SIRIUS ASTRONOMER

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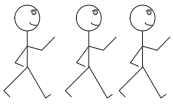
The Newsletter of the Orange County Astronomers

August 2025 Free to members, subscriptions $12 for 12 issues **Volume 52, Number 8**

Aurora Borealis image by Alan Lang, taken shipboard on a cruise off the Norwegian coast in February 2025. More images can be found in this newsletter.

Upcoming Events - free and open to the public

Beginner's class		
Club Meeting 	Friday, 8 August at 7:30 to 9:30 PM "What's Up": Michael Beckage from OCA Main speaker: Dr. Brian Thomas from Washburn University whose talk will be "Exploding Stars and Life on Earth"	**IN PERSON** and **ONLINE** **IN PERSON**
Astro-Physics SIG	Friday, 15 Aug 2025, at 7:00 PM to 10 PM Orange Coast College, Building 40, Astronomy House	**IN PERSON**
Astro-Imagers SIG	Friday, 5 Sept at 7:00 to 10:00 PM Orange Coast College, Building 40, Astronomy House	**IN PERSON**
Star Parties	Saturday, 23 August at the OCA Anza site.	

The monthly club meeting is viewable in progress on Zoom and our social media platforms. The recording is available on these platforms after the meeting is over.

https://www.facebook.com/OrangeCountyAstronomers
https://www.youtube.com/@ocastronomers

Please consult the calendar on the OCA website to RSVP online meetings (required)

President's Message

By Barbara Toy

Starbecue 2025

Those of us who made it out to Anza for the Starbecue on July 26th had a really great time, with a lot of excellent food (some people took home some great leftovers), lots of good conversation, catching up with old friends, getting acquainted with a number of new members – a really great time was had by all. If you missed it, you missed a great event – but we'll hope to see you out there for the Starbecue next year!

Many thanks to David Searle for volunteering to manage the event – he got the supplies, extracted the tables and barbecue from the storage container, set up, and otherwise pulled things together to make the event a success. His efforts were really appreciated!

This potluck event happened in stages, as several participants were delayed and arrived at different times, so it was dusk before we cleaned everything up and everyone headed off for their regular star party activities. Liam Kennedy and I hung out at the club observatory and had a number of visitors over the course of the evening who came to look through the Kuhn Telescope (they also received stickers that Liam had created to commemorate their first views through the Kuhn, which brought additional fun to the evening!).

There were a stream of clouds moving through, which made finding objects to view a challenge, as the clearest areas of the sky kept shifting. Despite that, we were able to show visitors a couple of globular clusters, the Ring and Dumbbell nebulas, the Whirlpool and a few other items. The highpoint, though, was a naked-eye view of the ISS passing from the western horizon over our heads just as the rocket carrying the latest bunch of Starlink satellites was launched from Vandenberg – it was pretty cool seeing both events together.

Fire Danger Continues…

On July 16, 2025, there was another fire in the area of our Anza site, the fourth this year, this time a bit to the north of our site (as was fire #2 which happened near the Cahuilla Casino). This "Dale fire" was fully contained on July 22, fortunately without loss of structures or any injuries. Our site wasn't directly threatened, though it was in the mandatory evacuation zone, but it was another reminder of how vulnerable that area is to fire.

Fire #1 happened in May and was located near the intersection of HWY 331 and Wilson Valley road while Fire #3 was in June and located off Sage road fairly near its intersection with Wilson Valley road.

There's been enough moisture in the Anza area that we're getting a new crop of weeds growing on the site, and even some new bushy growth. If you have a pad or observatory there, please check regularly for any plant growth that would make your area more vulnerable to fire and cut it back or remove it. For all members using the Anza site, if you see any condition that you think could increase fire risk to any structure on the site, please do what you can to reduce the risk, or at least bring it to the attention of a Board member.

Thank you, stay safe, and enjoy your summer astronomical activities!

Help Wanted

- OCA representative to the Western Amateur Astronomers
- Coordinator to organize star parties in Orange County

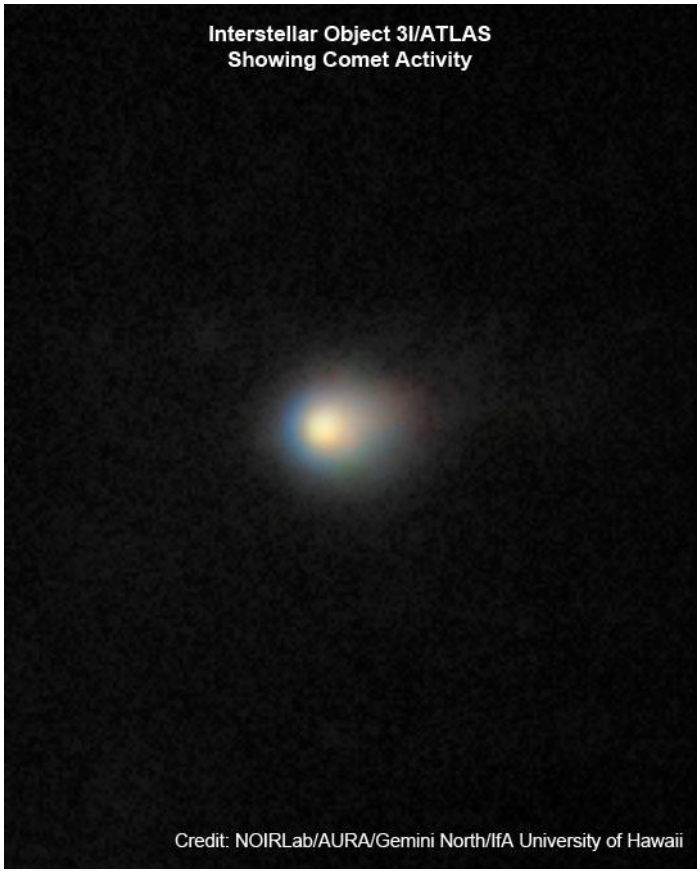
These are pretty easy jobs. Both you and the club can benefit with your participation. Please send Barbara an email and give her a chance to tell you about them.

