SIRIUS ASTRONOMER

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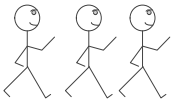
The Newsletter of the Orange County Astronomers

July 2025 Free to members, subscriptions $12 for 12 issues **Volume 52, Number 7**

M100, a grand design spiral galaxy in the Virgo Cluster, was imaged by Brett Nordby at the OCA Anza site in March and April 2025. Captured using a Celestron EdgeHD 14 telescope and ASI6200MM camera

Upcoming Events - free and open to the public

Beginner's class	**Monday**, 1 August at 7:30 to 9:30 PM **IN PERSON** This is session 6 of the class, covering the basics of astrophotography, different types of imaging, how different types of cameras are used for this kind of photography, other equipment and considerations for taking a good picture. Teacher is Kyle Coker. This class is held at Orange Coast College, near Building 40, Astronomy House
Club Meeting 	Friday, 11 July at 7:30 to 9:30 PM **IN PERSON** and **ONLINE** "What's Up": Chris Butler from OCA **IN PERSON** Main speaker: Steve Hallman from OCA **IN PERSON** whose talk will be "Backyard Exoplanet Observatory …measuring exoplanets with a small backyard telescope"
Astro-Physics SIG	Friday, 18 July 2025, at 7:00 PM to 10 PM **IN PERSON** Orange Coast College, Building 40, Astronomy House
Astro-Imagers SIG	Friday, 5 Sept at 7:00 to 10:00 PM **IN PERSON** Orange Coast College, Building 40, Astronomy House
Open Spiral Bar	Closed for remodeling
Star Parties	Saturday, 26 July 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

OVRO

For many years, Doug Millar and Helen Mahoney have organized and hosted an annual event at the Owens Valley Radio Observatory (OVRO), the great array of radio dishes you can see from Highway 395 between Big Pine and Bishop. They have all kinds of activities during the day, including tours of some of the radio dishes, and star parties on Friday and Saturday nights. This year, the OVRO event was scheduled for June 20 – 21, which happened to include the summer solstice, though that did not seem to be an important feature of the event.

As it happened, Alan Smallbone and I were going to be in Lone Pine that weekend. Alan wanted to get some images of the summer Milky Way from the Alabama Hills, a picturesque bit of California featured in hundreds of movies over the last hundred years, all the way back to the silent movie era. When we realized that it was OVRO weekend, we made tentative plans to meet up with the group for dinner and firmer plans to join the Saturday night star party.

Well, as is too often the case in astronomical circles, the weather didn't favor these plans. Specifically, a very high wind condition moved in on Saturday afternoon and lasted most of the night. The wind was too strong for telescopes, and there was too much dust and high smoke in the air for decent visibility, so the star party was cancelled. We were able to meet up with the OVRO group at the Pizza Factory in Bishop for dinner. Everyone was very enthusiastic about the entire event, though disappointed about the cancelled star party. It was a fun and congenial group, and I hope we'll have a chance to meet up with them again next year.

Comments made during the dinner imply that Doug is already planning the OVRO event for next year. I strongly recommend contacting him about joining the event when you start seeing announcements about it at the club meetings in the spring of 2026. It's well worth the trip to have a chance to see the radio observatory up close, the skies there are usually excellent for observing and imaging, Doug and Helen plan a great array of activities each year, and there's a lot to see and do up there outside of OVRO (including a possible visit to the Alabama Hills).

Reminder – Starbecue on July 26

Unless something unusually bad happens weather-wise or there's some emergency that blocks our access to the Anza site, our annual Starbecue Potluck dinner is on calendar for the evening of the July star party on Saturday, July 26. If something happens that forces us to cancel it, we would post the information on the website and send it out on the email groups, so you might want to check before heading out, just in case.

Thinking positively, we expect the Starbecue to go forward as scheduled and hope that you all will come and help make it a truly memorable event. Please check the President's Message for June for details – and I look forward to seeing you there!

