Skywatchers

Newsletter of the China Lake Astronomical Society

Volume 57 No. 07 July 05, 2020

NEXT MEETING 7:30 p.m., Monday, July 6th, 2020 - Cancelled
Maturango Museum, 100 East Las Flores Avenue, Ridgecrest, California.

PROGRAM FOR THE July 6th, 2020 7:30 PM MEETING - Cancelled

A Message from the President

Hello China Lake Astronomical Society Members

It's July and I was hoping we could hold a CLAS meeting soon. But my reading of the COVID-19 situation is that we probably shouldn't do that yet. The state is needing to dial back or reverse some openings because cases are surging again. So I think we can't hold a public CLAS meeting in July. I'm starting to think about ways we could use the Internet for virtual meetings, or record a presentation an put it on YouTube, webcast a remote viewing session, make more use of the CLAS website, etc.

Your thoughts are welcome, as we decide what to do.

Ralph

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.

Included are the Star Party times and locations for the rest of the year despite at this time we have no plans yet to have them. Hopefully that will change in the future.

Fri,	Aug 21st	Signs out at 8:00 p.m., Star viewing at 8:30 p.m. (New Moon +2 days) **(TBA)**
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)**

All Star Parties at the Brown Road site and Red Rock Campground are postponed until further notification..

Next CLAS Meeting: Aug 3rd, 2020 at 7:30 PM. If conditions change for the better you will be notified if a meeting and program will be presented.

Most massive black hole yet discovered redefines 'gargantuan'

An artist's impression of a supermassive black hole surrounded by a vast disc of gas and dust. Image: NASA/JPL-Caltech

Astronomers have found one of the most massive black holes yet discovered, one that is gargantuan by even astronomical standards. Known as J2157, the enormous black hole weighs in at 34 billion times the mass of the Sun and is consuming the mass of a normal star on a daily basis.

"The black hole's mass is also about 8,000 times bigger than the black hole in the centre of the Milky Way," said Christopher Onken, a researcher at The Australian National University. "If the Milky Way's black hole wanted to grow that fat, it would have to swallow two thirds of all the stars in our galaxy."

