



This is the globular cluster M13 (" Hercules") TAKEN BY Ross Salinger about 3 years ago using an AP Starfire 155mm refractor and ASI071 color camera.

Upcoming Events - free and open to the public

Beginner's class	Friday, 4 October at 7:30 to 9:30 PM ONLINE This is the 2nd session of the Beginners Astronomy Class. It covers the different types of equipment used to observe the night sky, including telescopes, mounts, eyepieces, filters, and advantages and disadvantages of different options.
Club Meeting	Friday, 13 September at 7:30 to 9:30 PM IN PERSON at Chapman University and ONLINE "What's Up?": Lonny Buinis from UACNJ (online) Main speaker: Dr. Marta Filipa Simões from Macau University of Science and Technology (online) presenting "What is the role of fungi in space exploration?"
Open Spiral Bar	Saturday, 14 September at 10:00 to 11:30 PM ONLINE Want to socialize? Grab your images, experiences, questions, or none and see your fellow Orange County Astronomers face-to-face.
Star Parties	Saturday, 28 September and 5 October at the OCA Anza site. ??? Irvine site dates are yet to be determined

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://twitter.com/OCAstronomers>
<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

It seems that this year has been an unusually fast-moving year for just about everyone I talk to – and here we are at the fall equinox already. The eclipse in April wasn't all that long ago, but it was on the other side of the Summer Solstice, and now we're halfway to the Winter Solstice, in the heart of the holiday season. Not that most of us want to think about the holiday season yet, even though it could be a justification for getting some cool new astronomical gear...

Even though I was among the hundreds that got clouded out for the eclipse, I did wind up with a collection of eclipse T-shirts, thanks to my husband, who is much better at finding these things than I am. I've discovered since then that those T-shirts get more response than any of my other shirts. Total strangers regularly ask if I actually saw the eclipse, then ask questions or start telling me about their own attempts to see it, or aspirations of seeing one in the future. That eclipse is a real ice-breaker for conversations, much more than the 2017 eclipse for some reason.

It's a reminder that many people out there, from all walks of life and backgrounds, are fascinated by astronomical events and astronomy in general. Of course, there are those who confuse astronomy with astrology and, even after the difference is explained, remain foggy about it, but even they are usually delighted when actual objects in the sky are pointed out to them, or when they see them for themselves through binoculars or a telescope.

In these divided times in our society, it's good to know that astronomy has the rare ability to bridge gaps between people and give them interesting and non-acrimonious topics to discuss. Weather, a related topic of interest to those who are planning to view or image astronomical objects, can also bridge a lot of gaps – we're all affected by weather, after all. So, if you're with a bunch of people where you need to make conversation and want to keep things non-controversial, think of astronomy and weather for topics to see you through. And it's always possible that this will help you find fellow astronomers in the group, making it more fun for all of you.

Outreach

September generally marks the start of a new school year, and historically that has meant an increase in requests for outreach events at various schools. Martin Christensen, our current Outreach Coordinator, is looking for volunteers – even if you could only attend one event this outreach season, please send him your contact information at outreach@ocastronomers.org.

Fire Near Anza Site

As most of you already know, we had another brush fire this year that passed close by our Anza site, formally known as the Nixon Fire, the second in two years (BonnyFire being exactly one year prior). Fortunately, the winds didn't send it in our direction, and we didn't suffer any damage other than not having access to our site for over a week and having power shut off for part of that time. Others in our area were not so lucky – per Cal Fire, there were several homes and other structures that were burned, but fortunately no loss of life. If any of you know anyone who did suffer losses from the fire, I hope you'll convey our sympathy.

We still have at least a couple months of fire season left, and having one fire in our vicinity doesn't mean there couldn't be more. If you're out at Anza and see anything that you think could present a fire hazard or have a way to make the site more defensible, please bring it to the attention of any Board member who may be out there, or send a notice about it to the Board (board@ocastronomers.org will get a message to all Board members). If you can remedy the situation yourself, such as by cutting back grasses or bushes that are too close to a building, please do.