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

July 2025
Astronomy and space news summarized by Don Lynn from NASA and other sources

Black Hole Spin and Accretion – Back in 2017 scientists produced the first image of material swirling into a black hole, namely the supermassive black hole in galaxy M87. Further analysis of the observations made for that image measured the spin of the black hole (about 80% of the maximum allowable spin) and roughly the rate of accreting material (somewhere in the range of 0.00004 to 0.4 solar masses per year, which is fairly quiescent).

Maybe Collision – For decades, the best measurements of the motions of our Milky Way and the Andromeda Galaxy showed that they are moving toward each other, with an estimated time of collision about 5 billion years hence. A new study took into account the motions of other nearby galaxies (including M33 and the Large Magellanic Cloud), along with their gravitational effects, and the estimated errors in all measurements, and concluded that there is only about a 50% chance that Andromeda and our galaxy will collide any time in the next 10 billion years. The study ran 100,000 computer simulations with random errors of proper size distributions applied to every measurement, and only about half the simulations resulted in collision of the two large galaxies.

Rubin First Images – The Vera Rubin Observatory team released the first images taken by that observatory, which is located on the mountain Cerro Pachon in Chile. It is named after Vera Rubin, who developed evidence that dark matter must be tugging on the stars of essentially every galaxy. The telescope in the Rubin (known as the Simonyi Telescope, named after the billionaire who donated the money for the optics) is a very wide-field telescope with a doughnut-shaped 8.4-meter (26.7 ft) primary mirror. It can take an image every 37 seconds reaching objects past 24th magnitude. For the next 10 years, it will take images of the entire sky visible from its latitude (which is the entire southern hemisphere and maybe half the northern, except the area temporarily near the Sun) through 6 different color filters, repeating about every 3 days. Computers automatically make lists of every object that changed brightness or position since days ago. It has the largest digital camera ever made, having 3.2 billion pixels and weighing 6746 pounds. It is expected to catalog 20 billion galaxies, 17 billion individual stars, 3 to 4 million supernovas, and the orbits of 6 million Solar System bodies. In test operations, the Observatory has already discovered 2104 asteroids. Full operations will start this fall. Needless to say, it will revolutionize astronomy. The initial images released were of part of the Virgo galaxy cluster, the Trifid and Lagoon Nebulas, and a video of asteroids moving. Because each image taken has 1600 times the pixels of a high-def TV, the Observatory team has developed an online viewer known as Skyviewer that allows users to zoom in on any portion of any Rubin image. Astro trivia question with a new answer: What is the largest lens ever made for a telescope? It is now the front corrector lens (of 3) in the Rubin Observatory camera, at about 62 inches in diameter.

Complex Chemical – Astronomers have detected the largest aromatic molecule ever found in space. It is known as cyanocoronene, and consists of 7 connected benzene rings and a cyano group. It was detected in the molecular cloud TMC-1, where new stars are forming. The detection was made spectroscopically in radio data from the Green Bank Telescope. The significance of the discovery is that more complex chemistry than previously thought can form in space before stars can form such later in their lives. Complex chemistry is needed to build planets and life. Astronomers will search for other complex chemicals in space.

Galaxy Catalog Released – A collaboration known as COSMOS has released the collected images taken by the James Webb Space Telescope (JWST), along with a catalog of about 800,000 galaxies in those images. The farther away objects are in the JWST images, the farther back in time we are seeing the objects, due to the time their light took to get here. So, the COSMOS catalog covers galaxies over 98% of the history of the Universe. Surprises found in this catalog are that galaxies existing in the first 3-4% of history are about 10 times more common than theorists predicted. More supermassive black holes are seen in the early history period than the Hubble Space Telescope (HST) was able to see. The COSMOS group will continue to expand the catalog as JWST takes more images, and they will also add JWST spectroscopic data to the catalog.

Thick And Thin Disks – JWST images of more than 100 disk galaxies were used in a study to determine if each possessed a thick disk and a thin disk like our Milky Way galaxy does. Our galaxy's thin disk is about 1000 light-years thick, while the thick disk is about 3000 light-years thick. Due to differences in distances, the studied galaxies were seen at different ages of the Universe. The study showed that thick disks form first, followed by thin disks billions of years later. High-mass galaxies developed their thin disks about 8 billion years ago, while low-mass galaxies formed thin disks about 4 billion years later. This result supports the "turbulent gas disk" theory which states that a thick disk forms when the galaxy's gas is turbulent, and the thin disk forms after initial turbulence has settled billions of years later. The turbulence apparently takes longer to settle in lower-mass galaxies.