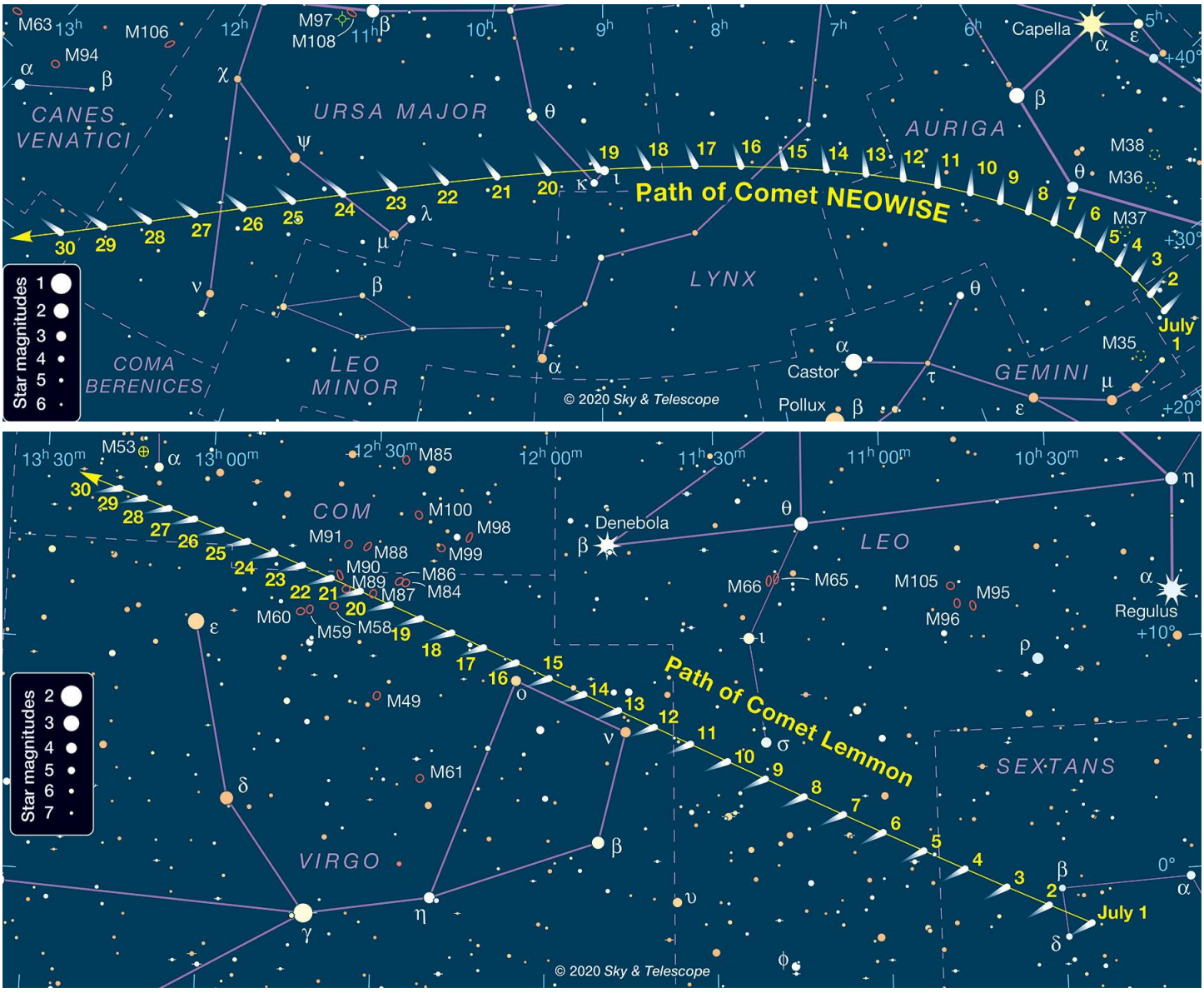
The black hole was discovered by Onken and his colleagues in 2018. The observations indicate it dates back to about 1.2 billion years after the Big Bang and is the most massive yet "weighed" from this era of cosmic evolution.

The ANU team and researchers from the University of Arizona used the European Southern Observatory's Very Large Telescope to measure the black hole's mass.

"With such an enormous black hole, we're also excited to see what we can learn about the galaxy in which it's growing," Onken said. "Is this galaxy one of the behemoths of the early Universe, or did the black hole just swallow up an extraordinary amount of its surroundings? We'll have to keep digging to figure that out."

Source: https://astronomynow.com/2020/07/01/most-massive-black-hole-yet-discovered-redefines-gargantuan/

Two comets spark excitement for the coming week — NEOWISE might reach naked-eye visibility at dawn, while Lemmon will be visible in binoculars at dusk.



Dare we hope? Expectations were high for comets ATLAS (C/2019 Y4) and SWAN (C/2020 F8) last season but both ultimately fizzled. Will Comet NEOWISE (C/2020 F3) finally take us to the naked-eye finish line?Comet NEOWISE has a close brush with the Sun on July 3rd when it reaches perihelion at a distance of 44 million kilometers, some 14 million km closer on average than the planet Mercury. If it survives the solar onslaught skywatchers in the Northern Hemisphere could see it peep over the northeastern horizon at dawn glowing at first magnitude. Its unusual name comes from NASA's Near-Earth Object Wide-field Infrared Survey Explorer (NEOWISE), which discovered the comet back in March.

