SIRIUS ASTRONOMER

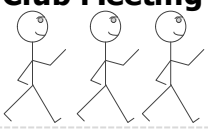
www.ocastronomers.org

The Newsletter of the Orange County Astronomers

March 2025 Free to members, subscriptions $12 for 12 issues **Volume 52, Number 3**

NGC 4567 and 4568, also known as the Butterfly Galaxies, on left with M58 on the right. Jerry Floyd imaged these with a William Optics 5 inch refractor and ASI 1600MM mono camera from our Anza site in April 2022.

Upcoming Events - free and open to the public

Beginner's class	Friday, 4 April 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, 14 March at 7:30 to 9:30 PM **IN PERSON** and **ONLINE** "What's Up": John Garrett from TVA **IN PERSON** Main speaker: Courtney Duncan from JPL **IN PERSON** whose talk will be "Mars Helicopter Telecom"
Astro-Physics SIG	Friday, 21 March at 7:00 to 9:00 PM **IN PERSON** Orange Coast College, Building 40, Astronomy House
Astro-Imagers SIG	Friday, 4 April at 7:00 to 10:00 PM **IN PERSON (**and **ONLINE) ?** Orange Coast College, Building 40, Astronomy House
Open Spiral Bar	Saturday, 15 March 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, 29 March 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

The March 2025 issue of the Sirius Astronomer will be the last paper edition of our newsletter, as we announced last month. The decision to go to a purely electronic version of the newsletter was made at the January Board meeting based on the information Charlie Oostdyk put together on our past and expected annual expenses, which have been increasing significantly, and our expected revenue, which has held fairly steady.

The club has been faced with increasing costs for insurance and utilities, as have many of our members. We need liability insurance coverage for all of our activities, including all club meetings, outreach activities and star parties. Chapman University and other venues won't allow us access without proof of insurance. Our insurance agent regularly checks for less expensive coverage and yet, even without fire coverage and though we've never had a claim, our insurance costs have risen each year. We don't yet have the bills for 2025, but the Insurance Commissioner has been allowing increases to premiums and thus we expect higher bills than last year.

Our utility expenses for the Anza site include electrical service, propane for Anza House, and internet access. Our water comes from a well on-site, so instead of a utility bill we have maintenance costs for the well, pump and related tank and plumbing. Other Anza maintenance costs include periodic cleaning of the septic tanks at Anza House and the club observatory, repair of erosion to the access road to the site and roads and other areas on the site, repairs to Anza House and the club observatory and, more recently, brush clearance to make the site more fire-resistant and defensible (that work, by the way, has started now that we have had some rain). We cover a lot of the Anza costs through pad and observatory fees, payments for use of Anza House, and fees for access to the wireless system on the site (which is why it's important not to share the password with people who haven't paid the fee). We recently had to raise the observatory fees to help cover increased costs at Anza, as the observatory holders benefit most consistently from those services.

In spite of that increase, we were facing a significant shortfall for the coming year, and our choices were to raise membership fees to cover it, and/or to reduce expenses. Our largest expense after insurance is the cost to print and mail the Sirius Astronomer to our membership each month. If we eliminated that cost, we could balance our budget without need of raising membership fees. The Board agreed unanimously that this was our most reasonable course, given our current fiscal reality.

If you look at the electronic copies of the Sirius Astronomer on our website, you'll notice that they are in color, which we couldn't afford to do on the paper copies and which does greater justice to the images selected for publication. Going forward, since we won't be limited by the printing requirements for the paper copies, we should have more flexibility for format and content, allowing longer articles on occasion, or having longer issues to cover particular events or other matters of interest to our membership. It's sad to say goodbye to our paper newsletter, but it'll be exciting to see where going fully electronic can take us.

© Barbara Toy, February, 2025

Help Wanted

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

Adopt-a-Scope Raffle at the OCA Club Meeting in February

The raffle winner from our General Meeting on February 14, 2025 was Joe Pomathy. The prize was a Celestron CPC 800 telescope with mount, tripod, and accessories.

Our next raffle is planned for the April general meeting with another telescope and mount set (type TBD) to be awarded.