At this point, our Anza site is fully available to our members, and we expect our regular star parties to go forward as scheduled. Those coming up after you're likely to receive this are September 28 and October 5 (the Saturdays before and after the Wednesday new moon). The site, as usual, is open to members and their guests all the time, and many members use it for viewing or imaging on non-star party nights. Whenever you go out there, it's wise these days to check not just the weather but also for conditions that might shut off access to the site (flash floods from thunderstorms sometimes do a lot of damage to the dirt roads), and for smoke conditions that could affect viewing or imaging conditions.

That said, I hope you have great conditions for any time you spend out under the stars!

© Barbara Toy, August 2024

AstroSpace Update

August 2024

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

Martian Sulfur – Mars rover Curiosity ran over a rock and broke it open, revealing yellow material inside. It was found to be sulfur crystals, the first time such were found on Mars, though sulfur compounds have been previously found. A look around the area found more similar rocks. Now astronomers have to figure out the process by which these crystals could have formed. Curiosity drilled a sample of the sulfur for further analysis. The discovery was made in an area covered with a jumble of rocks that appear to have been left by ancient floods and landslides rushing down a channel.



Martian Lake – The European Mars Express spacecraft has imaged a region known as Caralis Chaos and analysis of the images shows that it and surrounding areas were a huge lake billions of years ago. That lake has been named Lake Eridania. Its shoreline has been found by chloride deposits left by evaporation. It was calculated that the volume of water that filled this lake is 3 times the volume of the largest lake on Earth (the Caspian Sea).

Martian Water – New analysis of data from the seismometer on the now-retired Martian InSight lander shows that there is a zone of fractured rock with cracks filled with liquid water that lies from about 7 to 12 miles below the surface. The data apply only to the region below where the seismometer was deployed, but it may well apply globally. It is calculated that the volume of liquid water in this zone, if global, is more than the volume that is believed to have filled an ocean on Mars a few billion years ago. It has long been known that frozen water is common much closer to the Martian surface, but the new discovery is definitely liquid.



Young Asteroid Surface – About 2 years ago, the DART spacecraft was smashed into asteroid Dimorphos to test whether that could deflect the orbit of an asteroid, should that become necessary in the future. Further analysis of DART data showed that the surface of Dimorphos was (before the collision) only 300,000 years old, while the surface of Didymos (its larger companion asteroid) is about 12.5 million years old. Both asteroids are determined to be rubble piles rather than solid bodies. Because rubble piles are easier to deflect than solid bodies, the impact of DART deflected Dimorphos more than had been predicted before the collision. The new analysis showed that Didymos was likely spun so fast by the action of sunlight that it threw off material that collected to become Dimorphos. The European Hera mission is scheduled for launch next month to follow up on the effects of the DART collision when Hera arrives at the two asteroids in late 2026.

Impactor Identified – An analysis of material left by the impact of an asteroid 66 million years ago near what is now called Chicxulub on the Yucatan Peninsula has determined that the asteroid was a carbonaceous chondrite. This was determined from the relative amounts of isotopes of the rare element ruthenium. The analysis ruled out the possibility that the impactor was a comet, which some astronomers have previously proposed. Such asteroids (and meteorites of the same composition) formed in the outer Solar System, though they can be found in the asteroid belt today. They are more fragile than stony asteroids. Analyses of other ancient asteroid impacts showed they were stony asteroids.

Cold Exoplanet Imaged – Of the more than 5000 exoplanets (planets outside our Solar System) known, only dozens of them have been imaged. Most exoplanets are too dim or appear too close to their star to be imaged. Another exoplanet, known as Epsilon Indi Ab, has been imaged, this one using the James Webb Space Telescope (JWST), and its temperature was taken also. It is only 35 °F, the coldest exoplanet yet imaged. Epsilon Indi Ab is much more massive than Jupiter and is considerably warmer but resembles Jupiter more closely than any other imaged exoplanets. It is only about 12 light-years away, making it the 12th closest known exoplanet. It orbits a star a little smaller and cooler than our Sun. There had been previous radial velocity evidence that there might be an exoplanet orbiting this star, which is why JWST was pointed at it. The planet is dimmer than expected at short wavelengths of infrared, which may mean the planet is cloudy or that certain gases in its atmosphere absorb short wavelengths. Further observations made with a spectrograph will decide the cause.