By now we all know that comet magnitude predictions should be taken with a proverbial grain of cometary ice. But there's cause for optimism: When last photographed in the field of SOHO's C3 coronagraph NEOWISE appeared intact and was still climbing in brightness, both great signs. The most recent ephemeris from the

Central Bureau for Astronomical Telegrams, dated June 27th, includes a cautious peak magnitude estimate of **+0.6 on July 5th**, followed by **+0.8 on July 7th**, the expected date of the comet's first appearance at dawn. During its debut week NEOWISE will hug the northeastern horizon. From the southern states it will stand only about 2°–3° high at the start of morning twilight. The central and northern U.S. fair better with altitudes between 3° and 7°. The situation improves considerably once the comet emerges in the evening sky at mid-month. If NEOWISE stood high in a dark sky at 1st magnitude it would be incredibly obvious even from the suburbs. But while shining at its brightest it hovers near the horizon through mid-July, so it will appear about two magnitudes fainter than the published estimates. Denser, dustier air near the horizon both scatters and absorbs light from celestial objects compared to overhead views, where we look through much less atmosphere.Assuming NEOWISE will look about 3rd magnitude I encourage you to bring along a pair of binoculars or a small, wide-field telescope for a satisfying view. Comet heads can be bright while tails are often faint and wispy, making them difficult to see with the naked eye. I can't tell you how many times my 10×50 binoculars have revealed a beautiful feathery appendage that my unaided eye struggled to see. Based on the SOHO images, NEOWISE should be wagging a tail pointing upward from the northern horizon. **SPLENDID EVENING APPEARANCE**

A Bright moonlight will compromise the dawn view until about July 11th, which happens to be the same time that NEOWISE emerges into the evening sky. There, it quickly gains altitude while zipping across Ursa Major under moonless skies. Although the comet fades to magnitude 2 by mid-month and magnitude 3 by month's end, its increasing elevation will help offset its diminishing light, making the latter half of July the prime time to enjoy the comet. For the best views of NEOWISE at both dawn and dusk find a location with a wide-open northern horizon such as a lake or field. More happy news: The comet's dawn and dusk appearances coincide with the best time for noctilucent cloud watching. Keep a lookout.(**Special note!** Carl Hergenrother, ALPO Comet Section coordinator, managed to spot the comet in 30 x 125 binoculars shortly before sunrise in a rapidly brightening sky on July 1 around 11:45 UT from Arizona. He described it as "easy" in the large instrument and "difficult but visible" in a pair of 10x50s. NEOWISE was just 3.6° high at the time with a magnitude of ~1.0.)

LEMMON JOINS THE SCENE

If you're like me and burn the candle at both ends, be sure to set aside time in the evening for the arrival of Comet Lemmon (C/2019 U6). After a splendid run in the Southern Hemisphere, where it maxed out at 6th magnitude, it's now on its way north. Although the comet has dimmed to magnitude 7, it still sports a gorgeous tail and should be a lovely sight in binoculars and telescopes from a dark sky. Lemmon makes its initial appearance low in the western sky around July 4th in Sextans and gradually ascends, crossing the rich Virgo Cluster of galaxies at mid-month before reaching Coma Berenices at month's end. The comet passed perihelion on June 18 and swung closest to Earth at 124 million km on June 29th. Like NEOWISE, it will slowly fade, dimming by about 1.5 magnitudes during July.

Source: https://skyandtelescope.org/astronomy-news/anticipation-grows-for-comets-neowise-and-lemmon/

