SIRIUS ASTRONOMER

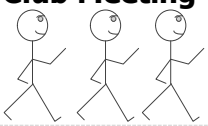
www.ocastronomers.org

The Newsletter of the Orange County Astronomers

April 2025 Free to members, subscriptions $12 for 12 issues **Volume 52, Number 4**

Here we have the Dolphin Head nebula (SH2-308), formed by a Wolf-Rayet star. Sam Saeed captured this in January 2015 from the club's Anza site. He used a Borg 71mm refractor with QSI683WSG mono camera.

Upcoming Events - free and open to the public

Beginner's class	Friday, 2 May at 7:30 to 9:30 PM **ONLINE** This is the 3rd session of the Beginners Astronomy Class. It covers various methods of finding objects in the night sky.
Club Meeting 	Friday, 11 April at 7:30 to 9:30 PM **IN PERSON** and **ONLINE** "What's Up": Chris Butler from OCA **IN PERSON** Main speaker: Jason Williams from JPL **IN PERSON** whose talk will be "NASA's Cold Atom Lab: Quantum Science and Technology Maturation on ISS"
Astro-Physics SIG	Friday, 18 April at 7:00 to 9:00 PM **IN PERSON** Orange Coast College, Building 40, Astronomy House
Astro-Imagers SIG	Friday, 2 May 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, 27 April 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

Happy April! I hope you are enjoying the first all-electronic issue of the Sirius Astronomer! We'll undoubtedly have some bugs to work out on this, such as getting out reminders to members when each issue becomes available, but, as a club, we've successfully made bigger changes than that over the years, and I'm confident we'll find our way through this change, too.

Regardless of the format, the value of our newsletter ultimately is in its content, and our editor, Dave Fischer, has been doing a great job of pulling together articles of astronomical interest and items relating to the club itself to keep the Sirius Astronomer consistently useful and interesting in a way that also looks good.

Regarding content, we've been fortunate to have Don Lynn as a long-standing contributor, with his much-appreciated "Astro-Space Update" column. I don't know when he started giving his updates on recent scientific discoveries and developments in the space program, but his column was well-established when I joined the club in 2000, so he's been at it for well over a quarter century. We've had a lot of articles in the newsletter on a wide range of topics from other members over the years, which have been much appreciated, but Don's contribution is in a class of its own for longevity, quality, and interesting and wide-ranging content.

In the past, Don was also a regular source of astronomical and astrophysical information in person, particularly at our General Meetings (he was one of our regular "Ask an Astronomer" participants when we used to have that feature at the meetings) and also at Astrophysics meetings. Times change, and he's now mostly in Colorado, so it's reassuring as well as informative to see his column continuing regularly in the Sirius Astronomer. Thanks, Don!

If you have an area of interest that you'd like to cover in an article or a series of articles, do discuss it with Dave Fischer. And, if you enjoy an article in the Sirius Astronomer, consider reaching out to the author to let them know – a bit of appreciation can make an author's day! If you don't know how to reach them, I'm sure Dave could help you out with that…

The 2025 Messier Marathon that Wasn't…

Unfortunately, the March Anza Star Party, when we hoped to have the Messier Marathon, featured cloudy skies, fog, and cold temperatures, so, sadly, it was a bust. I don't know if anyone tried to do the Marathon on another night that was clearer – if you did, I hope you had a good time and found a lot of objects! For the rest of us, we're hoping for better luck next year.

As a consolation prize, this time of year is when Omega Centauri rises above our southern horizon at Anza – if you're not familiar with it, it's a very large globular cluster that's generally considered a Southern Hemisphere object. Although it's not at its best when viewed from our site, as it's low in the sky, it's pretty cool to see it at all. April is usually the best month for viewing it, and it's easily visible in binoculars, though more spectacular in a telescope. I hope you'll give it a try!

Help Wanted

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

AstroSpace Update

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

Hot Neptune – Astronomers used the James Webb Space Telescope (JWST) to investigate the atmosphere and weather on the exoplanet LTT 9779 b. It is classified as an ultra-hot Neptune, that is, a planet about the size of Neptune, but orbiting extremely close to its star. Very few of this class have been found. It is tidally locked so that one side always faces its star. That side reaches about 3600°F. Reflective clouds and cooler temperatures were found on the western part of the daytime side. This implies strong winds blow some of the heat away from this western region into the dark side. The clouds contain silicate materials, or vaporized sand. Water vapor was detected in the atmosphere.