AstroSpace Update

August 2025

Astronomy and space news summarized by Don Lynn from NASA and other sources

Interstellar Object – Astronomers have discovered the third ever object shooting through the Solar System so fast that it must have come from interstellar space, beyond the gravitational influence of the Sun. It was at first thought to be an asteroid, but newer imaging of it showed a comet-like head forming about it. Its official designation is 3I/ATLAS. It was discovered by the ATLAS system of telescopes that scan the skies for asteroids. Several prediscovery images were found in the test images being taken by the Vera Rubin Observatory, which is scheduled to start regular operations later this year. The size of the object is estimated at roughly 12 miles, but this may change as closer and therefore better observations are made. It is definitely larger than the two previous interstellar objects, ʻOumuamua and Comet Borisov. It is just inside the orbit of Jupiter and its brightness is about magnitude 17. Its closest approach to the Sun will be in late October, and closest to Earth later this year. But in early October it will come much closer to Mars than to Earth or Sun. It will probably not reach naked-eye visibility from Earth, though brightness estimates of comets this early in their approach are notoriously inaccurate. The best images of 3I/ATLAS show it has a reddish color resembling the color of some Kuiper Belt objects. Tracing back the incoming direction, this object probably came from somewhere in the Milky Way's thick disk. Many of the stars in the thick disk are older than the Sun, so this interstellar object may be much older than the Solar System. So far 3I/ATLAS has not shown any behavior different than seen in ordinary (non-interstellar) comets.

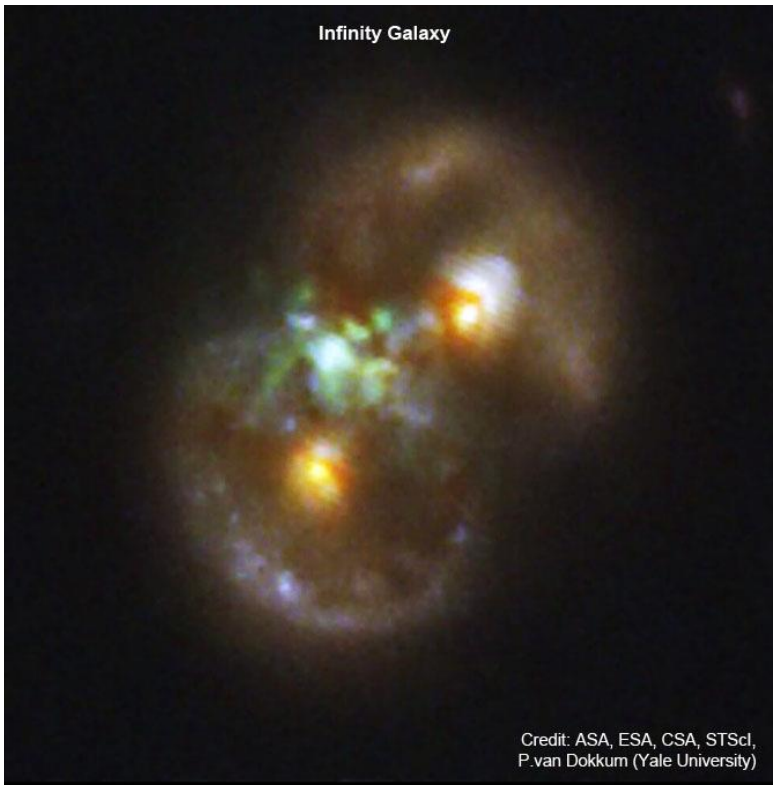


Bullet Cluster – The James Webb Space Telescope (JWST) was used to observe the Bullet Cluster, which consists of two large clusters of galaxies that are colliding, beginning an estimated 150 million years ago. It is located in the constellation Carina and is about 3.8 billion light-years away. The mass of the galaxies causes light of more distant galaxies to be gravitationally lensed, changing their size, brightness and shape. This lensing can be measured, allowing scientists to calculate where the mass, including dark matter, of the Bullet Cluster lies. This yielded the most accurate map yet of dark matter in the Bullet Cluster, due to the superior capabilities of JWST. This confirmed to greater accuracy previous study of the Bullet Cluster which concluded that dark matter is affected only by gravity, while ordinary matter such as gas is affected by both gravity and friction, resulting in separation of the gas of the Bullet Cluster from its dark matter. Alternate theories of gravity that try to explain the motions of the Universe without dark matter find this separation in the Bullet Cluster very difficult to explain. The new work also allowed calculation of the total mass of the Bullet Cluster and the total light of stars outside individual galaxies (intracluster stars). The study was not able to measure any effects on the motion of dark matter other than from gravity, so the theoretical self-interaction of dark matter must be small or nonexistent. The study found some evidence for previous galaxy cluster collisions on at least one of the two that are now colliding.