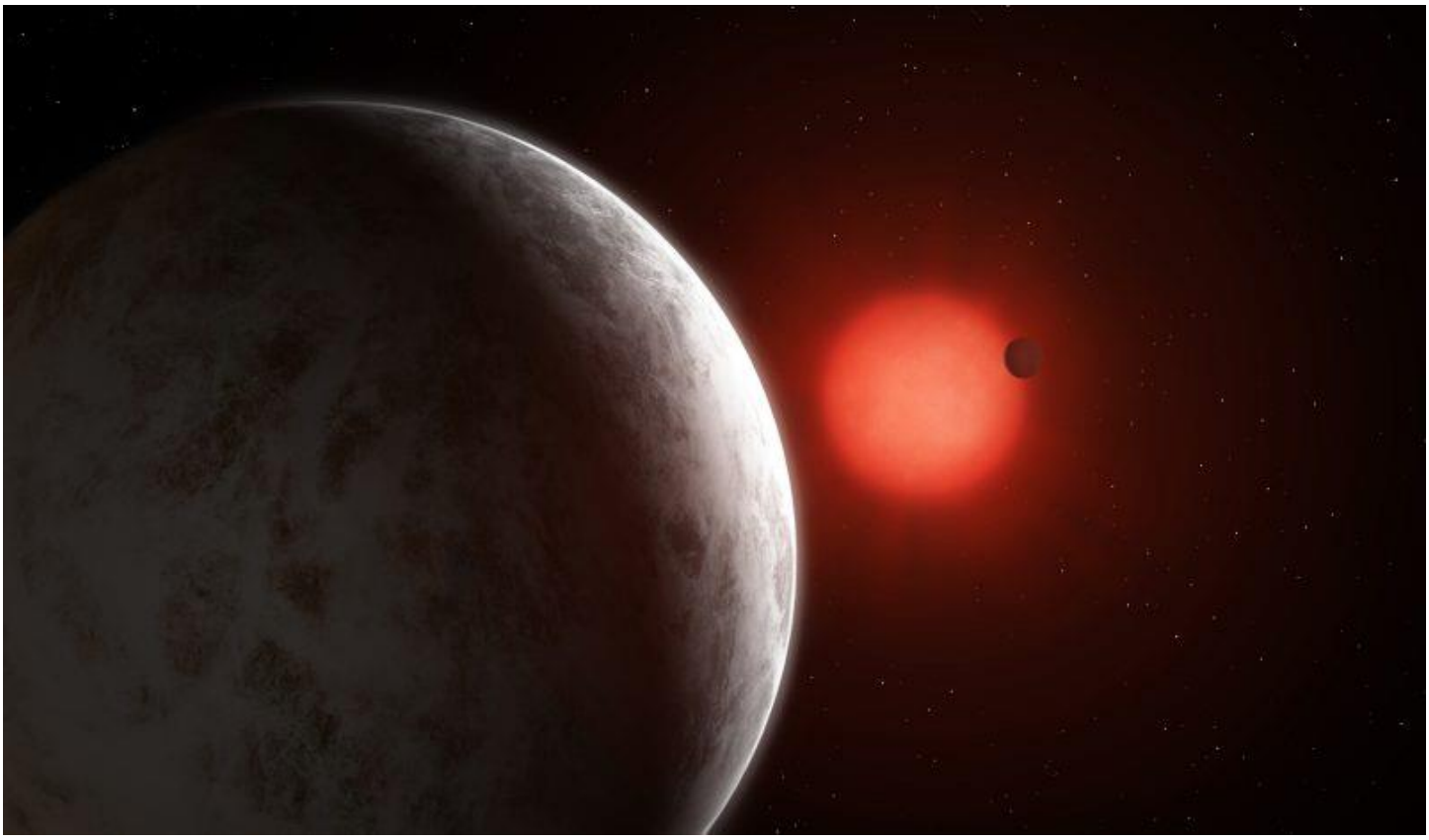
At least 2 super-Earths orbit this red dwarf star

Posted by **Paul Scott Anderson** *in* **SPACE** | July 2, 2020

Astronomers from the University of Göttingen in Germany have discovered two, and possibly three, super-Earth exoplanets orbiting the nearby red dwarf star Gliese-887.