Barnard's Exoplanets – Barnard's Star, at just under 6 light-years distant, is the next closest star to us beyond the Alpha Centauri system. For decades astronomers have announced discovery of numerous exoplanets orbiting Barnard's, but all have been proven false … until now. Confirmation efforts after last year's reports of exoplanets at Barnard's have resulted in confirming 4 planets. The confirmations were made with the radial velocity method, where the planet's gravity wobbles the star as the planet orbits. Because the 4 planets are quite small (19% to 34% of Earth's mass) the radial velocity effect was quite small and difficult to measure. Also, activity on the star made the measurements more difficult. With these small masses, they are rocky planets. The smallest of the 4 is probably the least massive planet ever detected with the radial velocity method. They orbit close to the star, having periods of 2.34 to 6.74 Earth days. All of the planets are too close to the star to be in the habitable zone (where temperatures would allow liquid water).

Brown Dwarfs – JWST was used to study the Flame Nebula, where new stars and brown dwarfs are forming. It is about 1400 light-years away in Orion. Brown dwarfs are sometimes called failed stars because they never grow massive enough to sustain nuclear fusion of hydrogen like ordinary stars do. Brown dwarfs form fairly hot, but cool over time. While still hot, they show up well in infrared light, which JWST is designed to observe. Also infrared light penetrates better than ordinary light through the gas and dust that obscure the view where stars form. The new study of the Flame showed the distribution of various masses that new brown dwarfs form with. Below 10 Jupiter masses, brown dwarfs began to be rarer and none were found below about 2 or 3 Jupiter masses. This distribution will help theoretical astronomers determine how brown dwarfs form.

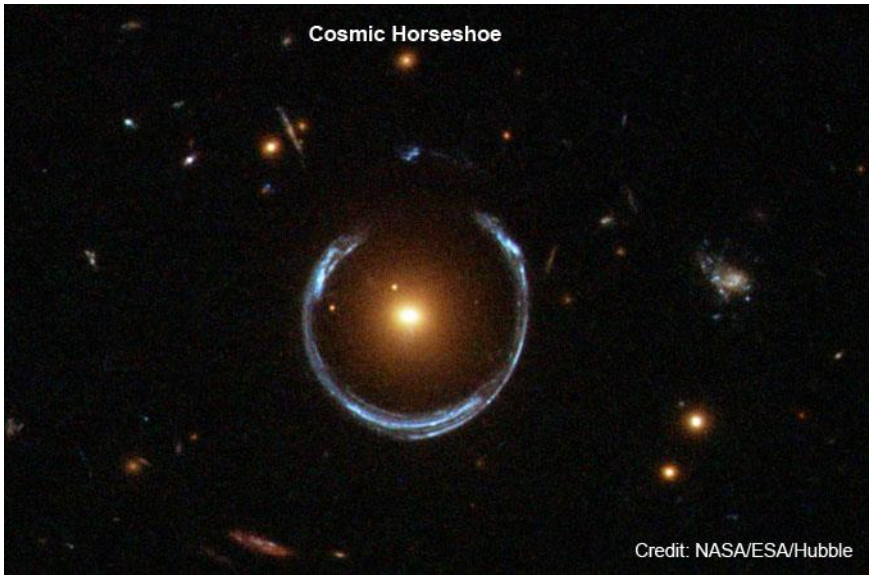
Rogue Planet – JWST was used to observe a planet-sized object that has no star to orbit about. Such objects are known as rogue or free-floating planets. The object observed is known as SIMP 0136 and is 20 light-years away. It rotates every 2.4 hours. The new observations covered 2 complete rotations. The variations seen cannot be explained simply, but must involve cloud, temperature and chemical variations that pass through our view during rotation. The best estimate of the object's mass is 13 times that of Jupiter. That puts it in the high end of planet masses, not quite massive enough to be a brown dwarf.

Exoplanets Imaged – Astronomers used the coronagraph of JWST to image exoplanets orbiting a nearby star, HR 8799. The coronagraph blocks out the star making the much dimmer planets easier to image. HR 8799's planets are 4 gas giants found to be rich in carbon dioxide. There are two theories for how gas giants form: core accretion and disk instability. The best fit for these new observations is that the 4 formed by core accretion (which is believed to be how Jupiter and Saturn formed also). HR 8799 is a young star, only about 30 million years old. The planets are still hot from forming, and thus glow brightly in infrared. Out of nearly 6000 exoplanets known, fewer than 100 have been imaged, due to the difficulty of imaging dim and possibly obscured planets extremely close to bright stars.

Collision Averted – The asteroid known as 2024 YR4 was discovered the last week of 2024 by the ATLAS telescope in Chile. It was soon found that it would pass quite close to Earth in 2032, with a 2.8% chance of striking our planet. With continued observation through the end of February, the precision of the asteroid's orbit was improved to the point where astronomers could tell that the chances of collision were only 0.001%, essentially a sure miss. From JWST observations, the asteroid is estimated to be about 200 feet in diameter, large enough to possibly cause serious damage if it hit Earth, depending on the exact impact location. The closest YR4 came to Earth in 2024 was 516,000 miles, which is more than twice the Moon's distance.