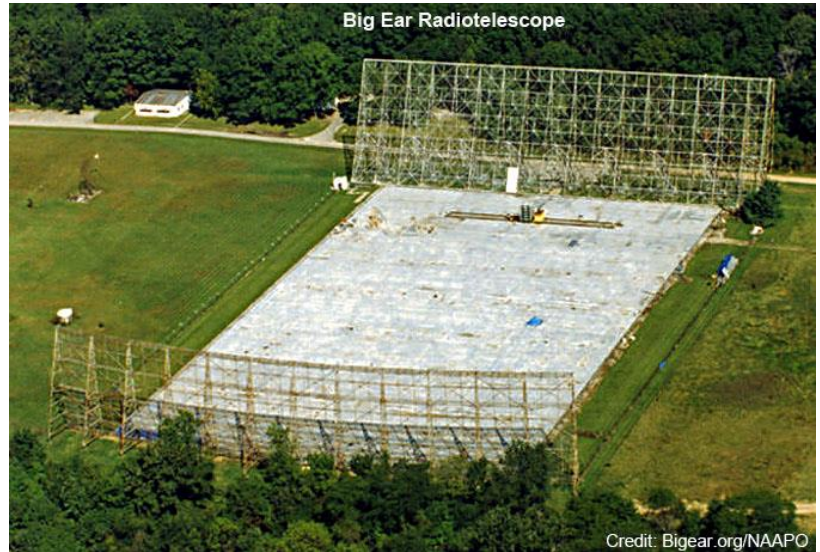
Hot Earth-Like Exoplanet – A team of researchers has found an Earth-sized exoplanet, known as TOI-6255, that orbits its star in just 5.7 hours (its year). Tidal forces from its star distort its shape to about 10% from spherical. It is calculated that in about 400 million years it will approach its star so closely that tidal forces will begin to tear the planet apart. The planet is about 1.08 times Earth's diameter and 1.44 times Earth's mass. It is about 65 light-years away. The astronomers hope to study the planet further with JWST observations. For instance, such observations could tell us if the surface is hot enough to melt rock. Astronomers like to observe a planet being torn apart (though they won't wait for this one) because spectroscopic observations of the debris tell us what the interior of the planet was made of.

Forming Exoplanet – New analysis of archived radio images of the disk surrounding the young star TW Hydrae shows that an exoplanet with about 4 times the mass of Earth is forming there. The images were taken using the ALMA radiotelescope array in Chile. The evidence was not the forming planet itself, but outflow shocks, which are produced during planet formation. These are located at the same radius in the disk as a previously known gap, which is also evidence for planet formation.

Black Hole Repeatedly Consumes Star – Usually when a star passes too close to a supermassive black hole, tidal forces tear the planet apart and the black hole consumes the pieces entirely. However, such an event that was discovered in X-rays in 2018 was found to repeat about 2 years later, implying that the star was only partially consumed and the remainder of it orbited close to the black hole again. The black hole has 50 million times the mass of the Sun and is located in a galaxy about 860 million light-years away. Based on the observations of the first event, astronomers predicted the second event would end in August 2023, and it did so on time. They then predicted the next close approach will begin between May and August of 2025 and will last about 2 years. They will be watching closely then.

Neutron Stars – An X-ray telescope known as NICER, which is located on the International Space Station, has been measuring the masses and diameters of neutron stars. Because the pressures in the centers of neutron stars are beyond what can be created in labs, scientists don't know exactly how neutrons react with increasing pressure, this reaction known as the equation of state. The NICER measurements will be used to try to pin down this equation of state. The initial results show that it is slightly squishy, which means the neutrons pack only slightly tighter with increased pressure. This rules out the theories that predict the centers of neutron stars should be very squishy or very stiff (hardly compress at all). This agrees with implications regarding the equation of state from gravitational wave measurements made of colliding neutron stars. NICER observations will continue, hoping to pin this down better than just "slightly squishy".

Wow! Explained – In 1977 the Ohio State University Big Ear radio telescope received an unusual and strong signal from the direction of Sagittarius that became known as the Wow! Signal. Some people believed it to be a signal from intelligent aliens. A new study of archived radio signals from the now-defunct Arecibo radiotelescope has found patterns with similar characteristics, implying the Wow! Signal had a similar cause. The Arecibo signals had been previously identified as being caused by a flare from either a magnetar or a soft gamma repeater, whose flare light was then modified by passing through a hydrogen gas cloud. No aliens required for the Wow! Signal.