Among the various types of exoplanets discovered so far, those larger than Earth but smaller than Neptune are among the most common. Astronomers call these worlds super-Earths. The nearby TRAPPIST-1 planetary system actually has seven known super-Earths orbiting its star! Now, RedDots researchers at the University of Göttingen in Germany have announced the discovery of another nearby planetary system with at least two

super-Earths and possibly a third.Details of the peer-reviewed findings have been published in the June 26, 2020, issue of the journal *Science*.The two planets are orbiting the nearby red dwarf star called Gliese 887 (also known as GJ 887 or Lacaille 9352), which is only 11 light-years away. While not quite within the habitable zone, where liquid water could exist on the surface of rocky worlds, the planets are close to the inner edge of the zone. According to the abstract of the new paper:



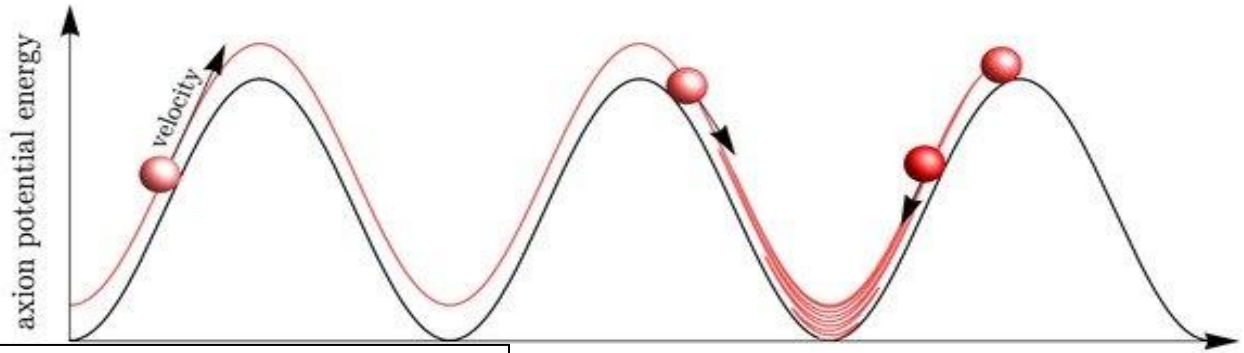
Artist's concept of Gliese 887b and Gliese 887c orbiting their red dwarf star. Image via Mark Garlick/ University of Göttingen.

The closest exoplanets to the sun provide opportunities for detailed characterization of planets outside the solar system. We report the discovery, using radial velocity measurements, of a compact multiplanet system of super-Earth exoplanets orbiting the nearby red dwarf star GJ 887. The two planets have orbital periods of 9.3 and 21.8 days. Assuming an Earth-like albedo, the equilibrium temperature of the 21.8-day planet is ~350 kelvin [-623 Celsius or -1,090 Fahrenheit]. The planets are interior to, but close to the inner edge of, the liquid-water habitable zone. We also detect an unconfirmed signal with a period of ~50 days, which could correspond to a third super-Earth in a more temperate orbit. Our observations show that GJ 887 has photometric variability below 500 parts per million, which is unusually quiet for a red dwarf.

The temperature of Gliese 887c has been estimated at 158 degrees Fahrenheit (70 degrees Celsius). A bit hot, but perhaps not enough to render the planet uninhabitable. If the third planet does exist, it could have cooler temperatures since it is in a more temperate orbit within the habitable zone.The planets were discovered using the "Doppler Wobble" technique, which enables the researchers to measure the tiny back and forth wobbles of the star caused by the gravitational pull of the planets. The researchers used the High Accuracy Radial velocity Planet Searcher (HARPS) spectrograph at the European Southern Observatory (ESO) in Chile.Red dwarf stars, although smaller and dimmer than our sun, are known for typically being very active, emitting strong bursts of radiation that could strip close-in planets of their atmospheres and make conditions difficult or impossible for life to exist. But Gliese 887 has only a very few star spots and appears to be less active than most red dwarfs. That's good news for the possibility of any of the planets retaining their atmospheres and perhaps being habitable.If someone had to live around a red dwarf, they would want to choose a quieter star like GJ 887. If further observations confirm the presence of the third planet in the habitable zone, then GJ 887 could become one of the most studied planetary systems in the solar neighborhood. Red dwarf stars are known for being very active, emitting