AstroSpace Update

March 2025

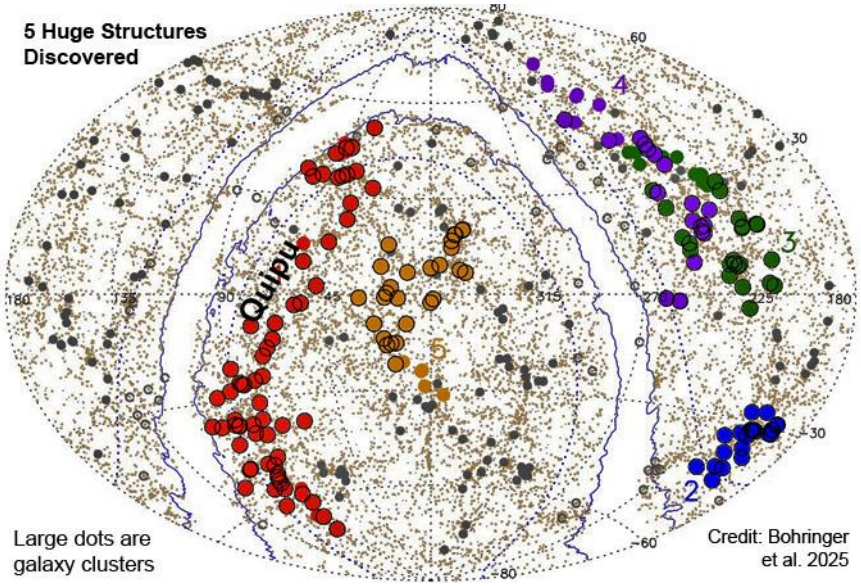
Astronomy and space news summarized by Don Lynn from NASA and other sources

Source of Heavy Elements – When the LIGO gravitational wave detectors caught a pair of neutron stars colliding in 2017 and follow-up observations by multiple telescopes showed huge amounts of very heavy elements (heavier than iron) being produced, astronomers posited that such collisions might account for all the very heavy elements found in the Universe today. However, the numbers didn't work. Such collisions and their associated short gamma-ray bursts are not frequent enough to produce all those heavy elements. New observations by the James Webb Space Telescope (JWST) show that long gamma-ray bursts also can be caused by colliding neutron stars and so should also generate huge amounts of very heavy elements. The combination of short and long gamma-ray bursts may be frequent enough to create all the very heavy elements, though more observations and theoretical work are needed to verify this. In the past, the very heavy elements had been attributed to supernovas, but eventually observations showed that supernovas do not produce much of the elements heavier than zirconium, but observations of the Universe showed it has much gold and other post-zirconium elements that supernovas cannot explain. Thus gamma-ray bursts are now being studied to explain the very heavy elements.

Highest Energy Neutrino – The ARCA neutrino telescope is under construction on the bottom of the Mediterranean Sea. A couple of years ago, with only 10% of the individual detectors operating, ARCA caught an extremely powerful neutrino. It took some time before the detection was analyzed and its high energy was then recognized. It is the highest energy neutrino ever detected by any neutrino telescope. It had tens of thousands of times the energy of any neutrino generated by the largest particle accelerator on Earth. Because neutrinos have no electric charge, they travel in straight lines, and so their source direction can be determined. There are a dozen blazars (active galactic nuclei with jets aimed at us) within the area where this neutrino originated. One of these might be the source, though there are theories other than blazars of what the sources of extremely energetic neutrinos might be. But scientists cannot yet explain how any astronomical object would put that much energy into a neutrino.

New Particle Belts – Last May was the largest solar storm in 20 years, dumping waves of charged particles into the Earth's magnetic field. A CubeSat about the size of a loaf of bread named CIRBE, which was capable of observing charged particles, had been launched about a year before, but unfortunately had gone silent the month before the solar storm. Fortuitously, for no apparent reason, CIRBE came back to life in June, and it found that two new belts of particles had formed in between the long known permanent particle belts known as the Van Allen Belts. Similar belts had formed temporarily during past solar storms, but the new ones differed from previous ones in that one new belt contains both protons and electrons and the new belts persisted longer. In fact, one new belt appears to still be there as I write this. CIRBE, however, is no longer observing charged particles because it fell into the atmosphere and burned up last October.