Matter/Antimatter Difference – Scientists have long puzzled this: The best understanding of the Big Bang says that it should have created equal amounts of matter and antimatter, and given billions of years, almost all the antimatter should have encountered some matter, which is known to annihilate each other in a flash of energy. So how did the Universe we live in result with lots of matter and almost no antimatter? All interactions of matter ever seen are symmetric with antimatter, so neither matter nor antimatter should accumulate in excess, with a few rare exceptions that could not possibly create the amount of matter seen in the Universe. New experiments at the Large Hadron Collider near Geneva, Switzerland have shown that the rate at which lambda-b baryon particles decay (break up into lighter particles) differs from that of the corresponding anti particles. Much more work is needed to see if this occurs with other baryons and whether this could explain matter dominating the Universe.

Massive Black Holes Merge – The LIGO gravitational wave detectors saw the signal of two massive black holes merging together, where the total mass was the largest seen to date. The problem with this is that astronomers can't figure out how the two black holes got so massive before they collided and merged. The best estimates for those two are 137 and 103 times the Sun's mass, though the uncertainty in those numbers is fairly large. The resulting mass after merging was measured at 225 solar masses, and that number has more certainty than the input masses. The previous record holder had a mass of 142 solar masses after merging. Because of the way that stars collapse into black holes at the ends of their lives, astronomers believe that the resulting black hole will never fall in the range of about 60 to 130 times the Sun's mass. So how the two new merging black holes came to have such masses remains a mystery. The merging black holes were measured to have exceptionally large spins. This may be a hint to astronomers that the black holes were both the result of past mergers, not the result of stars collapsing. But the spins measured were even higher than is typical for the result of a prior merging.

Possible Direct Collapse Black Hole – When a galaxy is hit by another galaxy right through its center, it often forms a ring of star formation about the struck galaxy. Under certain circumstances, both of a colliding pair of galaxies can form rings. Astronomers have discovered such a case. The resulting two rings look something like an infinity sign ∞, and so the discovery is being called the Infinity Galaxy. Astronomers observed Infinity in radio, X-rays, and visible light. The real surprise is that they found a supermassive black hole midway between the two galaxies, independent of the supermassive black holes at the center of each of the two galaxies. The astronomers proposed that the likely method of forming a supermassive black hole there would be direct collapse of a huge gas cloud. This formation method has been proposed theoretically, but no observational evidence of such has ever been found, except possibly now. More work is needed to substantiate this.



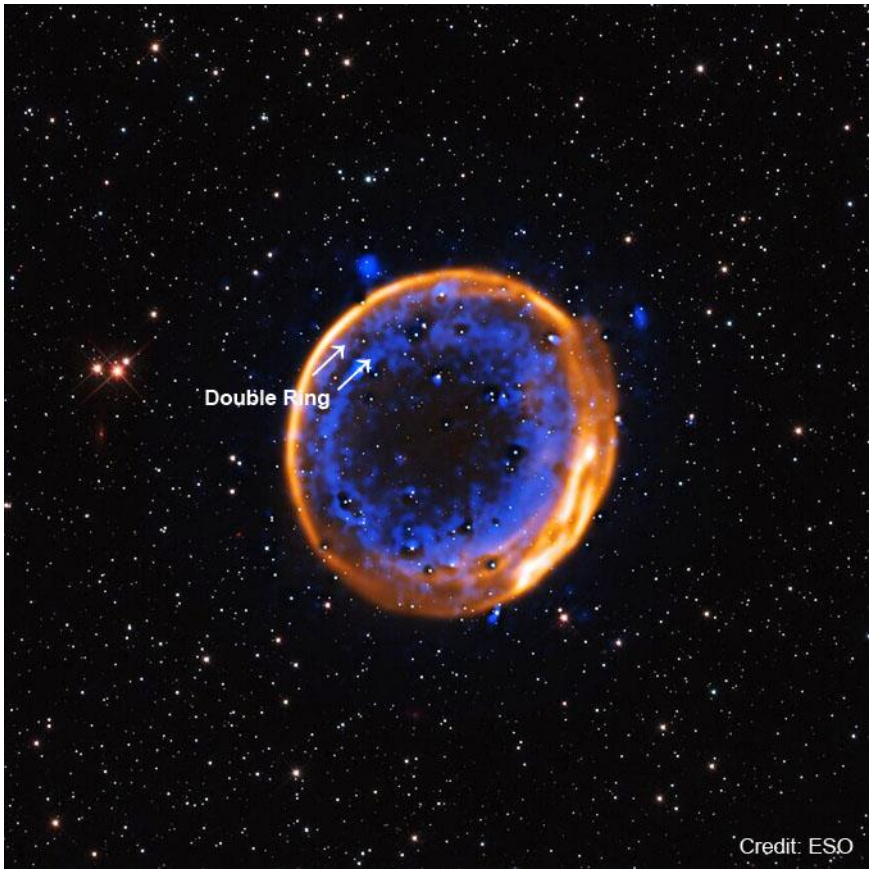
Possible First Generation Galaxy – Because the Big Bang produced only hydrogen, helium and a touch of lithium, the first stars to form had no elements heavier than these. Generations of stars after these first ones had heavier elements that formed in stars and supernovas. For historic reasons, stars without these heavier elements were dubbed Population III (3) stars. Astronomers have been unable to find a Population III star or galaxy. Now a galaxy observed by JWST may be a Population III galaxy. It is called AMORE6 and it is so distant that the light we are seeing from it left there about 0.9 to 1.0 billion years after the Big Bang. It is being seen through a gravitational lens, so it appears brightened and magnified. The JWST observations showed hydrogen in its spectra, but not oxygen. It is puzzling that lack of oxygen is not found in more distant galaxies, which we would be seeing closer to the time of the Big Bang. More work is needed to confirm that AMORE6 is indeed a Population III galaxy.