powerful blasts of solar radiation, which can strip atmospheres off planets that are too close, as in this artist's concept. But Gliese 887 is less active than most red dwarfs, increasing the chance that some of its planets might be potentially habitable. Image via NASA/ Ames/ JPL-Caltech/ *HowStuffWorks*.The Gliese 887 worlds will also be ideal candidates for follow-up studies by the upcoming James Webb Space Telescope (JWST), not only because they are close by, but also because the brightness of the star is almost constant, making it easier to detect any atmospheres. As Sandra Jeffers, from the University of Göttingen and lead author of the study, said in a statement:These planets will provide the best possibilities for more detailed studies, including the search for life outside our solar system.The discovery reinforces two previous findings about exoplanets: one, super-Earth worlds are common (as well as Earth-sized planets), even though there isn't one in our solar system (unless the elusive Planet Nine turns out to be one, as some scientists think), and two, exoplanets are abundant around red dwarf stars, which are the most common stars in our galaxy. This is exciting, since many, if not most, super-Earths are thought to be rocky like our own planet. But we still don't know how habitable these kinds of worlds could be. Scientists think that some super-Earths could have extensive or even global oceans. Others might be dry and barren. New upcoming telescopes like JWST will be able to take a closer look at some of these worlds, and provide a much better idea of what the actual conditions are like. If there are millions or billions of them in our galaxy, as seems likely – and scientists now say there are *more exoplanets in total than stars*, including an estimated six billion 'Earth-like' planets – then it seems reasonable that some of them should be potentially habitable.**Source: https://earthsky.org/space/exoplanets-super-earths-gliese-887-red-dwarf-star**

Case for Axion Origin of Dark Matter Gains Traction



The axion field rapidly runs over the potential barriers and eventually begins oscillations when sufficiently slowed down by friction. Image credit: Co & Harigaya / IAS

In a new study of axion motion, researchers propose a scenario known as "kinetic misalignment" that greatly strengthens the case for axion/dark matter equivalence. The novel concept answers key questions related to the origins of dark matter and provides new avenues for ongoing detection efforts. This work, published in *Physical Review Letters*, was conducted by researchers at the Institute for Advanced Study, University of Michigan, and UC Berkeley.

The existence of dark matter has been confirmed by several independent observations, but its true identity remains a mystery. According to this study, axion velocity provides a key insight into the dark matter puzzle. Previous research efforts have successfully accounted for the abundance of dark matter in the universe; however certain factors, such as the underproduction of axions with stronger ordinary matter interactions, remained unexplored.

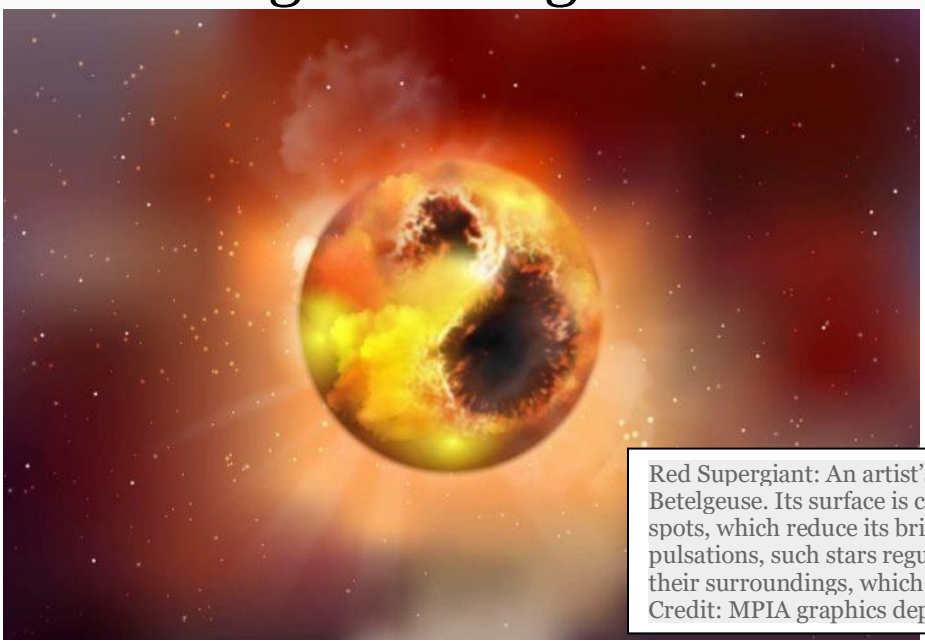
By assigning a nonzero initial velocity to the axion field, the team discovered a mechanism—termed kinetic misalignment—producing far more axions in the early universe than conventional mechanisms. The motion, generated by breaking of the axion shift symmetry, significantly modifies the conventional computation of the axion dark matter abundance. Additionally, these dynamics allow axion dark matter to react more strongly with ordinary matter, exceeding the prediction of the conventional misalignment mechanism.