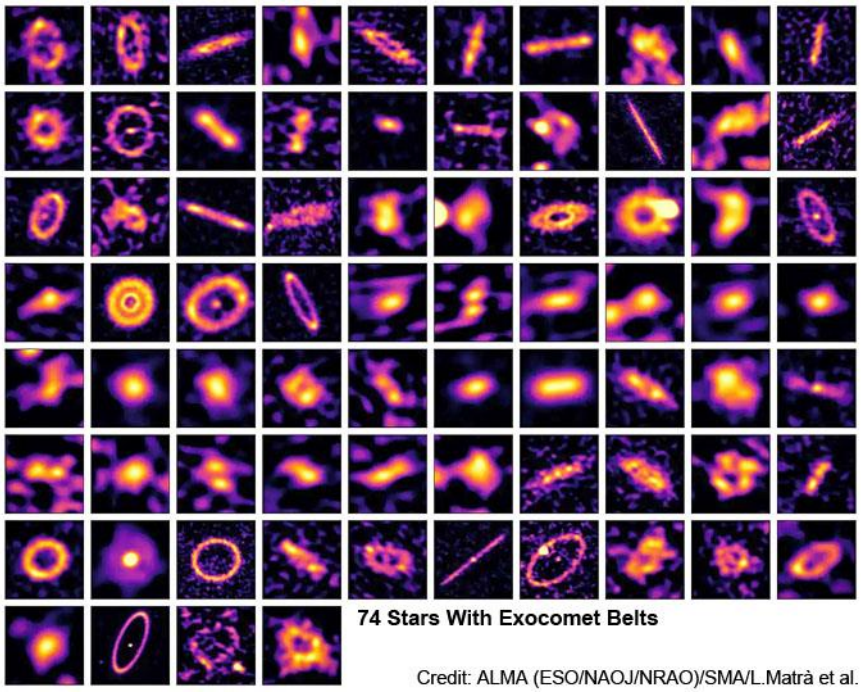
Galaxy Cluster Structures – A new study has found five of the largest structures known in the Universe. One of these, which has a mass 200 quadrillion times the Sun and is 1.3 billion light-years long, sets the size record. This one has been named Quipu, after an Incan measuring system. Such huge structures consist of filaments of galaxy clusters. The structures were found by searching X-ray sky images. Clusters of galaxies typically contain large amounts of very hot gas, which emits X-rays. The newly found structures had higher densities of galaxies than surrounding space.



Planet and Brown Dwarf Discovery – The Gaia spacecraft has measured the precise positions and motions of more than a billion stars. Using data from Gaia, astronomers have discovered a large exoplanet and a brown dwarf by their gravitational tugs on the positions of the stars they orbit. This is the first time a planet has been discovered from Gaia data, though that data has confirmed the motion induced by planets previously found by other means. Because the motions in all 3 dimensions are known (2 dimensions from Gaia, 1 from radial velocity), astronomers were able to calculate complete orbital dimensions and accurate masses. The planet has 12 times the mass of Jupiter and is 244 light-years away. The brown dwarf has 21 times the mass of Jupiter and is 134 light-years away. Astronomers expect to find lots of similar objects in Gaia data.

Exoplanet Atmosphere Mapped – For the first time, astronomers have mapped in 3 dimensions the atmospheric content and winds of an exoplanet. By combining the light of all 4 Very Large Telescopes in Chile, they were able to detect very weak spectral information. The observations were made while the planet, known as WASP-121b and also as Tylos, transited (passed in front of) its star. As the transit progressed, starlight passed through progressive layers of the planet's atmosphere, and allowed determination of the properties of different layers. The planet is classed as an ultra-hot Jupiter, that is, a gas giant that orbits extremely close to its star. It's so close that its year is only 30 Earth hours. It keeps one face always toward its star. The observations found a jet stream circling the planet's equator, and a lower layer that blows from the hot side (facing its star) to the somewhat cooler side. Iron, sodium and hydrogen were found in different layers. Titanium was also detected, which is a surprise because previous attempts to find titanium there were not successful. The planet is 900 light-years away in the constellation Puppis.