Rare Binary Star – A rare pairing of stars orbiting each other has been discovered: a pulsar and a helium star. The pulsar rotates nearly 100 times per second, making it the fastest known rotating pulsar that is paired with a helium star. The pulsar was found by the Chinese FAST radiotelescope, the largest single dish telescope. Astronomers believe the only way such a pair can result is this: they start out as a binary pair of ordinary stars. One of them runs out of fuel and collapses into a neutron star. The other star swells up near the end of its life. The neutron star strips the swollen outer hydrogen layers of the other, leaving it as a helium core. The stripped material spins up the neutron star to high speed. Magnetic fields of the neutron star cause it to beam energy outward, which we see as pulses as the beam sweeps past, making it a pulsar. Astronomers believe that in such a pair the helium star will evolve into a different stage in several million years (astronomically a short time), so that is what makes it rare to find a pair in the pulsar/helium stages.

Young Exoplanet Losing Atmosphere – Astronomers have found a young exoplanet that is being torn apart by the powerful X-rays emitted by its star. The planet is known as TOI-1227b, has about 20% the mass of Jupiter and is located about 330 light-years away. It quite closely orbits a red dwarf star that frequently strongly flares in X-rays. Calculations show that this flaring is causing about a million tons per second of atmosphere to be lost to space. Its entire atmosphere will likely be lost within a billion years.

Pulsating White Dwarf – ZZ Ceti class stars are white dwarf stars with hydrogen atmospheres and pulsations in brightness with periods ranging from ½ minute to 25 minutes. The most massive known example of this class is known as WD J004917.14-252556.81. A new series of observations of WD J0049-2525 (as it is known by astronomers in a hurry) has been completed using 3 large earth-bound telescopes. It is located about 315 light-years away in the constellation Sculptor. These observations showed that it actually has 13 different superimposed pulsation periods. From these astronomers were able to calculate the star's mass at 1.29 times that of the Sun, and that the core is made of oxygen and neon and is under such pressure that it has 99% solidified or crystallized. Surprisingly this observational campaign did not produce enough data to determine the period of orbiting its companion star, though about 7 hours or 16 hours were likely values. So more observation is needed.

Double Detonation Supernova – Observations made by the Very Large Telescope in Chile of a supernova remnant known as SNR 0509-67.5, found in the Large Magellanic Cloud, show that it has two rings of matter (chiefly calcium) blown off by the supernova explosion, indicating that it exploded twice. Theorists have been claiming this is possible, but this is the first evidence that this happens. A Type Ia supernova is known to occur when a companion star orbiting a white dwarf star dumps enough gas onto the white dwarf to heat up to the point of a nuclear explosion on the surface. Theoretically under certain circumstances the shock wave from this explosion can cause a second explosion a little later in the core of the white dwarf. It is thought that this is what caused the double ring observed. The theorists claim that if two white dwarfs collide and merge, they can each undergo this kind of supernova double explosion, which would result in 4 rings of calcium-rich material being emitted. Astronomers will look for such a quadruple ring.