Reionization Source – For a several hundred million years after the Big Bang, most of space was filled with neutral hydrogen gas, which formed a kind of fog that absorbed many wavelengths of light emitted by stars. Eventually enough ultraviolet light was emitted to ionize (electrically charge) the hydrogen, at which point it became transparent. This has been termed the "reionization" because all matter was ionized for a short previous time after the Big Bang. There has been much discussion about the source of the reionizing light. New observations with JWST indicate that small galaxies were a substantial source of the reionizing light. JWST observed many small galaxies through a gravitational lens that made dim objects such as small and very distant galaxies more easily visible. These observations showed that the small galaxies produced large amounts of ultraviolet light due to bursts of intense star formation and thus made the major contribution to the reionization.

Mystery Object – Astronomers used the Chandra X-ray Space Telescope to see if a radio source known as ASKAP J12832-0911 was also emitting in X-rays. The radio source flashes every 44 minutes and 12 seconds, which is unusual for a cosmic radio source. The object was measured to be 15,000 light-years away, putting it well within our Milky Way galaxy. Even with both radio and X-ray observations, astronomers still cannot determine what type of object would emit like this. They have narrowed the possibilities to a white dwarf star (but only if it has a companion object) or a neutron star (but not a pulsar type of neutron star), either of which must be surrounded by a strong magnetic field. Either of these causes leaves some observational properties unexplained. Complicating the search for a cause of this emission is the fact that the object recently stopped emitting X-rays. Further work is needed.

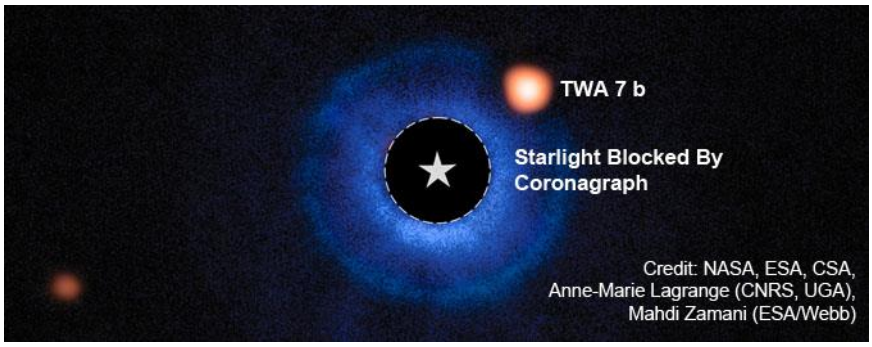
Missing Image Found – A distant galaxy dubbed HE0230-2130 contains a supermassive black hole/quasar, which is seen through a gravitational lens created by a pair of massive galaxies that happens to sit in front of it. Computer modeling of the gravitational lens keeps showing that it creates 5 images of the quasar, yet visible-light observations show only 4. Astronomers made a new search for the 5th image in X-ray pictures, by stacking multiple pictures to bring out faint objects, and thus found the 5th image, though fainter than expected. The faintness has been attributed to dust dimming the view.

Cosmic Filament – There is missing ordinary matter (that is, matter made up of protons, neutrons and electrons, so not including Dark Matter) in the Universe. Meaning that when the (ordinary) masses are added up of all known stars, planets, gas clouds, and dust clouds, the result is considerably short of the amount of ordinary mass calculated from the Cosmic Microwave Background. A team of astronomers has discovered a large filament of hot gas that connects 4 clusters of galaxies. If this filament is typical, such filaments may account for part or all of the missing ordinary matter. The filament was found by the X-rays that it emitted, which had to be isolated from all the X-ray-emitting matter along the same line of sight. The mass of the filament was determined to be about 10 times the mass of the Milky Way. The filament is located in the Shapley Supercluster of galaxies, which is about 650 million light-years away in Centaurus. The density of the filament is rather low, at about 10 particles per cubic meter, which is why such filaments are very difficult to detect.