Dark Matter – Readers may have seen images of the Bullet Cluster, showing that when two clusters of galaxies collide, the gas of the galaxies is slowed by friction while most of the mass (as measured by gravitational lensing) is not substantially slowed. This is considered perhaps the most irrefutable evidence that most of the mass of galaxy clusters is dark matter, which feels only gravity not friction. It happened again: another pair of colliding galaxy clusters, known as MACS J0018.5+1626, has been discovered where the gas and the other mass have separated due to friction in the collision. It has been studied by observations from many ground- and space-based telescopes. However, this pair is oriented with the collision motion towards and away from us rather than across our field of view and so data on the new discovery showed the separation as differences in speed toward/away from us rather than differences in location in the field of view.

Gaia Recovers – Gaia, the space telescope that has measured extremely precise locations and motions of more than a billion stars, has experienced two problems: A micrometeoroid pierced a cover on the telescope (letting stray light in) and a sensor failed. The sensor was not the main imager, but an auxiliary one used to register when the telescope is pointed directly at a star. Spacecraft controllers reprogrammed the onboard computer and took the opportunity to refocus the telescope, and it is now functioning a little better than when new. Gaia is planned to continue to take data for several more years.

Asteroid Moons – A search through Gaia data has found 352 new instances of asteroids that are wobbling like they are being orbited by a moon. Only about 500 asteroid moons were previously known. Theoretically one in every 6 asteroids should have a moon, though far less than 1% of asteroids have actually been found to have moons because asteroid moons are so hard to detect.

NEOWISE Ends – The NEOWISE mission, which for more than 10 years has been discovering asteroids and comets, particularly ones that pass near Earth, has ended. The reason for ending the mission is that the spacecraft has dropped in its orbit due to atmospheric friction so far that it is becoming unusable. It is expected to burn up in the atmosphere before year's end. The spacecraft was known as WISE when first launched in 2009 and completed a survey of the entire sky in infrared with far greater sensitivity than previous infrared missions. When the coolant for its sensors ran out, it was found still to be sensitive enough to detect thousands of asteroids and comets and was given its new name and mission. NEOWISE's mission of discovering near-Earth asteroids and comets will be taken over by an even more capable space telescope known as NEO Surveyor, which may launch as soon as 2027.

Small Speeding Star – Citizen scientists working on NASA's Backyard Worlds: Planet 9 project found an extremely fast-moving object whose small mass places it in either the very small star or brown dwarf category. It is moving fast enough, about a million mph, to escape our Milky Way galaxy, and is the smallest known object in this escape class. The Backyard Worlds project has volunteers examining archived images from the WISE infrared space telescope. Follow up observations found that this fast-moving object is quite low in heavy element content, which means it formed early in the history of the Milky Way, before many generations of stars had created and spread heavy elements.

Boeing Starliner – As was reported here the past two months, the first test flight of a Starliner spacecraft with crew to ISS in June experienced problems with thruster operation. In order to allow testing of the thrusters before returning to Earth with its two astronauts (Butch Wilmore and Suni Williams), their originally planned stay at ISS of about a week has been extended. The thrusters are on a spacecraft part that is burned up on reentry, so that is one reason why the testing while still at ISS was important and took so long. In late August, NASA announced that because of uncertainties in thruster behavior, even after testing that had been done, it was decided in the interests of safety to bring the Starliner back to Earth in September without crew, by remote control, and to bring Wilmore and Williams back on the next scheduled SpaceX crewed flight to ISS, designated Crew-9 Mission. This means removing two scheduled passengers on Crew-9, leaving 2 seats empty, to be filled by Butch and Suni on the return flight down. Crew-9 is currently scheduled to launch in September and return to Earth February or March 2025. Boeing will work to correct thruster problems before the next flight of Starliner. NASA wants to have two methods of transporting astronauts to and from ISS, but so far only SpaceX vehicles have been certified for this. So, it is important to NASA for Starliner to finish certification. It is important to Boeing also, as they have overspent the payments for development of Starliner and won't get paid again until they get Starliner certified for regular trips to ISS.

Pictures from Nixon Fire Near OCA Anza Site



From Brett Nordby from upper pads, taken about 2 PM.
Fire start was estimated to be just about noon.



From Leon Aslan via his observatory security camera at about 5 PM.