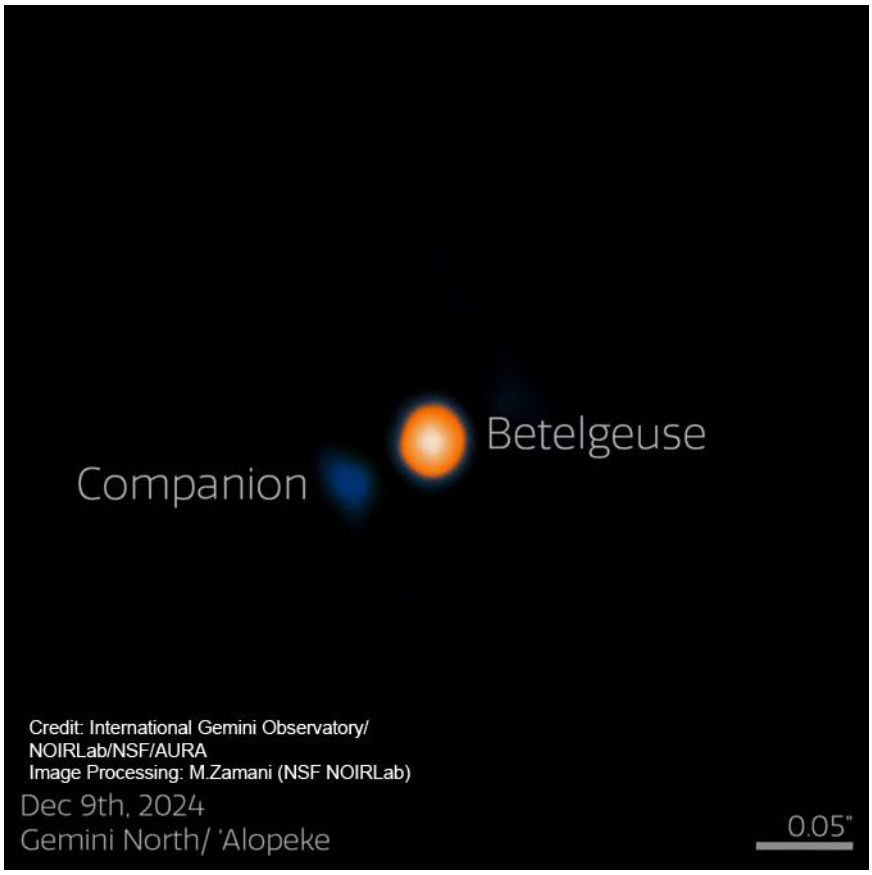


Unusual Radio Star – Stars that emit radio flashes at much longer periods than pulsars are known as Long Period Transients, or LPTs. Only about 10 of them are known. The process by which they generate the radio flashes is a mystery. One more LPT has been discovered, and it is being known as CHIME J1634+44 (CHIME being the radiotelescope that found it). Observations of it in radio and other forms of light have discovered two unique properties: the period of the flashes is speeding up instead of slowing down, and the radio flashes are highly polarized. The discoverers believe that the only way the flashes could speed up is if the object has a companion star in orbit about it whose orbit is decaying for some reason. The LPT itself is probably some kind of neutron star.

Nearby Exoplanet System – A team of researchers has studied the L 98-59 system, which was known to have 4 rocky exoplanets closely orbiting it. They discovered a fifth planet, which was found to be in the habitable zone, that distance from its star where temperatures would allow liquid water. The star is a dim red dwarf only 35 light-years away and all its planets orbit much closer than Mercury orbits the Sun. The new study also yielded the most precise values for the planets' properties (mass, orbit, size). The system's nearness and the variety of planets make this an ideal target for atmospheric study using JWST. Such observations have begun.

Earliest Stage of Star Formation – Using JWST and the ALMA radiotelescope array, astronomers observed a planet-forming disk about the protostar (star still forming) HOPS-315 and identified the mineral silicon monoxide solidifying in a forming planet. This should happen extremely early in planet formation due to the high melting point of the mineral. This observation is then the earliest stage of the planet forming process that astronomers have ever observed. HOPS-315 is located 1300 light-years away in the L1630 molecular cloud in Orion, in which stars are forming, not in the Orion Nebula, more famous for its star formation.

Betelgeuse May Be Binary – Using a speckle imaging instrument on the Gemini North telescope in Hawaii, astronomers have imaged what appears to be a binary companion star to Betelgeuse. There have been many claims of a companion to Betelgeuse in the past, but all have been unverifiable. New precise measurements of the primary star's motion support the discovery this time however. The companion star appears to be much less massive than Betelgeuse and far dimmer. Given the history of past claims, this will take further verification before being generally accepted as a discovery. Also, recent searches for a companion to Betelgeuse by the Hubble Space Telescope and JWST were unable to locate anything.



Sednoid – The Subaru Telescope in Hawaii has found only the 4th known Sednoid, which is an object in the outer Solar System with an orbit resembling the dwarf planet Sedna, which reaches in its eccentric orbit an extremely large distance from the Sun and never approaches our star even as close as Neptune. The new discovery is called 2023 KQ_{14}. Prediscovery images have been found in archived observations as far back as 2014, allowing its orbit to be well determined. It is currently near its perihelion (closest approach to the Sun) of 71 astronomical units (AU), where one AU is Earth's distance from the Sun. Simulation of its orbit shows that it has been stable for most of the life of the Solar System. This means that if the proposed Planet 9 exists, it must orbit so far that it has not gravitationally disturbed 2023 KQ_{14}.