Exocomet Disks – Researchers released images of 74 nearby stars that showed belts of comet-sized objects orbiting them. The images were taken using the ALMA radiotelescope array in Chile and the Submillimeter radiotelescope array in Hawaii. These belts resemble the Kuiper Belt in our Solar System. The exocomets themselves are too small to resolve, but the whole belts showed up in the images. The first such belt was found in 1984 around the star Beta Pictoris. Astronomers estimate that about 20% of stars with planet systems also have such exocomet belts. The ages of the newly observed belts range from 20 million to 2 billion years. Hundreds of exocomet disks are known, but the new images are the best resolution, good enough to see structure in the disks. The radiuses of the newly observed disks ranged upward from 10 AU (about the distance of Saturn from the Sun). These sizes were expected because this is where volatiles (including water) freeze into icy comet-like bodies.

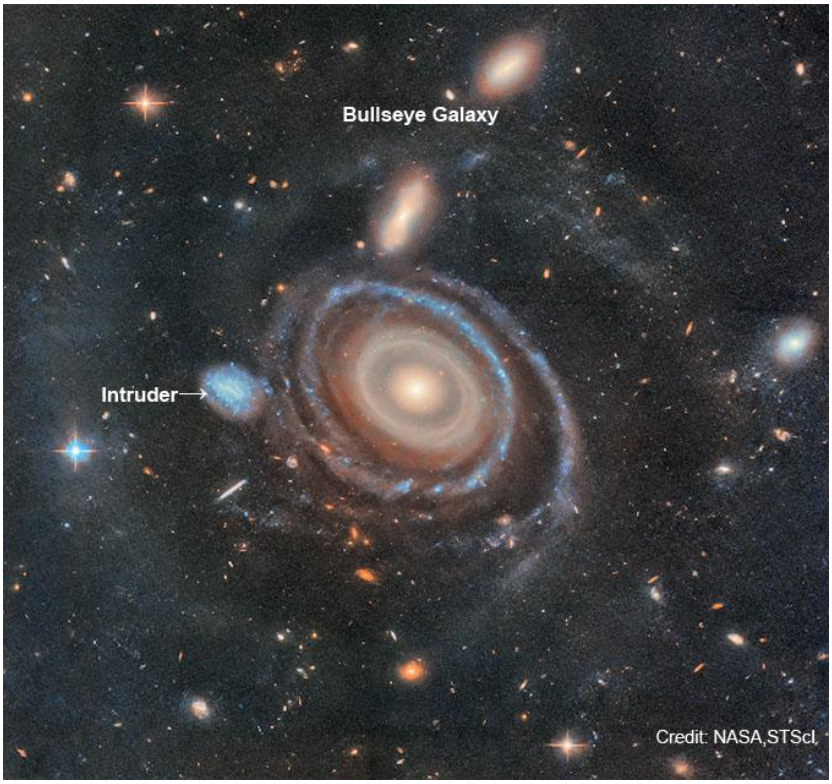


74 Stars With Exocomet Belts

Credit: ALMA (ESO/NAOJ/NRAO)/SMA/L.Matrà et al.

Asteroid Sample – The first results have been released from analyzing the rocks and dust retrieved from asteroid Bennu by the OSIRIS-REx spacecraft. Among the findings were amino acids and the nucleobases used in RNA and DNA, which are building blocks of life. Such were likely not produced by life but instead show that conditions in our Solar System can produce these building blocks so that if life develops (as it did on Earth) the raw materials are there. Also found were materials apparently altered in the past by contact with saltwater. The amino acids found included both right-handed and left-handed versions. Life on Earth almost always uses just the left-handed versions, and it remains a mystery why this is so. Material previously exposed to water has been found in meteorites, but the care taken in returning the Bennu sample guarantees that it is unaltered since collection on the asteroid, never subjected to the burning that meteors encounter when they hit Earth's atmosphere. Some of the minerals found in the Bennu sample have not been seen in meteorites.

Ringed Galaxy – When a small galaxy collides with a large galaxy, and the collision path is nearly central to the large one, it often creates a ring or multiple rings about the large one. The rings form by concentration of material from a shock wave and by new star formation. The galaxy with the largest known number of rings is designated LEDA 1313424 and is nicknamed the Bullseye. A new study was made of it using the Hubble Space Telescope and the Keck Telescopes in Hawaii. Nine rings were identified. No other galaxy is known to have more than 3 rings. A small blue galaxy nearby was shown by the new study to be the one that passed through the Bullseye and formed the rings. The Bullseye is huge: about 2.5 times the diameter of our Milky Way. The collision happened about 50 million years ago. The rings will probably fade over the next many million years. The rings were found to be not evenly spaced; the more distant ones are farther apart.



