SIRIUS ASTRONOMER

www.ocastronomers.org

The Newsletter of the Orange County Astronomers

January 2025 Free to members, subscriptions $12 for 12 issues **Volume 52, Number 1**

Jones-Emberson 1, or PK 164+31.1, is an old and faint (magnitude 14) planetary nebula in the constellation Lynx. The fine details of this object were captured by Brett Nordby at the OCA Anza site using an EdgeHD 14 telescope and ASI6200MM Pro camera..

Upcoming Events - free and open to the public

Beginner's class	**Monday**, 6 January at 7:30 to 9:30 PM **ONLINE** 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. New location: This class is at Orange Coast College, near Building 40, Astronomy House
Club Meeting	Friday, 10 January at 7:30 to 9:30 PM **IN PERSON** at Chapman University and **ONLINE** "What's Up": Chris Butler **IN PERSON** Main speaker: Ardis Herrold from Rubin Observator **ONLINE** whose talk will be "Rubin's Revolution: From Data to Discovery"
Open Spiral Bar	Saturday, 11 January 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, 26 January and 1 February 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

I'm finishing this on the Winter Solstice, which means that, by the time this reaches you, your nights will be getting shorter and your days longer – though probably not very noticeably yet. On cold viewing nights in January or February, shorter nights will likely not be noticeable at all, as cold temperatures make a night incredibly long, at least to those of us raised in temperate zones. I remember Don Lynn commenting several years ago on a cold winter star party night when a group of us were in the club observatory that it seemed we'd been viewing for hours, what felt like most of the night, but his watch said it was only 10:00. From experience on other cold nights, I'd say he was pointing out a general winter phenomenon.

You'll notice I mentioned viewing, not imaging. Modern imagers usually have the option of spending time in warmer surroundings while their equipment gathers data on their objects of interest, only subjecting their bodies to the cold intermittently. Those of us who explore the night sky with eyeballs applied to the eyepiece can't do it from a place of warmth, and even the warmest clothes don't stop the time dilation effect at this time of year. But winter is a great time to view, with so many fun objects to visit, that it makes spending some time in the cold worthwhile, especially if the night is dark and the sky clear and steady…

AstroImagers SIG

Speaking of imaging, I'm happy to report that the AstroImagers (AI) Special Interest Group is tentatively planning to start in-person meetings again. Our club has always had a lot of active imagers, and the AI SIG meetings in the past were usually well-attended. The AstroImagers email group remained very active after meetings stopped due to Covid, and it has acted in some ways as a substitute for meetings post-Covid. While people have expressed interest in starting meetings again over the last couple years, that required finding a new meeting location and other organizing issues.

We had a Zoom kick-off meeting for the SIG on December 6 which had a great turn-out. This was to assess interest in having in-person meetings again, share information on tentative plans for the group, and for meetings going forward. Alan Smallbone and Dave Kodama chaired this group in the past (before Covid shut things down) but neither is able to continue in that role. Alan has been working with the new planning/organizing committee for the group and took the lead in arranging access to a new meeting location at Orange Coast College (where the Astrophysics SIG has been meeting) and reserved tentative meeting dates. Kyle Coker, a long-time AI member who has also been teaching the AstroImaging section of our Beginners Astronomy Class for several years, has agreed to chair the group going forward.

If you are interested in participating, keep an eye on the calendar for upcoming meeting dates. Information on meetings and topics will also be shared on the AstroImagers email group. Many thanks to all of you who are working to bring these meetings back!

AstroSpace Update

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

Very Young Exoplanet – An exoplanet designated TIDYE-1b was discovered, and it is only 3 million years old. The TESS planet-finding space telescope made the discovery when the planet transited (passed in front of) its star. It is unusual to find very young planets because they are almost always hidden in the clouds of dust and gas that comprise the material planets are built from. In this case, the planet transit was visible because the disk of dust and gas is tilted with respect to the planet's orbit, so that it does not block our line of sight. While this is fortunate for finding the planet, it now requires theoretical astronomers to find a means that would tilt the disk. It also requires explanation for how a planet of this mass can have formed in only 3 million years. The planet takes only 9 Earth days to orbit its star. When it is fully formed, it is likely to be a super-Earth or sub-Neptune in size.