From Robert Peck via his observatory security camera 3:12 PM



Taken from Menafee by Mark Maiar on afternoon of first day

Afterwards



By David Fischer, taken near the Kuhn observatory on 8 August after fire ended



Taken from Upper Pads

From the Editor

The newsletter is open to suggestions for new content to replace the column "Another Look". We are trying out a monthly column from NASA which they provide for use in Astronomy club newsletters. It also appears in newsletters of some other local clubs. Please let the editor know what you think of it.

Due dates for submission of articles, pictures and advertisements

<u>Issue</u>	<u>Due date</u>
October	21 September
November	19 October
December	23 November
January 2025	21 December



This article is distributed by NASA's Night Sky Network (NSN).

The NSN program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

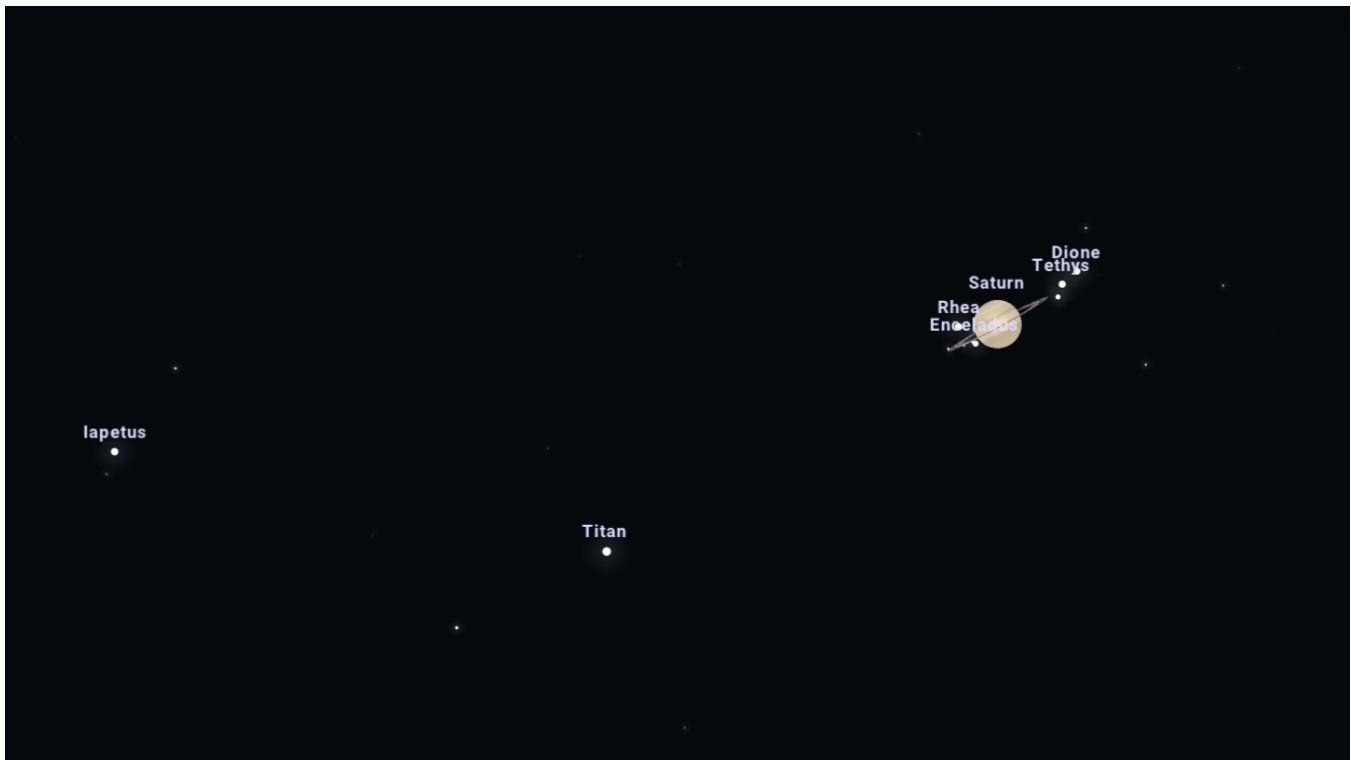
September's Night Sky Notes: Marvelous Moons

By Kat Troche

September brings the gas giants Jupiter and Saturn back into view, along with their satellites. And while we organize celebrations to observe our own Moon this month, be sure to grab a telescope or binoculars to see other moons within our Solar System! We recommend observing these moons (and planets!) when they are at their highest in the night sky, to get the best possible unobstructed views.