Impact Marsquake – The Mars InSight lander ended its mission in 2022, but scientists are still analyzing the seismometer data from it. They matched up a newly-made impact crater found by a Mars orbiter with a marsquake that InSight had recorded. The new crater is 71 feet in diameter, and located in the Cerberus Fossae region, which is more than 1000 miles from InSight. Seismic waves that travel through the crust of Mars are damped in relatively short distances. But this one was not damped much, indicating that the wave traveled through the Martian mantle, where less damping occurs. This is deeper than Martian seismic waves have been observed previously. The new crater was found by a machine learning computer program comparing pairs of images taken by the Mars Reconnaissance Orbiter.

Record Volcanic Activity – On a recent flyby of Jupiter's moon Io, the Juno spacecraft found the most powerful volcanic event ever seen. The heated area around the volcano was larger than Lake Superior. The energy emitted by this event was measured to be 6 times the energy generated by all power plants on Earth. Io is heated by powerful tidal forces squeezing the moon every revolution about Jupiter. On Juno's next flyby of Io (this month) the spacecraft will observe this volcanic activity again and see if it has changed.

From the Editor

The newsletter is once again looking for front cover picture contributions.
Due dates for submission of articles, pictures and advertisements are tentatively 6 days prior to the next general club meeting.

Issue	**Due date**	
April	5 April	Changed
May	3 May	Changed
June	7 June	

Astroimaging Meetings Return In-person

By Kyle Koker

The OCA has always had a robust astroimaging group. I joined OCA a little over 20 years ago and was immediately drawn to astroimaging, perhaps because it really appealed to my geeky side. I was fascinated by how much more you could see in the night sky with a camera than through an eyepiece. When I started with the AI group we were meeting in-person at Bill Paterson's workplace. Later we moved the group to Joe Bush's law office and finally to the Urban Workshop near John Wayne airport. Then Covid-19 hit. We stopped on-site meetings and eventually lost access to that facility.

Meanwhile, the group started picking up steam via our online group, Astroimagers@groups.io. With more than a dozen online participants and perhaps twice as many lurkers, the astroimagers have stayed together. However, there has always been a desire to return to our in-person meetings. Although we continue to be good about showing off our successes and pat each other on the back, the main goal of learning from each other is hampered by not being face-to-face. This is especially true with our beginner and intermediate imagers. We needed a new place to meet.

Enter Mark Price, leader of the OCA Astrophysics SIG. That group was meeting monthly at the OC Heritage Museum in Santa Ana. Although centrally located, the room was small and had awkward seating. The gate at the entrance of the parking lot also had to be constantly attended. Although we weren't bothered by noisy planes overhead, there were the occasional gun shots and fireworks and the constant police sirens to provide that sense of security. The final straw was near the end of last year when everyone had to be rerouted out of the parking lot because they found a dead man in the street in front of the facility.

Working with Orange Coast College (across from the OC Fairground entrance off Fairview), through Charlie Oostdyk, the OCA has secured the Astronomy Room 40 to the north side of the OCC planetarium. The Astrophysics SIG uses the room on the 3rd Fridays of each month and I use it for the astroimaging beginner's classes in February and August. The beginners classes uses the area in January and July for the "How to Use Your Telescope" class so that leaves 8 first Fridays available March, April, May, June, Sept, Oct, Nov, and Dec.

We had our first astroimaging meeting at the new OCC facility on January 3 and I think it was a success. There were 16 of us that attended in person and a couple others online via a Zoom link (more on that later). Of those in attendance I would say there were perhaps 4 who had more than 10 - 20 years of experience, 6-8 who had 2- 10 years and a handful of newbies. That led to some very productive exchanges at all levels. The meeting lasted about 2 hours and we discussed many topics, some in depth from our more experienced members and some put on hold so we could get into more depth at a future meeting. Some of the topics we touched on at the meeting were eclipse photos, image processing, PixInsight and Photoshop techniques, equipment, calibration tips, guiding tips, HDR imaging, planetary imaging, PowerPoint presentations and printing.

