561 (email ghodkinson@sbcglobal.net)

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/>