Puffed Up Exoplanet – In 2023 the James Webb Space Telescope (JWST) observed an exoplanet dubbed HIP 67522b, which was believed to be a hot Jupiter, meaning it was about the mass and diameter of Jupiter but hot due to proximity to its star. It was found to have an atmosphere rich in water vapor and carbon dioxide, unlike Jupiter. Also, its mass was much smaller than Jupiter, so it is actually a sub-Neptune planet whose atmosphere puffed up to the size of Jupiter. In the next billion years or so its atmosphere is expected to boil off into space.

Long-Lived Planet-Forming Disks – New observations by JWST found planet-forming disks that were 20-30 million years old, much older than other such disks which seem to dissipate in 2-3 million years. The disks were in a star-forming region known as NGC 346, which is located in the Small Magellanic Cloud (SMC), a satellite galaxy to our Milky Way. It is thought that the fairly low content of heavy elements in the SMC is causing planet-forming disks to last longer. In the early Universe, all galaxies had low content of heavy elements, so planet-forming disks likely persisted much longer in all galaxies in the early Universe. This solves a mystery that has been around since 2003 when the Hubble Space Telescope found evidence of a massive planet orbiting a star that formed in the very early Universe. Apparently, the longer persistence of planet-forming disks made up for the scarcity of heavy elements needed to form such a planet. More work is needed to find the exact mechanism by which low-heavy-element planet-forming disks persist longer.

Milky-Way-Like Galaxies – A study known as SAGA was made of 101 nearby galaxies with Milky-Way-like masses and their satellite galaxies. The goal was to determine from the satellite galaxies's motions what the larger galaxy's masses are, including dark matter and poorly seen halo matter. A number of differences were found between our Milky Way and most of the 101 galaxies. Newly released results of SAGA showed: Galaxies with the most massive satellite galaxy generally had more satellites, while the Milky Way has a massive satellite (the Large Magellanic Cloud) but relatively fewer satellites; satellite galaxies generally have active star formation, though satellites closest to their primary galaxies have relatively less star formation, while most of the Milky Way's satellites have no star formation.

Very Distant Milky-Way-Like Galaxy – A galaxy, nicknamed Firefly Sparkle, has been imaged by JWST and it is so distant that we are seeing it as it was just 600 million years after the Big Bang. It is predicted to have eventually grown into a galaxy about the size of our Milky Way. Other galaxies that have been imaged by JWST at this distance are more massive, perhaps because more massive galaxies are brighter and easier to image. The image was magnified and stretched because it is seen through a gravitational lens caused by a massive galaxy cluster in front of it. The image shows 10 star clusters within the galaxy where stars are forming. The star clusters are in different stages of development. The galaxy's shape shows that it had not yet settled into a flattened disk, so the galaxy is still in the formation process. The galaxy has two companion galaxies close enough that they are probably affecting star formation.

Less Gas In Halo – A new study examined the high-velocity clouds (HVCs) in the halo of our Milky Way galaxy using the Parkes radiotelescope in Australia. HVCs are mostly hydrogen gas, which can be detected in radio observations. Some astronomers believed that HVCs accounted for a substantial portion, as much as 10%, of the ordinary (non-dark) matter in this halo. The new study put HVCs at about 0.1%, however. More work is needed to confirm this low amount.

Jet Collides – Astronomers have discovered a V-shaped X-ray glow where the jet from the supermassive black hole in the Centaurus A galaxy is striking some object, as yet unidentified. The Chandra X-ray space telescope made the observations. The arms of the glowing V are about 700 light-years long. One theory is the object is a massive star. More work is needed to identify what type of object this is.