“The extensive literature on the axion was built upon the assumption that the axion field is initially static in the early universe,” stated Keisuke Harigaya of the Institute for Advanced Study. “Instead, we discovered that the axion field may be initially dynamic as a consequence of theories of quantum gravity with axions.”
Two members of the research team, Keisuke Harigaya and Raymond Co, previously explored the concept of axion dynamics in the study “Axiogenesis,” which explained how the excess of matter over antimatter could be due to a nonzero initial velocity of the QCD axion field. This study also provided a framework for generating new insights into the questions surrounding dark matter.
“This new kinetic misalignment mechanism predicts an axion with a larger interaction strength and may be discovered in planned experimental searches,” stated Raymond Co of the University of Michigan. “Our discovery of new axion dynamics thus opens up unexplored research avenues for theoretical and experimental particle physics and cosmology.”

To date, the axion has proven incredibly versatile. The particle was originally proposed to solve the mystery of why neutrons do not interact with an electric field despite having charged constituents. Former IAS Professor Frank Wilczek, who coined the term axion, published his landmark findings in 1978 in *Physical Review Letters* while a Member of the Institute for Advanced Study’s School of Natural Sciences.
The published article is available here. Source: Institute for Advanced Study

Source: https://www.technology.org/2020/07/01/case-for-axion-origin-of-dark-matter-gains-traction/

“More on” Betelgeuse – a giant with blemishes



Red Supergiant: An artist’s impression of Betelgeuse. Its surface is covered by large star spots, which reduce its brightness. During their pulsations, such stars regularly release gas into their surroundings, which condenses into dust. Credit: MPIA graphics department

Red giant stars like Betelgeuse undergo frequent brightness variations. However, the striking drop in Betelgeuse’s luminosity to about 40% of its normal value between October 2019 and April 2020 came as a surprise to astronomers. Scientists have developed various scenarios to explain this change in the brightness of the star, which is visible to the naked eye and almost 500 light years away. Some astronomers even speculated about an imminent supernova.An international team of astronomers led by Thavisha Dharmawardena from the Max Planck Institute for Astronomy in Heidelberg have now demonstrated that temperature variations in the photosphere, i.e. the luminous surface of the star, caused the brightness to drop. The most plausible source for such temperature changes are gigantic cool star spots, similar to sunspots, which, however, cover 50 to 70% of the star’s surface.“Towards the end of their lives, stars become red giants,” Dharmawardena explains. “As their fuel supply runs out, the processes change by which the stars release energy.” As a result, they bloat, become unstable and pulsate with periods of hundreds or even thousands of days, which we see as a fluctuation in brightness. Betelgeuse is a so-called Red Supergiant, a star which, compared to our Sun, is about 20 more