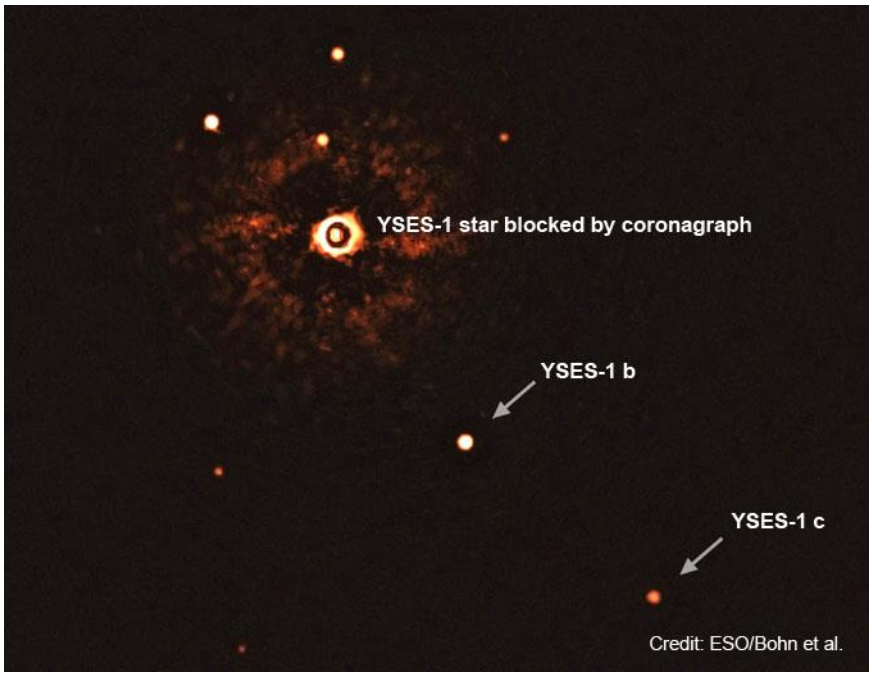
Timing Variation Exoplanet Discovery – Astronomers measured variations in the timing of a known exoplanet passing in front of its star (transiting) to prove that there is a second planet in this system that gravitationally disturbs the transit timing of the first. The star is a Sun-like star known as Kepler 725 located 2475 light-years away. The newly discovered planet has about 10 times the mass of Earth. Its average distance from its star puts it in the habitable zone, that is, where surface temperatures would allow liquid water to exist. However, it has a fairly eccentric orbit and so goes in and out of the habitable zone on every revolution. The first planet found in this system is a gas giant with about ¼ the mass of Jupiter.

Misaligned Exoplanet Imaged – JWST has taken an image of an exoplanet known as 14 Herculis c, located about 60 light-years away. Although about 6000 exoplanets are known, less than 100 of these have been imaged due to the difficulty of seeing a very dim object next to a far brighter star. The planet's temperature was determined, and it is cold at about 26°F. It is a gas giant about 7 times the mass of Jupiter. It orbits a Sun-like star. There is a second planet in the system, but it is too close to the star to be imaged. The most unusual thing about the system is that the planes of the two planets' orbits are inclined at about a 40° angle. This is the most misaligned planet system that has been imaged. Theorists are working on explaining how this misalignment came about. The imaged planet averages 15 AU from its star (where 1 AU is Earth's distance from the Sun), but the orbit is quite elliptical. Spectroscopic observations are planned to find out more about the planet's atmosphere.

Saturn-Mass Exoplanet – JWST has discovered by imaging an exoplanet known by either of the names CE Antilae b or TWA 7 b. Its mass is about that of Saturn. This is the least massive exoplanet ever discovered through direct imaging. Photographing such a dim object required using JWST's coronagraph to block the star's light and performing advance image processing to remove glare. The planet is located in a gap between dust rings that were previously discovered in ground-based observations. The planet's properties are those expected for a planet that has gravitationally created a gap in dust rings. The planet's star is a young red dwarf about 34 light-years away.