Distant Star Imaged – Astronomers have taken the best close-up image of a star outside our galaxy. It was done with the Very Large Telescopes in Chile, combined together as an interferometer. The star, known as WOH G64, is located in the Large Magellanic Cloud, a satellite galaxy to our Milky Way. The star is ejecting gas and dust and will soon (cosmically speaking) explode as a supernova. It is a red supergiant with a diameter 2000 times that of our Sun.

Age Mystery Solved – The star known as HD 65907 has long been a puzzle because two different methods of determining its age yielded wildly different results. One method is matching the star's brightness and temperature with those of other stars on the main sequence with known ages. The second method is matching the star's heavy element content with that of other nearby stars of known age. The heavy element content that goes into a star forming in any region rises with time as stars create and distribute these elements. A new study of the star concluded that it is a blue straggler, which is a star that has undergone a merger with another star in the past. The merger causes the star to become more massive, hotter, and bluer, but generally does not raise the content of heavy elements. Most blue stragglers are found in star clusters, where mergers are more likely, but this star is not in a cluster, making it somewhat unusual.

Unusual Binary Star – Stars near the center of a galaxy, including our Milky Way, are subject to strong tidal forces from the massive black hole there. Such forces tend to separate or merge binary star systems. This explains why no binary star systems were found near the center of our galaxy … until now. A star known as D9 was found to be binary by detecting the red/blue shift of the pair orbiting, even though the pair is too close to resolve in images. The observations were made in infrared light because there is too much gas and dust hiding the center of our galaxy from visible light observations. The D9 system is only about 3 million years old. The two stars are of masses about 3 times the Sun and ¾ of the Sun. Computer simulations of the pair show that in about a million years the stars will merge into one.

Star Torn Apart – Astronomers observed a star becoming extremely bright, then dimming, in a tiny galaxy about 500 million light-years away. The light curve and spectrum did not match that of any kind of supernova, but did match that expected for a black hole tearing a star apart from tidal forces. This type of event has been seen before in large galaxies (which therefore have large-mass black holes), but the size of the galaxy where this occurred meant its black hole was likely pretty small, under 100,000 solar masses, making this an unusual event.

Gravitational Wave Background – Work announced last year that tracked the timing of pulsars for 15 years and showed that there is a background of low-level gravitational waves slightly wobbling pulsars. The effect is so small that it does not show up in tracking of individual pulsars but is shown in statistics of large numbers of observations. The MeerKat radiotelescope array repeated the experiment to find the gravitational wave background, and confirmed it in one third the time, due to the advanced capabilities of MeerKat. There are 64 antennas located in South Africa that comprise MeerKat. The gravitational wave background is thought to be caused by binary black holes, but more observation is needed to prove this.

Predicted Meteor – In November 2022 a sky survey in Arizona discovered an asteroid (designated 2022 WJ1) that was heading for a collision with Earth. This was only the 6th time that has ever happened. Only a few hours were available before the collision, but that was enough for telescopes to make observations, which determined it was of type S-chondrite, which are stony with substantial silica. The diameter was determined to be in the range of 16-24 inches, making it the smallest asteroid ever discovered. This was only the 2nd time that an asteroid was well observed before impacting Earth. Astronomers in the Niagara area were notified to look for the collision, and for the first time ever, a known asteroid was seen as a bright fireball meteor because people had been alerted. By chance, there was a network of meteor cameras in the area of the fireball, so the meteor was videoed, and the WJ1's orbit was precisely calculated from the video and earlier observations. Searches have been made for resulting meteorites, but none have been found yet, perhaps because much of the impact area is in Lake Ontario.

Small Asteroids Denser – A new study of archived JWST images, using a technique to tease out extremely faint objects, has found about 5 times more faint (and therefore small) asteroids than theory had predicted in the main asteroid belt. This may change estimates of how often very small asteroids strike the Earth and Moon. The imaged objects are estimated at between 30 and 1600 feet across. The technique used to find these small bodies is to stack dozens of images together, shifting each image so that the moving asteroid is made to stand still. Because it is not known beforehand which way and how far each asteroid moves between images, the astronomers programmed a computer to try all directions and speeds of movement and see if any object developed in the stacked images. This technique was used on JWST images that were archived from previous work to observe exoplanet transits, where images of the same piece of sky were taken repeatedly for hours. More than 1000 asteroid candidates were found. Sizes were calculated from brightnesses. Such sizes are usually more accurate when using infrared images (which JWST produces) rather than visible light.