massive and roughly 1000 times larger. If placed in the centre of the solar system, it would almost reach the orbit of Jupiter.Because of its size, the gravitational pull on the surface of the star is less than on a star of the same mass but with a smaller radius. Therefore, pulsations can eject the outer layers of such a star relatively easily. The released gas cools down and develops into compounds that astronomers call dust. This is why red giant stars are an important source of heavy elements in the Universe, from which planets and living organisms eventually evolve. Astronomers have previously considered the production of light absorbing dust as the most likely cause of the steep decline in brightness.To test this hypothesis, Thavisha Dharmawardena and her collaborators evaluated new and archival data from the Atacama Pathfinder Experiment (APEX) and the James Clerk Maxwell telescope (JCMT). These telescopes measure radiation from the spectral range of submillimetre waves (terahertz radiation), whose wavelength is a thousand times greater than that of visible light. Invisible to the eye, astronomers have been using them for some time to study interstellar dust. Cool dust in particular glows at these wavelengths.“What surprised us was that Betelgeuse turned 20% darker even in the submillimetre wave range,” reports Steve Mairs from the East Asian Observatory, who collaborated on the study. Experience shows that such behaviour is not compatible with the presence of dust.For a more precise evaluation, she and her collaborators calculated what influence dust would have on measurements in this spectral range. It turned out that indeed a reduction in brightness in the sub-millimetre range cannot be attributed to an increase in dust production. Instead, the star itself must have caused the brightness change the astronomers measured.Physical laws tell us that the luminosity of a star depends on its diameter and especially on its surface temperature. If only the size of the star decreases, the luminosity diminishes equally in all wavelengths. However, temperature changes affect the radiation emitted along the electromagnetic spectrum differently. According to the scientists, the measured darkening in visible light and submillimeter waves is therefore evidence of a reduction in the mean surface temperature of Betelgeuse, which they quantify at 200 K (or 200 °C).“However, an asymmetric temperature distribution is more likely,” explains co-author Peter Scicluna from the European Southern Observatory (ESO). “Corresponding high-resolution images of Betelgeuse from December 2019 show areas of varying brightness.Together with our result, this is a clear indication of huge star spots covering between 50 and 70% of the visible surface and having a lower temperature than the brighter photosphere.” Star spots are common in giant stars, but not on this scale. Not much is known about their lifetimes. However, theoretical model calculations seem to be compatible with the duration of Betelgeuse’s dip in brightness.We know from the Sun that the amount of spots increases and decreases in an 11-year cycle. Whether giant stars have a similar mechanism is uncertain. An indication for this could be the previous brightness minimum, which was also much more pronounced than those in previous years.“Observations in the coming years will tell us whether the sharp decrease in Betelgeuse’s brightness is related to a spot cycle. In any case, Betelgeuse will remain an exciting object for future studies,” Dharmawardena concludes.

Source: https://www.technology.org/2020/06/30/betelgeuse-a-giant-with-blemishes/

July Celestial Calendar

1. Venus is in the morning sky this month where it will be visible in the east before sunrise.
2. Mercury moves to the morning sky this month where it can be seen in the North east the last half of the month.
3. Jupiter and Saturn are in the evening sky all month where they can be seen close together in the southeast after the sun sets.
4. Mars rises in the east around midnight this month and can be seen moving to the south as the night progresses.

5. The Delta Aquariid meteor shower peaks on the evening of July 28th and 29th.

July 4	***Earth at Aphelion***
July 5	Full Moon
	Penumbral Lunar Eclipse**.**
	Jupiter 1.9° N. of Moon
July 06	***Saturn 2° N. of Moon***
July 10	***Venus Greatest Illuminated Extent***
July 11	***Venus at Aphelion***
	Mars 2° N. of Moon.
July 12	Last Quarter Moon
	Moon at Apogee
	Venus 1° N. of Aldebaran
July 14	***Jupiter at Opposition***
	Uranus 4° N. of Moon
July 17	***Venus 3° S. of Moon***
July 19	***Mercury 3° S. of Moon***
July 20	New Moon
	Saturn at Opposition
July 22	***Mercury Greatest Western Elongation 20°***
July 25	Moon at Perigee
July 27	First Quarter
July 28 &29th	**S. δ-Aquariid meteors peak**

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/
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