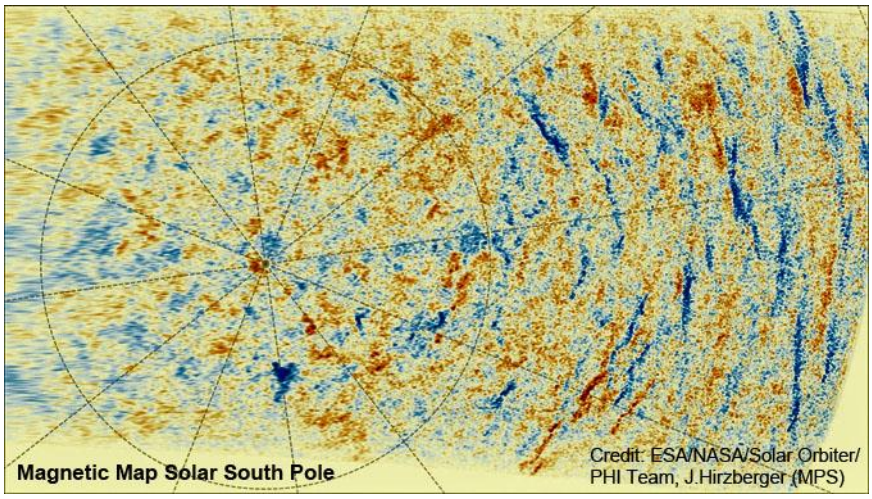


Forming Planetary System – JWST was used to observe two exoplanets orbiting a young (16 million years old) star known as YSES-1. It is Sun-like (except much younger) and is located 326 light-years away. Silicate (sand-like) clouds were identified spectrally in the "c" planet's atmosphere. It is a gas giant with 6 times the mass of Jupiter, and it orbits about 60 times farther from its star than Jupiter is from the Sun. A dusty circumplanetary disk was found about the "b" planet, indicating it is still forming as a planet. Silicates were also identified in this disk. Both planets' atmospheres contained carbon monoxide, carbon dioxide, water and methane. Only 3 other circumplanetary disks have been observed about planets of such young stars.



Planetary Formation Timing – A new image processing technique known as super-resolution with sparse modeling was applied to images of 78 planet-forming disks taken by ALMA (radiotelescope array in Chile). The result was that many of the disks showed ring or spiral substructures that were not visible with previous processing. It is believed that these substructures are formed gravitationally by planets undergoing formation. Some of these were found only several hundred thousand years after star birth, earlier than it was previously thought that planets form. Apparently, the dust and gas in the disks was preventing astronomers from seeing early signs of planet formation. These results show that planet formation likely starts while their star is still accumulating material. The early substructures were found more often in disks of radius over 30 AU.

Sun's Pole – About 5 years ago the European Solar Orbiter was launched. Like almost all interplanetary spacecraft, it orbited nearly in the plane of the planets. But over the years spacecraft controllers have slowly changed its orbit to now lie in a plane tilted by 17° to the planets' plane. This is enough so that at one point in its orbit the spacecraft gets a passable view of the Sun's south pole. This is the first time this has ever happened. Images of the magnetic field of the Sun show a surprising mess of magnetic polarities near its south pole.