Quaoar – JWST was used to observe Quaoar, a distant dwarf planet roughly half the size of Pluto. The observations included occulting a star. It was already known to have a system of rings, and previous spectral observations showed marginal evidence of an atmosphere. The new observations showed no evidence of an atmosphere. Planetary rings are generally inside the Roche radius, that distance where a planet's tidal forces rip solid bodies into shreds. Quaoar's rings are known to be outside its Roche radius, so the rings need some explaining. One theory is that resonances in orbital periods of the rings prevent the ring material from conglomerating into larger particles. From the opacity of the rings to starlight at different wavelengths it was determined that the ring particles are 3-4 micrometers in size, fairly fine dust.

Europa Ocean – Monitoring of Jupiter's moon Europa using JWST shows that ice is growing at different rates in different places. Also identified were salt (sodium chloride), carbon dioxide (dry ice) and hydrogen peroxide. This is further support for the belief that there is a liquid ocean beneath Europa's icy surface and that water along with impurities from the ocean makes it to the surface, perhaps through cracks.

Juno Camera – The Juno Jupiter orbiter was designed to withstand very intense radiation that is found about the planet, placing most instruments in a protective titanium box. But Juno's camera did not fit in the box. After 34 orbits of the planet, it was noticed that camera images were degrading, acquiring streaks and graininess. Spacecraft controllers tried heat annealing of the camera electronics, and it worked, restoring image quality. The process was easy to undertake, since the camera has a heater to keep it in normal operating range. Controllers just told the heater to operate at a higher temperature for awhile, but not quite high enough to ruin the camera. Now at 74 orbits the camera has again degraded, and controllers will heat anneal the camera again. Because this worked, future spacecraft cameras and other instruments expected to be subjected to high levels of radiation may be designed to include a heat annealer device.

New Spacecraft Missions – NASA launched the TRACERS spacecraft pair from Vandenberg in California. The pair's year-long mission is to observe how the Sun's and Earth's magnetic fields collide and reconnect. Three other spacecraft were launched piggyback on the same SpaceX rocket: Athena EPIC, which will test a configurable design for small spacecraft; PExT, which will demonstrate connection between commercial and government communications networks; and REAL, which will measure how electrons scatter out of the Van Allen radiation belts.

Astrophysics Special Interest Group

By Mark Price

The Astrophysics Special Interest Group (ASIG) recently completed a comprehensive, nearly two-year study of astrobiology, guided by The Great Courses' "Life in the Universe" lecture series. This exploration addressed the enduring question of whether humanity is alone in the universe.

Professor Laird Close of the University of Arizona presented the latest research as of the 2013 date of the series, suggesting life may not be unique to Earth. His lectures covered relevant life science, biochemistry and astronomy/astrophysics background material, including the "cosmic coincidences" that enabled life's emergence and sustained habitability on Earth for 3.5 billion years. The course then explored the search for life within our solar system and the quest for potentially habitable exoplanets.

Given the 2013 production date of the series, predating the James Webb Space Telescope (JWST) and other advancements, ASIG held a follow-up session to integrate more recent astrobiology findings. Initiated by ASIG member Chuck Smith, the discussion covered current research questions, including the "Rare Earth" theory, and incorporated new information from NASA and ESA. A significant focus was placed on how advanced telescopes and imaging technologies have enhanced our capability to analyze the cosmos since 2013.

A key part of the discussion centered on NASA's informal definition of life: "Life is a self-sustaining chemical system capable of Darwinian evolution." The profound impact of instruments like the JWST and other cutting-edge technologies on accelerating the search for extraterrestrial life since 2013 was also explored. With the concept of life in the universe recognized as a mainstream academic and research pursuit, we are in an extraordinary era for cosmic exploration.

Astroimaging Special Interest Group

The group will resume meeting in September.

Adopt-a-Scope

Raffle at the OCA Club Meeting in September 2025

Prize: (Currently evaluating:) Celestron Refractor model C100ED-R (4 inch)
On a 2-axis motorized Celestron Advanced GT GEM
with GoTo hand controller, medium-duty steel tubular tripod,
Accessories are TBD.

When: September 12, 2025, 7:30 pm.
Where: OCA General Meeting at Chapman University.

Participation is OPEN to OCA club members and non-members alike.
Interested parties must be present IN PERSON at the meeting.
Tickets for the RAFFLE are FREE to those in attendance.

Starbecue – Saturday, 26 July at Anza site

Starbecue winding down near sunset on 26 July

Space-X launch from Vandenberg AFB seen from Kuhn observatory

August's Night Sky Notes: The Great Rift

By Dave Prosper
Updated by Kat Troche

Summer skies bring glorious views of our own Milky Way galaxy to observers blessed with dark skies. For many city dwellers, their first sight of the Milky Way comes during trips to rural areas - so if you are traveling away from city lights, do yourself a favor and look up!

To observe the Milky Way, you need clear, dark skies and enough time to adapt your eyes to the dark. Photos of the Milky Way are breathtaking, but they usually show far more detail and color than the human eye can see – that's the beauty and quietly deceptive nature of long exposure photography. For Northern Hemisphere observers, the most prominent portion of the Milky Way rises in the southeast as marked by the constellations Scorpius and Sagittarius. Take note that, even in dark skies, the Milky Way isn't easily visible until it rises a bit above the horizon, and the thick, turbulent air obscures the view. The Milky Way is huge, but it is also rather faint, and our eyes need time to truly adjust to the dark and see it in any detail. Avoid bright lights as they will ruin your night vision. It's best to attempt to view the Milky Way when the Moon is at a new or crescent phase; a full Moon will wash out any potential views.