No Io Magma Ocean – It has long been known that tidal forces from Jupiter and orbital disturbances from Jupiter's large moons cause heating from flexing within the Jovian moon Io, and that explains why there are hundreds of volcanoes on Io. Scientists had calculated that enough heat was generated to create an ocean of magma beneath the entire surface. However new data from the Juno spacecraft indicates there is not a global magma ocean. The new data were measurements of how much Io's surface flexed with Jupiter's tides and found it was much less than would occur if there were liquid below. The best explanation for the volcanoes now is that each is fed from a smaller pocket of magma and these pockets are not globally connected. A possible explanation for this is that though there is enough heat generated by flexing to create a global magma ocean, it did not happen because so much of the heat is dissipated in the volcanic eruptions.

Martian Geyser Activity – A new study was made of crystals within a meteorite known as NWA 7034, which was nicknamed Black Beauty meteorite. It was known to have been splashed off the surface of Mars 1.5 billion years ago by an impact, and later fell to Earth. The rock contains crystals that formed 4.45 billion years ago while on Mars. The crystals are an unusual form of zircon that on Earth forms only in hydrothermal geysers. Black Beauty holds a higher water content than any other of the 200 meteorites known to have come from Mars. So the new study confirmed what was already known, that Mars was much wetter billions of years ago, but also it established that there was hydrothermal activity on Mars 4.45 billion years ago.

Main-Belt Comet – There are only 14 known comets that have orbits within the asteroid belt and so are known as main-belt comets. The latest such find is the comet 456P/PANSTARRS. New observations show that the object truly acts as a comet in that it forms a tail every time it is relatively nearer the Sun in its orbit. Some other objects in the asteroid belt that have formed a tail did so only once, due to a collision that knocked material off, rather than Sun induced tails of true comets. It is still a mystery how these comets' orbits moved to the asteroid belt; they are unlikely to have formed there.

Mars Rover – The Mars rover Perseverance has completed a nearly 4 month climb out of Jezero Crater, inside of which it has been exploring since it landed in 2021. The ascent was 1600 vertical feet, reaching slopes as steep as 20% grade. The rover actually backed up some of the steepest spots because it gets a little more traction in that direction. Outside the crater the rover will find on the surface large numbers of rocks thrown out when an impact created the crater about 3.9 billion years ago. Scientists have already chosen an area near the crater rim and two other areas for the rover's next explorations.

Proba-3 Launched – There are coronagraphs on Earth and in space (where they work better) and their purpose is to block the light of the Sun so that its corona, about a million times fainter, can be seen. Proba-3 is a European spacecraft to test a new concept in coronagraphs. It was launched from India in early December. The longer a coronagraph is, the less effect diffraction has in leaking light around the disk that blocks the Sun's image. So Proba-3's blocking disk is 150 yards away from the rest of the coronagraph, located on a second spacecraft that flies in extremely precise formation. If successful, the same principle will be used on future spacecraft to block the light of stars so their planets can be seen. Proba-3 is in a very elongated Earth orbit that takes it far above any traces of atmosphere that would interfere with precision flying. It will take observations only during 6 hours of each orbit when it is farthest from Earth.