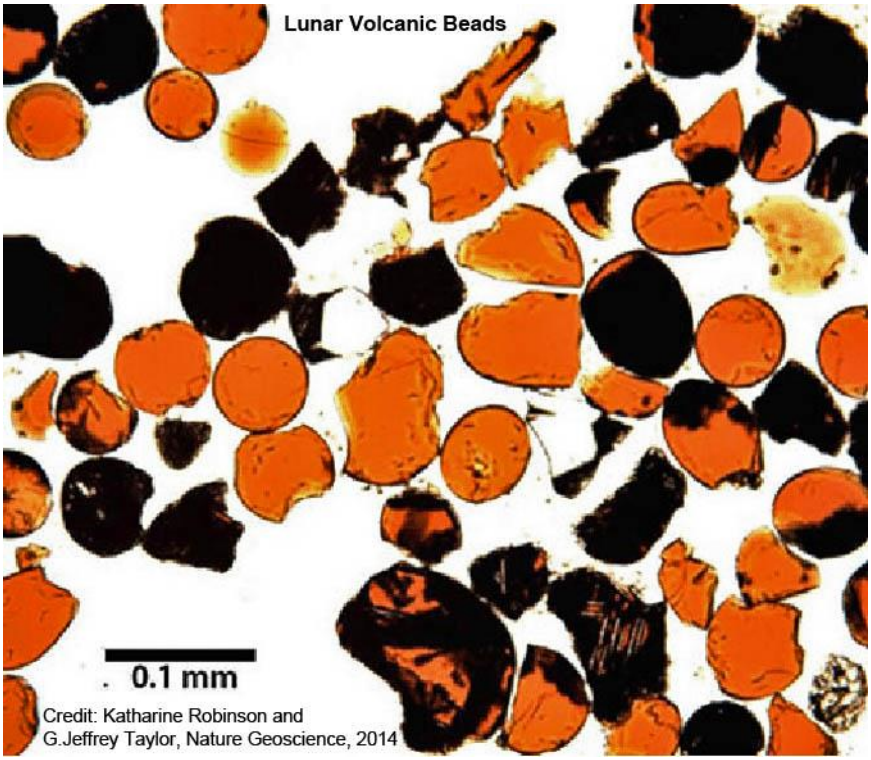


Uranian Moons – The large moons of Uranus are tidally locked to the planet, so that one side of each moon always faces toward the planet. Consequently, each moon has a side that leads in orbiting and the opposite side trails in orbiting. Theorists claimed that since the planet's magnetic field rotates faster than any of the moons orbit, the magnetic field would sweep up any charged particles and deposit them on the trailing side of each moon. Astronomers have been using HST to monitor the 4 largest Uranian moons to look for signs of particle debris on their trailing sides. Not only did they not find such signs, they instead found signs of particle debris on the wrong (leading) side of 2 of the moons (Titania and Oberon). The signs observed were darkenings in ultraviolet light. A new theory is that the irregular (small outer) moons shed material due to micrometeorite collisions, and that material drifts into Titania and Oberon, regardless of any magnetic effects, and hits the leading sides. Further research is needed to determine why the magnetic field does not affect the placement of debris on the moons.

Pluto Haze – Back in 2017 an astronomer published a theory that Pluto's atmospheric temperatures would be dominated by the actions of haze, unlike any other planet or dwarf planet in our Solar System. New observations of Pluto using JWST confirmed this theory. These haze-related temperature variations affect surface ice distribution and the falling of Pluto material onto its moon Charon.

Lander Failure – The Japanese company iSpace made its second attempt to land one of its Hakuto-R missions on the Moon, but like its first attempt in 2023, the lander crashed. This time the cause was a problem with the craft's laser range finder. iSpace will continue its efforts with future lunar landers.

Lunar Beads – One of the strangest things astronauts found on the Moon were tiny orange and black beads. A new study of these beads was made using new instruments and methods. The beads formed more than 3 billion years ago by volcanic activity. Molten material from the interior solidified into these beads when it struck the vacuum of space. These beads are evidence that long ago the Moon had explosive volcanic activity. The new study extracted material from within the beads and analyzed their minerals without allowing the samples to contact Earth's air. Zinc sulfides and other minerals were identified.



Huge Comet – A team of astronomers has detected cometary outgassing in a comet known as C/2014 UN271 (Bernardinelli-Bernstein), which is on its way into the realm of the Solar System planets from the Oort Cloud. (Comets can also originate from the Kuiper Belt.) The outgassing was detected by ALMA, a radiotelescope array in Chile. The comet's nucleus has been estimated at 85 miles across, extremely large for a comet. It is the largest Oort Cloud comet nucleus ever seen and the outgassing is the 2nd most distant for Oort Cloud comets. New observations show jets of carbon monoxide erupting. Astronomers expect that evaporating ices other than carbon monoxide will add to the jets as the comet gets closer to the Sun and therefore warmer.