The Vera C. Rubin Observatory, located at Cerro Pachón, Chile, under the Milky Way. The bright halo of gas and stars on the left side of the image highlights the very center of the Milky Way galaxy. The dark path that cuts through this center is known as the Great Rift, because it gives the appearance that the Milky Way has been split in half. Image Credit: RubinObs/NOIRLab/SLAC/NSF/DOE/AURA/B. Quint

Keeping your eyes dark-adapted is especially important if you want to not only see the haze of the Milky Way, but also the dark lane cutting into that haze, stretching from the Summer Triangle to Sagittarius. This dark detail is known as the Great Rift, and is seen more readily in very dark skies, especially dark, dry skies found in high desert regions. What exactly is the Great Rift? You are looking at massive clouds of galactic dust lying between Earth and the interior of the Milky Way.

Other "dark nebulae" of cosmic clouds pepper the Milky Way, including the famed Coalsack, found in the Southern Hemisphere constellation of Crux. Many cultures celebrate these dark clouds in their traditional stories along with the constellations and the Milky Way. One such story tells of a Yacana the Llama, and her baby, wandering along a river that crossed the sky – the Milky Way. The bright stars Alpha and Beta Centauri serve as the llama's eyes, with the dark sections representing the bodies of mother and baby, with the baby below the mother, nursing.

In the activity, "Our Place In Our Galaxy", if the Milky Way were shrunk down to the size of North America, our solar system would be about the size of a quarter. At that scale, Polaris - which is about 433 light years distant from us - would be 11 miles away. Image Credit: Astronomical Society of the Pacific

Where exactly is our solar system within the Milky Way? Is there a way to get a sense of scale? The "Our Place in Our Galaxy" activity can help you do just that, with only birdseed, a coin, and your imagination. You can also discover the amazing science NASA is doing to understand our galaxy – and our place in it - in the Galaxies section of NASA's Universe page.

Originally posted by Dave Prosper: June 2021
Last Updated by Kat Troche: July 2025

From the Editor

The editor would appreciate comments and suggestions for helping the newsletter take advantage of it no longer being bound to a set number of pages.

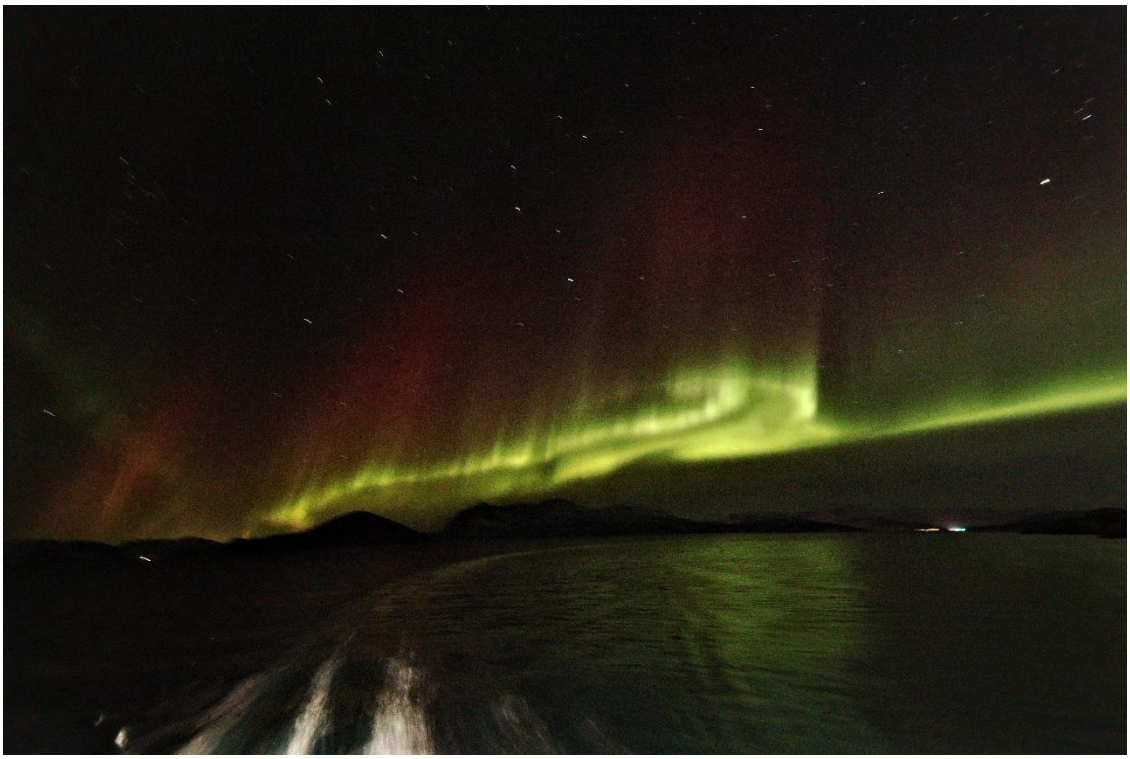
The newsletter is once again looking for front cover picture contributions.