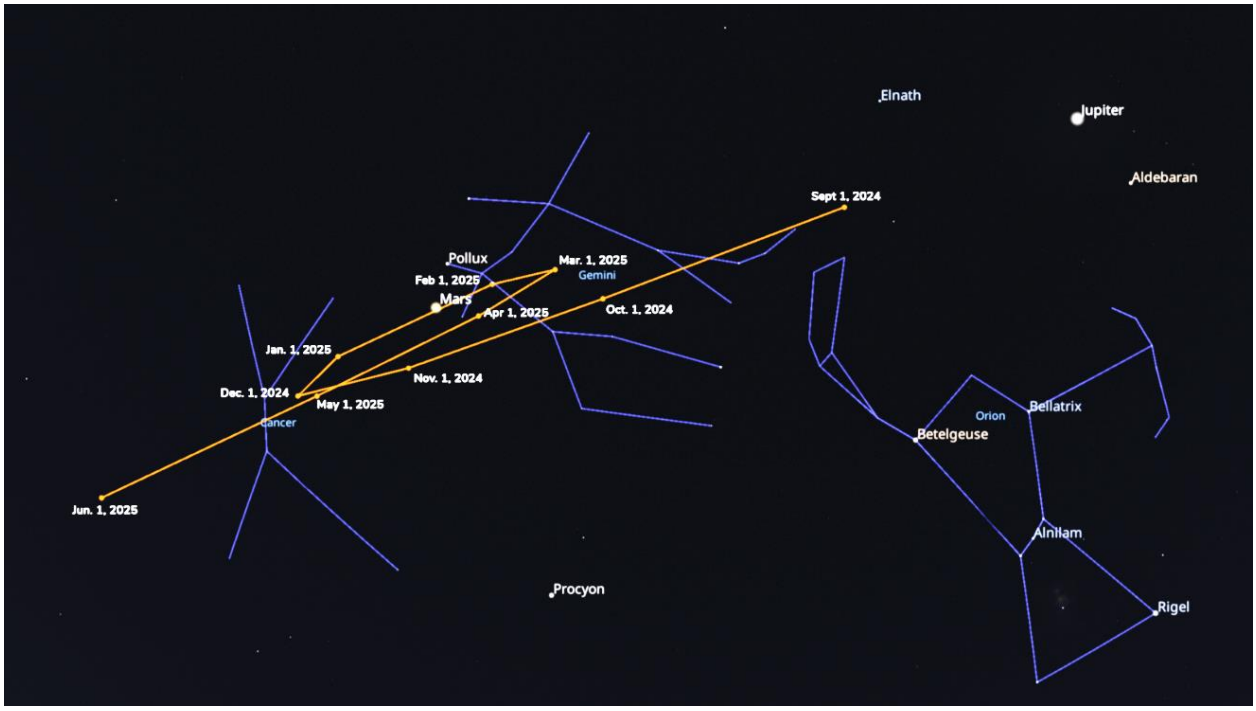
January's Night Sky Notes: The Red Planet

By Kat Troche

Have you looked up at the night sky this season and noticed a bright object sporting a reddish hue to the left of Orion? This is none other than the planet Mars! January will be an excellent opportunity to spot this planet and some of its details with a medium-sized telescope. Be sure to catch these three events this month.

Martian Retrograde

Mars entered retrograde (or backward movement relative to its usual direction) on December 7, 2024, and will continue throughout January into February 23, 2025. You can track the planet's progress by sketching or photographing Mars' position relative to nearby stars. Be consistent with your observations, taking them every few nights or so as the weather permits. You can use free software like Stellarium or Stellarium Web (the browser version) to help you navigate the night as Mars treks around the sky. You can find Mars above the eastern horizon after 8:00 PM local time.



This mid-January chart shows the path of Mars from September 2024 to June 2025 as it enters and then exits in retrograde motion. Mars appears to change its direction of motion in the sky because Earth is passing the slower-moving Mars in its orbit. Credit: Stellarium

Hide and Seek

On the night of January 13th, you can watch Mars 'disappear' behind the Moon during an occultation. An occultation is when one celestial object passes directly in front of another, hiding the background object from view. This can happen with planets and stars in our night sky, depending on the orbit of an object and where you are on Earth, similar to eclipses.