Adopt-a-Scope

Raffle at the OCA Club Meeting in July 2025

Prize: Celestron Nexstar 8 SE telescope with StarBright XLT Optics Single Fork 2-axis motorized Mount with ALT/AZ configuration Nexstar GoTo hand controller, Tubular steel Tripod, finder scope Diagonal, 32mm Plossl Eyepiece, AC Adapter, Manual

When: July 11, 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.

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.

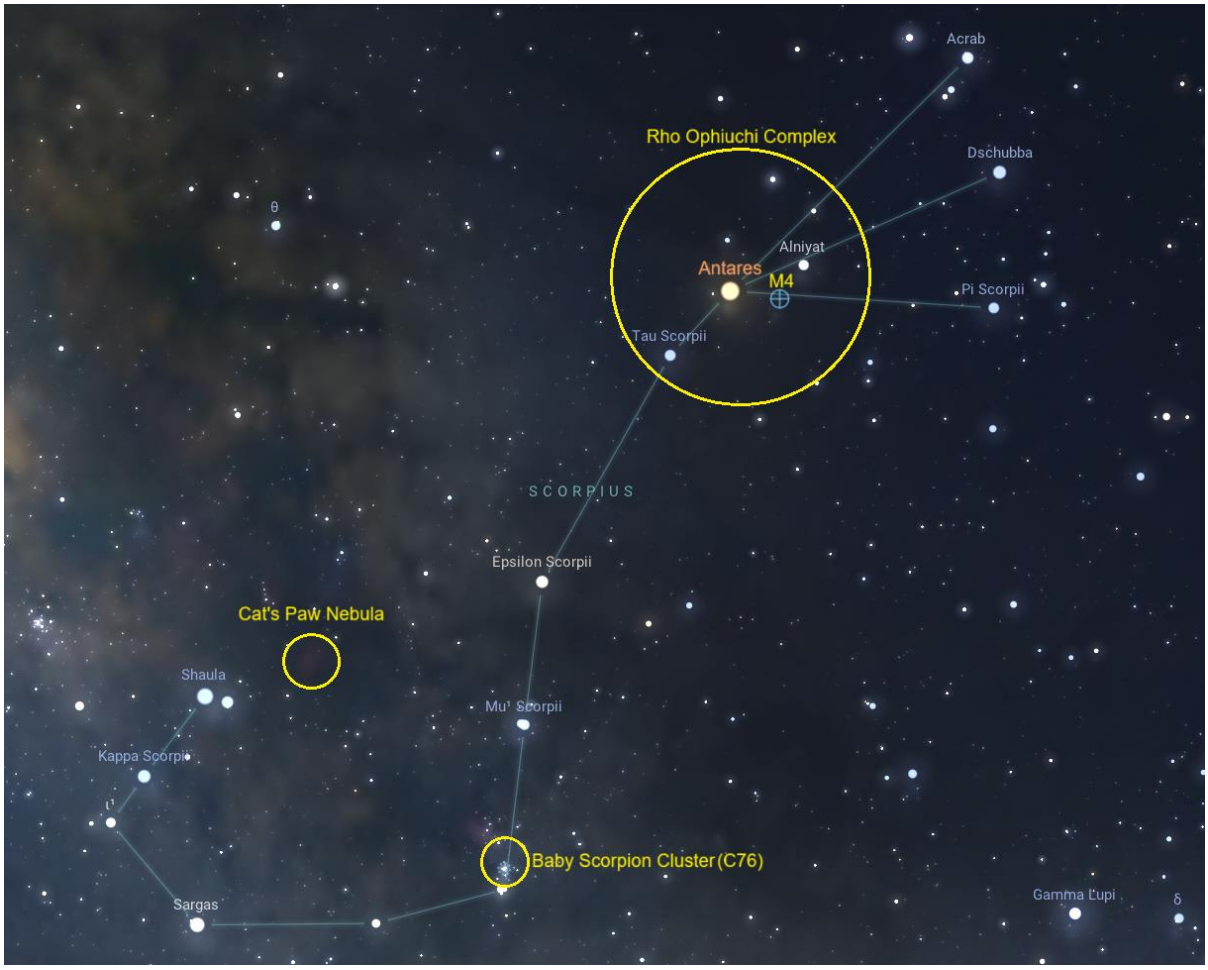
Due dates for submission of articles, pictures and advertisements are 13 days prior to the subsequent general club meeting.