The More the Merrier

As of September 2024, the ringed planet Saturn has 146 identified moons in its orbit. These celestial bodies range in size; the smallest being a few hundred feet across, to Titan, the second largest moon in our solar system.



The Saturnian system along with various moons around the planet Saturn: Iapetus, Titan, Enceladus, Rhea, Tethys, and Dione. Credit: Stellarium Web

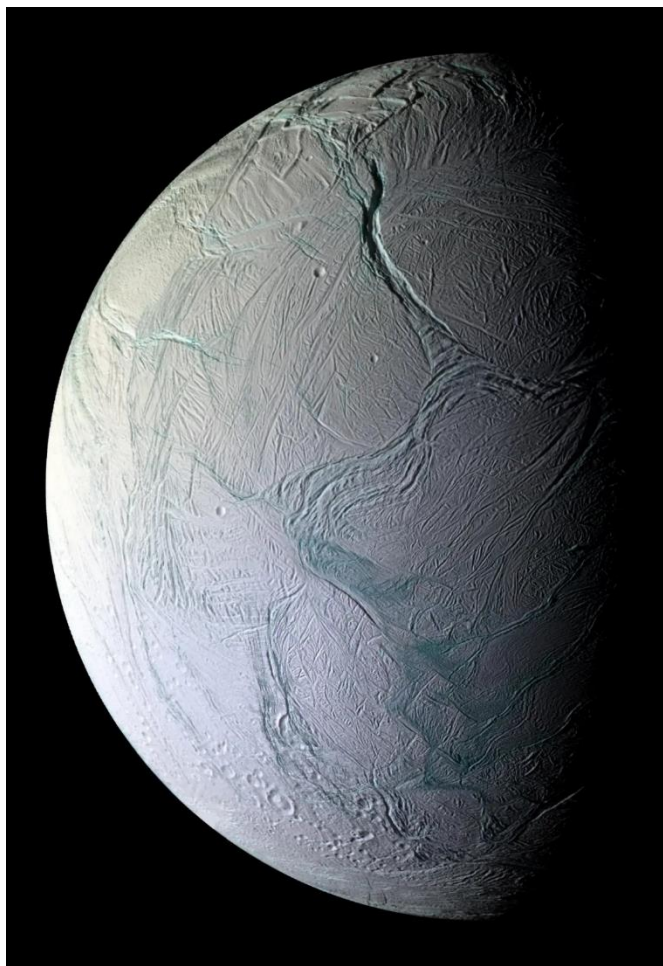
Even at nearly 900 million miles away, [Titan](#) can be easily spotted next to Saturn with a 4-inch telescope, under urban and suburban skies, due to its sheer size. With an atmosphere of mostly nitrogen with traces of hydrogen and methane, Titan was briefly explored in 2005 with the [Huygens probe](#) as part of the [Cassini-Huygens mission](#), providing more information about the surface of Titan. NASA's mission [Dragonfly](#) is set to explore the surface of Titan in the 2030s.

This mosaic of Saturn's moon Enceladus was created with images captured by NASA's Cassini spacecraft on Oct. 9, 2008, after the spacecraft came within about 16 miles (25 kilometers) of the surface of Enceladus. Credit: NASA/JPL/Space Science Institute

Saturn's moon [Enceladus](#) was also explored by the Cassini mission, revealing plumes of ice that erupt from below the surface, adding to the brilliance of Saturn's rings. Much like our own Moon, Enceladus remains tidally locked with Saturn, presenting the same side towards its host planet at all times.

The Galilean Gang

The King of the Planets might not have the most moons, but four of Jupiter's 95 moons are definitely the easiest to see with a small pair of binoculars or a small telescope because they form a clear line. The Galilean Moons – Ganymede, Callisto, Io, and Europa – were first discovered in 1610 and they continue to amaze stargazers across the globe.