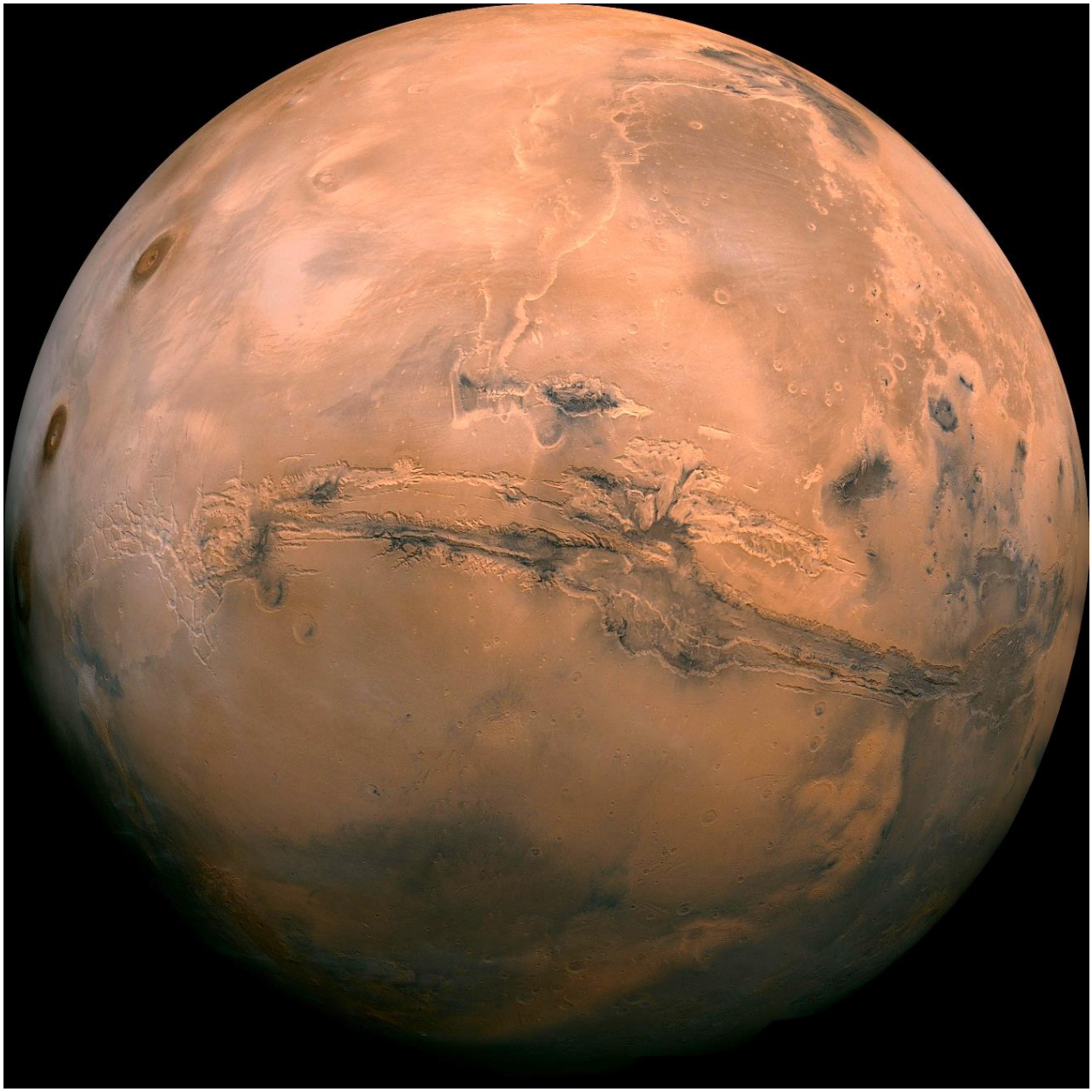
A simulated view of the Moon as Mars begins its occultation on January 13, 2025. Credit: Stellarium

Depending on where you are within the contiguous United States, you can watch this event with the naked eye, binoculars, or a small telescope. The occultation will happen for over an hour in some parts of the US. You can use websites like Stellarium Web or the Astronomical League's 'Moon Occults Mars' chart to calculate the best time to see this event.