Future topics will include more in-depth discussions on solar imaging, astro trips, automation, camera trackers, noise, equipment for sale, swap meet, solar tracking absolute encoders, ASIAir and other onboard controllers, pluses and minuses about various optical configurations and corrective measures, spectroscopy, filters, harmonic drives, observatories, and software (what's new).

As you can see there are lots of topics that will keep us busy and interested for years. Although in-person attendance is highly encouraged, our designated room only holds about 20-22 people comfortably. Therefore, we are making an effort to simulcast a Zoom meeting. Dave Pearson and I managed to set up a Zoom meeting for my last beginner's class at OCC but that was mostly a PowerPoint screen share. We still need to work on the video and audio for a meeting room environment. Anyone with experience in such meetings feel free to contact me (astroimagers@ocastronomers.org)

And FYI, the OCC website instructs visitors to prepay a $5.30 parking fee online. However, I've been assured from the planetarium staff which puts on weekend presentations to the public, (most of which don't even know about the parking fees) that parking is not enforced on Friday evenings. Like the planetarium, we will use parking lot E. A map of the facility can be found online at https://orangecoastcollege.edu/about/map/docs/occ-campus-map.pdf

So, if you are not already part of the OCA astroimaging SIG (Astroimagers@groups.io), please sign up as that is where information on our upcoming meetings will be posted. We welcome new members interested in this fun aspect of astronomy.

General Meeting Recap

By Helen Mahoney

The February OCA General Meeting on February 14 was a lot of fun. We had the largest in-person crowd at Chapman University since before the Pandemic.

In addition to the raffle of a Celestron CPC 800 (8" SCT) telescope, and a great virtual "What's Up" by Lonny Buinis from UACNJ, we were privileged to have Dr. Tim Parker of JPL (retired) as our in-person Main Speaker. Tim is a Planetary Geologist who worked with JPL for 44 years. He was Localization Scientist on all of the Mars Exploration Rovers. He was one of the first people to propose that features on Mars resembled shoreline features of dry lake beds on Earth, and therefore Mars once had a vast ocean.

His talk went through how, using photographs from Mars orbiting satellites (beginning with the Viking Orbiters), and Opportunity and Curiosity rovers, he was able to compare geomorphology and stratigraphy from Mars with Earth features of Lake Bonneville and Lake Mead. Terracing in a crater wall in the southern highlands (from HIRISE images) looked like the Provo shoreline of Lake Bonneville. A protrusion in the Martian Cydonia region was similar to Pavant Butte in Utah, both features believed to be caused by a volcanic eruption into the ocean/lake. Rilles on Mars resemble fluvial swash rilles on a beach on Earth. They may have been formed by Martian ocean tsunamis, following an impact in the ocean.

Striations found at Mars' Mount Sharp were thought to be stratified layers; however, Tim compared them to similar striations in a hill inside Lake Mead, and they are more likely to be terraces from a receding shoreline.

His computer-assisted "flooding" of the topography showed Mars' ocean likely covered 56% of the planet (Earth's oceans cover about 75%), and were 3 kilometers deep.

Tim's talk was captivating, and everyone present enjoyed it. In meeting-after-the-meeting style, there were many great personal conversations that followed. The March meeting will have many special moments, as well. I hope you are able to attend in person!

Actual people at the February meeting. Image courtesy of Doug Millar.

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!

March's Night Sky Notes: Messier Madness

By Kat Troche

March is the start of spring in the Northern Hemisphere; with that, the hunt for Messier objects can begin!

Showing a large portion of M66, this Hubble photo is a composite of images obtained at visible and infrared wavelengths. The images have been combined to represent the real colors of the galaxy. Credit: NASA, ESA and the Hubble Heritage (STScI/AURA)-ESA/Hubble Collaboration; Acknowledgment: Davide De Martin and Robert Gendler

What Are Messier Objects?