The Jovian system: Europa, Io, Ganymede, and Callisto. Credit: Stellarium Web

- [Ganymede](#): largest moon in our solar system, and larger than the planet Mercury, Ganymede has its own magnetic field and a possible saltwater ocean beneath the surface.
- [Callisto](#): this heavily cratered moon is the third largest in our solar system. Although Callisto is the furthest away of the Galilean moons, it only takes 17 days to complete an orbit around Jupiter.
- [Io](#): the closest moon and third largest in this system, Io is an extremely active world, due to the push and pull of Jupiter's gravity. The volcanic activity of this rocky world is so intense that it can be seen from some of the largest telescopes here on Earth.
- [Europa](#): Jupiter's smallest moon also happens to be the strongest candidate for a liquid ocean beneath the surface. NASA's [Europa Clipper](#) is set to launch October 2024 and will determine if this moon has conditions suitable to support life. Want to learn more? Rewatch the July 2023 Night Sky Network webinar about Europa Clipper [here](#).

Be sure to celebrate [International Observe the Moon Night](#) here on Earth September 14, 2024, leading up to the super full moon on September 17th! You can learn more about supermoons in our mid-month article on the [Night Sky Network](#) page!

Bonus Picture



This is an H-alpha image of IC5070, the "Pelican" from Bill Hall in 2013 using an 8 inch Newtonian and ST8300 camera.

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.

Each advertisement may be run for 3 consecutive issues, after which it will be removed. The advertiser may resubmit it for inclusion after a one-month hiatus.

For Sale	contact	Arnie Richards	(562) 644-9775	wannawalk52@gmail.com	
•		Meade 7" LX200 Maksutov-Cassegrain telescope with tripod.			\$ 900
•		Includes tripod, 9 Plossl eyepieces ranging in focal length from 6 mm to 40 mm; and a full aperture solar filter.			
Originally purchased in 2003 for \$3500; Excellent optics; Alt-Azimuth fork mount in excellent condition but GPS tracking program is slow and cranky. My understanding is that there are local (SoCal) experts who can fix this.					
Photos, including sample images, are available upon request. Will deliver to any location within 100 miles of Downey, CA.					
For Sale	contact	Jerry Floyd		jlfloyd720@gmail.com	
•		Celestron AVX mount, no tripod			\$ 450
		Excellent condition - includes SkySync GPS accessory and 11-pound counterweight			
The buyer can either pick it up at my house in Hemet at their convenience, or I can deliver it in Southern California at my convenience.					
For Sale	contact	Vince Laman		lamanvp@aol.com	
•		Celestron CGX-L mount package. Mount and Tripod. Star Sense AutoAlign, Polar Axis Finderscope			\$ 2600
		75 lb rating for astrophotography. Higher rating for visual.			
		All new in box. Never used. Retail value of these items \$5300.			
These items are local pickup only. If interested send me an email requesting a complete description.					
For Sale	contact	Marten Seth	949-892-7790	info@sethfamilyoffice.com	
•		Glass Solar Filter ST425G 4" from Spectrum Telescope.			\$ 50
		Inner Diameter 4.25"/108 mm/ clear aperture 3.5			
		Bought from OPT, never used, in original box.			
Located in Laguna Niguel.					
For Sale	contact	Dave Cook	949-689-0853	cell	
•		MEADE LX200 GPS, 10-inch diam. mirror			\$2300
•		Includes heavy-duty mount and tripod, 10-inch OTA, Heavy-duty optional equatorial wedge, 115-volt AC to 12-volt power adapter, all normal accessories			
•		Accessory & eyepiece utility tray, padded soft carrying case, soft dew shield, 1-1/4 90-degree diagonal			
•		Peterson Engineering modifications: ball-bearing focuser mod, precision brass drive gear mod			
•		Electronic focuser is included.			
This system can be used in either azimuth or equatorial mode. Mount and telescope just returned from Meade factory mechanical/electrical refurbishment and update costing \$500+ (still in shipping box from Meade). Current equivalent Meade LX200, 10-inch GPS, priced new is \$5899					
Note: This is my favorite telescope, but due to anti-cancer drugs, I no longer have the strength to singlehandedly maneuver this system.					
Wanted	contact	Marten Seth	949-892-7790	info@sethfamilyoffice.com	
•		Losmandy Heavy Duty Tripod (old version or new folding model) or similar, ideally with AP adapter			
		but not a requirement.			
Located in Laguna Niguel.					

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