Triple Kuiper Belt Object – Astronomers used the Hubble Space Telescope (HST) to observe a Kuiper Belt object (small body orbiting beyond Neptune) that was known to be binary, that is, two bodies orbiting about each other. The system is known as 148780 Altjira. Irregularities observed in their orbit implied that there is a third body in the system which is apparently too close to one of the binary pair to resolve. Only one other system in the Kuiper Belt is known to be a triple. The binary pair are about 6000 miles apart and circle each other every 140 Earth days. They are 137 and 153 miles in respective diameters. The third body orbits in 5.5 hours. Of the theories of how Kuiper Belt objects originally formed, the gravitational collapse theory is more likely to produce an occasional triple, so finding this triple supports that theory. For the next 10 years, one of the Altjira pair will occasionally occult (pass in front of) the other, so astronomers will be watching for more evidence of the third body during these occultations.

Distant Comet – Comet C/2025 D1 (Gröller) was discovered at a huge distance from the Sun, already active near the orbit of Uranus. This is only the 5th comet seen to be active that far. Its orbit was calculated to show its closest point (perihelion) is 14.1 AU (where an AU is the Earth's distance from the Sun), the record for known comets. Most comets become active at 3 to 5 AU, where the Sun's heat becomes adequate to sublimate (vaporize) water ice. This implies something else, such as carbon monoxide or carbon dioxide, is sublimating because the temperature is so much lower at Uranus's orbit.

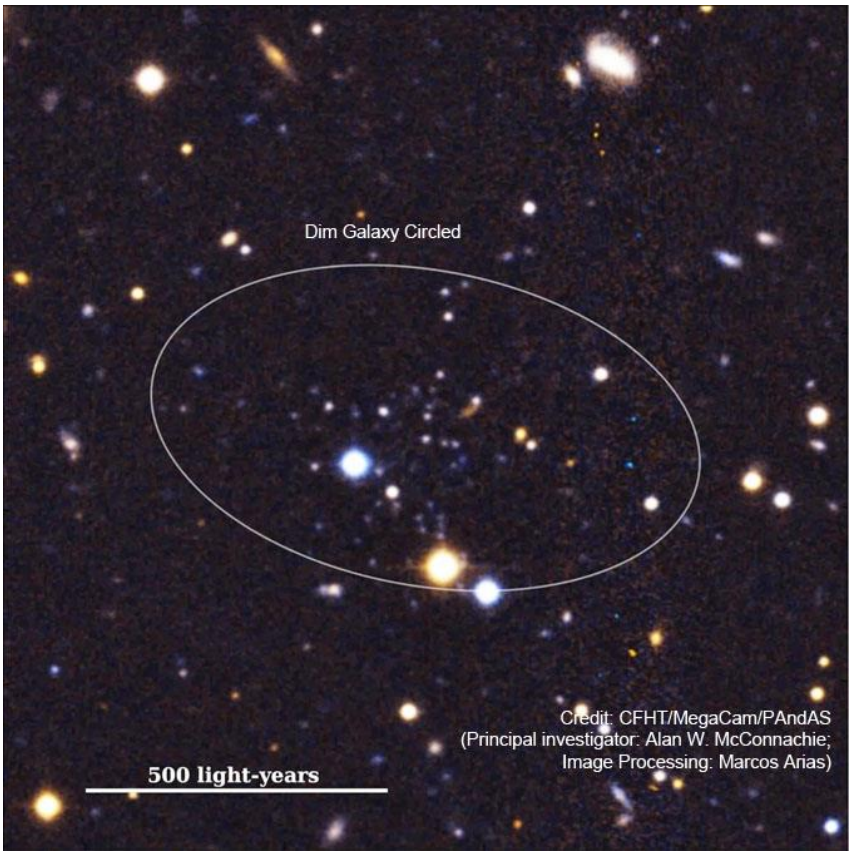


Extremely Massive Black Hole – When two galaxies line up perfectly on our line of sight from Earth, the gravity of the nearer one bends the light of the distant one, so that the image of the distant one distorts into a ring of light. This bending of light is known as gravitational lensing. This is predicted by General Relativity and the ring is known as an Einstein Ring. An example of this, but not quite perfectly aligned, and therefore missing the top of the ring, is known as the Cosmic Horseshoe, which was discovered in 2007. New research measured the mass of the central black hole of the foreground galaxy and found it to be 36 billion times the Sun's mass, an astonishingly large mass, probably in the top ten most massive black holes. The galaxy that this black hole is located in is known as LRG 3-757. The galaxy itself has an astonishingly large mass, about 100 times that of our Milky Way. It is one of an unusual class of galaxies known as Luminous Red Galaxies (LRGs), which are extremely bright in infrared and red.