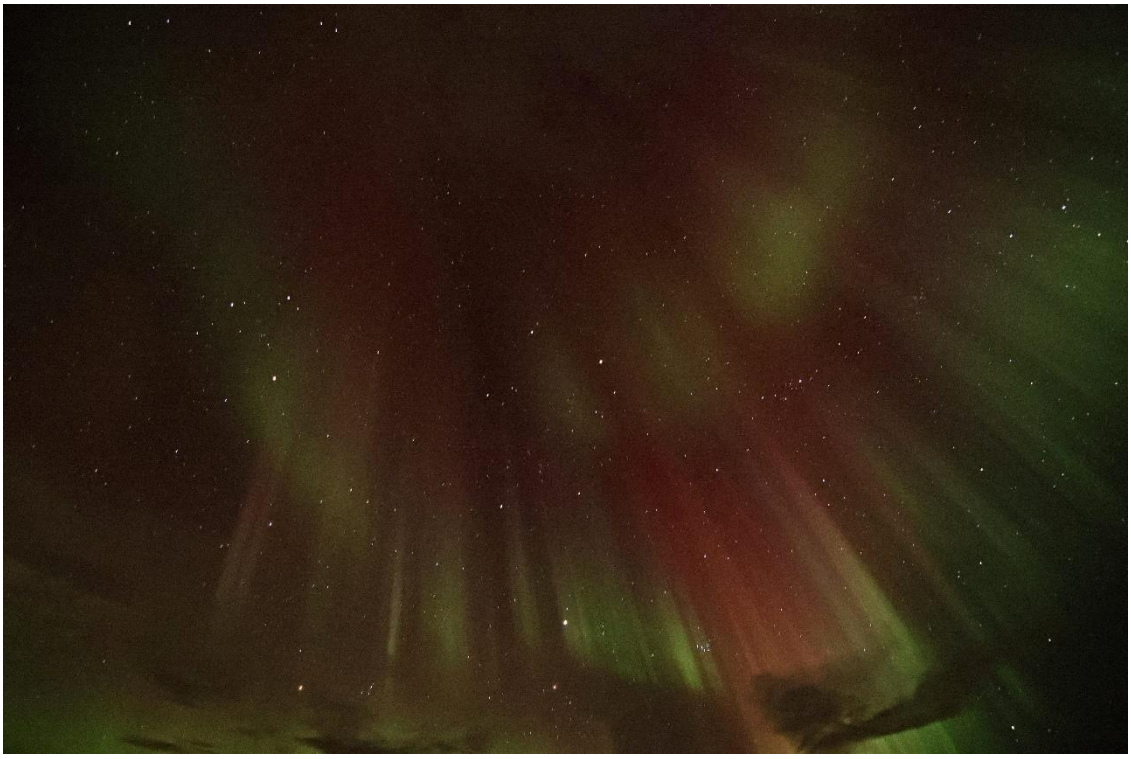
Due dates for submission of articles, pictures and advertisements are 13 days prior to the subsequent general club meeting.

Issue	**Due date**
September	30 August
October	27 September
November	1 November
December	29 November

Bonus Pictures of Aurora Borealis

These images were taken by Alan Lang in Februrary this year while on a cruise off the Norwegian coast. He tells the editor that the aurorae were very dynamic, shifting in position and color as he and his fellow travelers watched. These still images are pretty but seeing the action in real time brings another dimension to the experience.





Advertisements

Buy, Sell or Trade some of your gear? This is where club members can place advertisements. Please contact the editor at newsletter@ocastronomers.org to place an advertisement or to learn more about placing one. There is no cost to club members for non-commercial advertisements in the newsletter. The editor may resize and re-arrange ad content to fit and will feed back the formatted ad for approval prior to publishing.

Some policy changes have been made to reflect the expanded capacity of the electronically published newsletter.

- Each advertisement may now occupy up to ½ of a printed page and may include small pictures within the space permitted. The editor may resize and re-arrange ad content to fit and will feed back the formatted ad for approval prior to publishing.
- Each advertisement may be run for 3 consecutive issues, after which it will be removed unless the advertiser requests extension of the ad by contacting the editor of the newsletter.

For Sale contact Christophe Chasle chaslec@yahoo.fr

- William Optic Zenithstar 61 telescope (flattener included) $ 120
- ZWO (ASI120MC-S) guide camera with ZWO 30F4 mini-scope $ 60
- iOptron Skyguider Pro mount $ 40
- Celestron Powertank Lithum Pro (LiFePO4) that I give (free)

For Sale contact Rich Cormier rich.cormier3@gmail.com (949) 547-8808

Starzona APEX ED 0.65 Reducer Flattener - L Version $ 369

- "L" version works with 500 mm and longer focal length telescopes, including most 100 mm and higher refactors, as well as all RC and ACF telescope models
- Extra-low dispersion glass to eliminate chromatic aberration
- The reduction factor produces a 1.5x wider field of view and 2.4x shorter exposure times
- Original box and caps

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The Newsletter of the Orange County Astronomers

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