During the 18th century, astronomer and comet hunter Charles Messier wanted to distinguish the 'faint fuzzies' he observed from any potential new comets. As a result, Messier cataloged 110 objects in the night sky, ranging from star clusters to gal axies to nebulae. These items are designated by the letter **'M'** and a number. For example, the Orion Nebula is **Messier 42** or **M42**, and the Pleiades are **Messier 45** or **M45**. These are among the brightest 'faint fuzzies' we can see with modest backyard telescopes and some even with our eyes.

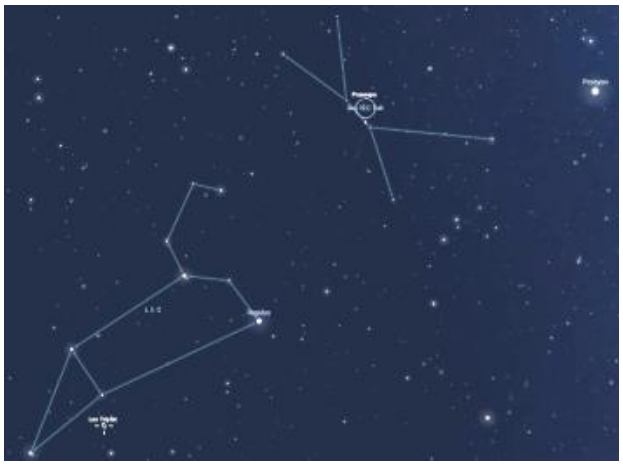
Stargazers can catalog these items on evenings closest to the new moon. Some even go as far as having "Messier Marathons," setting up their telescopes and binoculars in the darkest skies available to them, from sundown to sunrise, to catch as many as possible. Here are some items to look for this season:

Messier 44 in Cancer: The Beehive Cluster, also known as Praesepe, is an open star cluster in the heart of the Cancer constellation. Use Pollux in Gemini and Regulus in Leo as guide stars. A pair of binoculars is enough to view this and other open star clusters. If you have a telescope handy, pay a visit two of the three galaxies that form the Leo Triplet - **M65** and **M66**. These items can be seen one hour after sunset in dark skies.

Messier 3 Canes Venatici: M3 is a globular cluster of 500,000 stars. Through a telescope, this object looks like a fuzzy sparkly ball. You can resolve this cluster in an 8-inch telescope in moderate dark skies. You can find this star cluster by using the star Arcturus in the Boötes constellation as a guide.

Messier 87 in Virgo: Located just outside of Markarian's Chain, M87 is an elliptical galaxy that can be spotted during the late evening hours. While it is not possible to view the supermassive black hole at the core of this galaxy, you can see M87 and several other Messier-labeled galaxies in the Virgo Cluster using a medium-sized telescope.

Messier 76 in Perseus: For a challenge, spot the Little Dumbbell Nebula, a planetary nebula between the Perseus and Cassiopeia constellations. With an apparent magnitude of 12.0, you will need a large telescope and dark skies. You can find both M76 and the famous Andromeda Galaxy (M31) one hour after sunset, but only for a limited time, as these objects disappear after April. They will reappear in the late-night sky by September.



M44 in Cancer and M65 and 66 in Leo can be seen high in evening sky 60 minutes after sunset. Credit: Stellarium Web

Locate M3 and M87 rising in the east after midnight. Credit: Stellarium Web

Locate M76 and M31 setting in the west, 60 minutes after sunset. Credit: Stellarium Web

Plan Ahead

When gearing up for a long stargazing session, there are several things to remember, such as equipment, location, and provisions:

- **Do you have enough layers to be outdoors for several hours?** You would be surprised how cold it can get when sitting or standing still behind a telescope!
- **Are your batteries fully charged?** If your telescope runs on power, be sure to charge everything before you leave home and pack any additional batteries for your cell phone. Most people use their mobile devices for astronomy apps, so their batteries may deplete faster. Cold weather can also impact battery life.
- Determine the **apparent magnitude** of what you are trying to see and the **limiting magnitude** of your night sky. You can learn more about apparent and limiting magnitudes with our Check Your Sky Quality with Orion article.
- When choosing a location to observe from, select an area you are familiar with and bring some friends! You can also **connect with your local astronomy club** to see if they are hosting any Messier Marathons. It's always great to share the stars!

You can see all 110 items and their locations with NASA's Explore the Night Sky interactive map and the Hubble Messier Catalog, objects that have been imaged by the Hubble Space Telescope.