Issue	**Due date**
August	26 July
September	30 August
October	27 September

July's Night Sky Notes: Spy the Scorpion

By: Kat Troche

As summer deepens in the Northern Hemisphere, a familiar constellation rises with the galactic core of the Milky Way each evening: Scorpius the Scorpion. One of the twelve zodiacal constellations, Scorpius contains many notable objects, making it an observer's delight during the warmer months. Here are some items to spy in July:



The star map of the Scorpius constellation highlights the star Antares and several notable deep-sky objects like the Rho Ophiuchi Complex, Messier 4, the Cat's Paw Nebula, and Caldwell 76, the Baby Scorpion Cluster. Credit: Stellarium Web

- **Antares:** referred to as "the heart of the scorpion," this supergiant has a distinct reddish hue and is visible to the naked eye. If you have good skies, try to split this binary star with a medium-sized telescope. Antares is a double star with a white main-sequence companion that comes in at a 5.4 magnitude.
- **Messier 4:** one of the easiest globular clusters to find, M4 is the closest of these star clusters to Earth at 5,500 light years. With a magnitude of about 5.6, you can spot this with a small or medium-sized telescope in average skies. Darker skies will reveal the bright core. Use Antares as a guide star for this short trip across the sky.
- **Caldwell 76:** If you prefer open star clusters, locate C76, also known as the Baby Scorpion Cluster, right where the 'stinger' of Scorpius starts to curve. At a magnitude of 2.6, it is slightly brighter than M4, albeit smaller, and can be spotted with binoculars and the naked eye under good sky conditions.

A digital map of the Rho Ophiuchi Complex. Credit: Stellarium Web

Lastly, if you have an astrophotography set up, capture the Cat's Paw Nebula near the stinger of Scorpius. You can also capture the Rho Ophiuchi cloud complex in the nearby constellation Ophiuchus. Brilliant Antares can be found at the center of this wondrous structure.

Manaiakalani

While many cultures tell tales of a 'scorpion' in the sky, several Polynesian cultures see the same stars as the demigod Māui's fishhook, Manaiakalani. It is said that Māui didn't just use his hook for giant fish in the sea, but to pull new islands from the bottom of the ocean. There are many references to the Milky Way representing a fish. As Manaiakalani rises from the southeast, it appears to pull the great celestial fish across a glittering sea of stars.

Measure Your Darkness

While you can use smartphone apps or dedicated devices like a Sky Quality Meter, Scorpius is a great constellation to measure your sky darkness with! On a clear night, can you trail the curve of the tail? Can you see the scorpion's heart? Use our free printable Dark Sky Wheel, featuring the stars of Scorpius on one side and Orion on the other for measurements during cooler months. You can find this resource and more in the Big Astronomy Toolkit.

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

Hard case for Explore Scientific ED152 telescope, in mint condition $ 159

- This hard case can store refractors in the 127 mm to 152 mm range
- Back wheels allow for dolly like handling
- Essentially brand new ($299 new but on backorder at ES)

I had my ED152 serviced and had ES ship it back in the case

This item is local pickup only. If interested, please send me email requesting a complete description.

For Sale contact David Fischer dkn.fischer@gmail.com

Astronomy camera: SBIG STF-8300C, lightly used and still functional. 8.3 Mpxl, One-shot color. $ 200

- Hard case, power supply, USB cable
- Adapter for Nikon manually focused lenses

I haven't used it for several years. Its best use may be as a back-up for systems already employing a similar camera.

SBIG cameras are supported by The Sky, SGP, and some other image capture programs. The website for DiffractionLimited (successor to SBIG) has a pointer to third party Linux support. I believe that there is also a third-party driver enabling NINA to control this camera.

Available for local pickup (Laguna Niguel), delivery at OCA general meeting or Anza site. If interested, please send email.

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)

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