Closer and Closer

As you observe Mars this month to track its retrograde movement, you will notice that it will increase in brightness. This is because Mars will reach **opposition** by the evening of January 18th. Opposition happens when a planet is directly opposite the Sun, as seen from Earth. You don't need to be in any specific city to observe this event; you only need clear skies to observe that it gets brighter. It's also when Mars is closest to Earth, so you'll see more details in a telescope.

Want a quick and easy way to illustrate what opposition is for Jupiter, Saturn, Mars, or other outer worlds? Follow the instructions on our Toolkit Hack: Illustrating Opposition with Exploring the Solar System page using our Exploring Our Solar System activity!



A mosaic of the Valles Marineris hemisphere of Mars projected into point perspective, a view similar to that which one would see from a spacecraft. The mosaic is composed of 102 Viking Orbiter images of Mars. Credit: NASA/JPL-Caltech

Mars has fascinated humanity for centuries, with its earliest recorded observations dating back to the Bronze Age. By the 17th century, astronomers were able to identify features of the Martian surface, such as its ice caps and darker regions. Since the 1960s, exploration of the Red Planet has intensified with robotic missions from various space organizations. Currently, NASA has five active missions, including rovers and orbiters, with the future focused on human exploration and habitation. Mars will always fill us with a sense of wonder and adventure as we reach for its soil through initiatives such as the Moon to Mars Architecture and the Mars Sample Return campaign.

Outreach Activities

November 2024 Outreach Events

Event Date	Type	Site Name	Address	Start Time
17 Jan 2025	School	Cielo Vista Elementary	21811 Avenida de los Fundadores , Rancho Santa Margarita	7:00 PM
24 Jan 2025	School	Cypress Village Elementary	355 Rush Lilly, Irvine	7:00 PM
28 Jan 2025	School	Castille Elementary	24042 Via la Coruna, Mission Viejo	7:00 PM
31 Jan 2025	School	Portola Springs Elementary	12100 Portola Springs, Irvine	7:00 PM
6 Feb 2025	School	Ball Junior High	1500 W. Ball Rd, Anaheim	6:00 PM

Please also check 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 Dr. John Glassco 949-922-5037cell

- Complete Astrophotography Outfit $1500 o.b.o.

- Camera: ZWO ASI678MC Planetary/Deep Sky – 8.3 PMxl color
- Mount: MEADE LXD-55 Goto German Equatorial (GEM) with Autostar Goto Control Model #497, Heavy-duty tripod, A/C Adaptor, Mighty Max Battery, Model ML-9-12, 12 Volt, 9 Amp w/ cables, Neewer Padded, Soft Carrying Case
- Telescope: Explore Scientific AR 102 (102mm) f/6.5 Achromatic Refractor, Orion 2" 90-degree Diagonal, Parks 8 X 50 Finder Scope, 1 1/4 "diagonal w/ lighted reticle
- Oculars: Celestron Zoom 8-24mm Zoom w/ case 1 ¼", Celestron 2x Barlow Ultima SV Series 1 ¼", Celestron 25 mm 1 ¼", Baader Hyperion MK-IV Universal Zoom 8-24mm w/case 1 ¼", 2" adaptor
- Accessories: Meade Flip Mirror System, Model 644, Celestron Radial Guider
- Laptop computer: ASUS ROG GL552VW, 15" Gaming Laptop Intel Caore i7, Windows 10, some astronomy software is installed

This system has been used together only once. The telescope has excellent optics, especially when coupled with the Baader zoom ocular. I'm no longer interested in spending cold nights out doing imaging/observing.

Local pickup or deliver to OCA meeting venue only. Photos of all items in the astrophotography package for sale are available upon request. Located in Laguna Niguel

For Sale contact Dave Cook 949-689-0853 cell

- MEADE LX200 GPS, 10-inch diam. mirror $1995
- 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.

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
Astronomer's chair	$ 50
Wet/dry telescope cover	$ 30

From the Editor

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

Due dates for submission of articles, pictures and advertisements

Issue	**Due date**
February 2025	25 January
March 2025	22 February
April 2025	22 March
May 2025	19 April

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