Lunar Eclipse 3D effect

By Matthew B. Ota, former OCA Trustee

Although a lunar eclipse is rather common, and of little scientific value, it does have its attractions for its sheer beauty. As an amateur astronomer, I have learned of the most curious effect I have ever seen in naked-eye astronomy. This phenomenon is seen with regular binocular eye vision. No telescope or binoculars are needed for this.

The full Moon appears as a flat disk to the human eye. It has no limb darkening like Jupiter or other planets. The reason why was not answered until the Apollo moon landings of the 1960s.

The Moon's surface is covered with a very fine powder, which is composed of rock that has been pulverized by billions of years of meteoroid impacts. This powdered regolith, commonly known as "moon dust" is as fine as talcum powder. It is not smooth in texture and is angular and faceted on a microscopic level. This is because there never was any flowing water on the moon to erode and smooth out rocks into rounded curved pebbles. This is an effect that was coined as "gardening" by lunar geologists.

Any light that hits a perpendicular flat surface of this powdered regolith is reflected straight back toward the viewer. As a result, no matter what the angle of incidence of the curved face of the moon, light is reflected straight back to your eye in a linear fashion, so equal amounts of photons strike your retina from not only the center of the Moon's face, but also the edges of the Moon's surface at the limb. Therefore, the moon appears to us as a disk as flat as a pizza pan, with no depth.

However, this effect is nullified during a total lunar eclipse. When a lunar eclipse occurs, the only sunlight that reaches the moon is refracted by the earth's atmosphere, striking it at an irregular and diffuse angle. From the moon's surface, you would be seeing all of the Earth's sunrises and sunsets at the same time, appearing as a red-orange ring illuminating the atmosphere all around the Earth.

The light striking the moon is coming to the moon from more than one angle. The light that is reflected back to your eyes is red colored, with the light levels falling off as you look towards the limb or edges of the lunar face. This is the only time that you can see a lunar limb darkening effect.

With this limb darkening in view, and especially when the moon's face is framed by clouds or terrestrial objects like trees or buildings or your fingers and hands, the eclipsed moon magically and spookily appears to you as a three-dimensional sphere hanging in the sky. The first time I saw this I was stunned. The light that reaches the moon in this manner is scattered in all directions, and the ruddy moon takes on an eerie three-dimensional appearance.
We see it as a spherical natural satellite and not a flat dinner plate in the sky.

This was a view that was seen by the Apollo astronauts as they approached and receded from the Moon, and will be seen as well by the future Artemis and Lunar Gateway astronauts.

This stereographic projection of the moon will appear to be 3 dimensional when you relax the position of your eyes and allow these two orbs to coincide in your vision.

Outreach Activities

Upcoming Outreach Events

Event Date	Type	Site Name	Address
22 March	Outreach	Del Lago Elementary	27181 Entidad, Mission Viejo

Please also check OCA website for start times and with Martin Christensen for updates to this list.

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	Gene Kent	714-604-8396	Kenthouse@Cox.net

Telescopes & Optics

8 inch Cassegrain (Orion)	$ 400
8 inch Cassegrain (Celestron)	$ 350
4 inch refractor (Orion)	$ 60
4 inch refractor (Orion)	$ 60
5 inch refractor (Stellavue)	$1,000
2 inch tracking (Stellarvue	$ 50
Loadstar tracking scope	$ 50
Lenses	$ 200
3 Telrads	$ 90
Eye piece lenses	$ 100
Elbows 3	$ 50

Cameras

Orion I-cap5	$ 200
Atik Horizon	$ 800
Atik 420	$ 600
QHY 8L-C	$ 700
Loadstar (guide scope)	$ 225

Mount

Orion Atlas Pro	$1,000
Control paddle	$ 50
Atlas Pro tripod	$ 400
2 x 25lb weights	$ 60
Three Wheeled platform	$ 75

Connectors, hardware

Threaded extenders ~15	$ 100
Threaded tubing	$ 30
Elbow size adapter	$ 100

Electric Items

Power adapters –A/C to D/C	$ 10
Electric cables	$ 10
Control Pad	$ 50
12 volt D/C boat battery	$ 30
electric focuser	$ 50
Cable union box	$ 150

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