LPT Source – Radio pulses from space that last from seconds to minutes and repeat after tens of minutes to hours are known as long-period transients, or LPTs. They differ from any emissions known to come from neutron stars. The source of LPTs has been a mystery since LPTs were discovered a few years ago. New observations using the LOFAR radiotelescope arrays pinpointed the source of one LPT to a star-like object 1600 light-years away. Further investigation with other telescopes revealed the source object is a white dwarf star and a red dwarf star orbiting each other every 125 minutes. There are two theories of how this pair could be generating radio pulses, and both involve magnetic fields. Further observations will try to distinguish the correct theory. The period between pulses matches the orbital period of the stars.

Neutron Star Masses – A neutron star is formed when a fairly massive star reaches the end of its life and explodes as a supernova. The remaining core then collapses to an extremely small and dense body, which is the neutron star. A team of astronomers determined the masses of 90 neutron stars and corrected for mass gained since their birth, to determine the range of masses that neutron stars may possess at the time of their birth. The resulting range spanned from about 1.1 to 2.3 times the Sun's mass, with the most common mass being 1.3. This result should help astrophysicists understand the exact processes that occur in massive supernovas and their collapses to neutron stars.

Faintest Andromeda Dwarf Galaxy – In 2010, astronomers using the Canada-France-Hawaii Telescope discovered a faint satellite galaxy of M31. It was dubbed Andromeda XXXV. New data from HST established that it is the faintest M31 satellite galaxy. It contains only about 20,000 Suns worth of stars. It sits about 500,000 light-years from the center of M31.



Andromeda Dwarf Galaxies – Astronomers used HST to map the dwarf galaxies surrounding the Andromeda Galaxy (M31). Half of these dwarf galaxies strangely lie in one plane and orbit in the same direction. This may have been caused by a galaxy collision a few billion years ago. The study also found that Andromeda dwarf galaxies experienced vigorous star formation that finally shut down about 5 billion years ago while similar dwarf galaxies orbiting our Milky Way shut down star formation far earlier, about 10 billion years ago. The shutdowns probably occurred when the gas with which to form stars was pushed away by hot young stars. More work is needed to explain these findings.

Saturnian Moons – Astronomers announced the results of a search about Saturn to discover new moons, which was made using the Canada-France-Hawaii Telescope. 128 new moons were found, bringing Saturn's total to 274. Jupiter is in a distant second place with only 95 known moons. The new discoveries ranged in size from 0.6 to 12 miles in diameter. They do not orbit in the plane of the rings and large moons, and the majority orbit retrograde (the opposite direction from the rings and large moons). They also tend to have very large orbits. These properties imply that they are all captured asteroids or collisional pieces of captured asteroids.

Neptunian Aurora – Aurora have been imaged on all 4 gas planets except Neptune, until now. JWST used its near-infrared spectrograph to spot Neptunian aurora. Because Neptune's magnetic poles are tilted 47 degrees from the spin axis, the aurora, following the magnetic field touches down in mid latitudes. The new observations also measured the temperature of the top of Neptune's atmosphere and found it has dropped by several hundred degrees since it was last measured by Voyager 2 in 1989. This drop made the auroras fainter than expected.

Red Planet Explained – It has long been known that the red color of Martian soil is caused by rusty iron minerals. New study shows the color is specifically due to the iron mineral ferrihydrite. This is interesting because this mineral forms only in the presence of water, as opposed to some other iron minerals. This means the red dust has probably been coating the planet for billions of years, since the time when liquid water flowed on the surface of the red planet. The precise color of Martian dust was found in the new study to best match a mixture of ferrihydrite and basalt.

Oldest Impact – Researchers discovered the oldest meteorite impact crater known on Earth. It is in western Australia and is 3.5 billion years old. It was identified as an impact crater by the presence of shatter cones, formations created only by impacts. The crater, before eroding, would have been about 60 miles across.

Astronauts Return – You may recall that back in June last year, astronauts Suni Williams and Butch Wilmore were asked to become part of the International Space Station (ISS) long-term crew rather than risk returning to Earth that month using the Boeing Starliner spacecraft that had been acting up. So, the Starliner splashed down empty. Long term ISS stays are usually 6 to 8 months, but various reasons extended this stay to 9 and ½ months. The stay finally ended the middle of March, with Williams and Wilmore and two other crew members returning to Earth in a SpaceX Dragon spacecraft (capacity 4), splashing down off the coast of Florida. Their replacements to continue running the more than 150 experiments and demonstrations ongoing aboard ISS had just arrived days before in another Dragon. Williams now holds the record for the most total time on space walks by a female (62.1 hours) and is 2nd on the list of most total time in space by any astronaut (608 days).

Fram2 – SpaceX flew its 6th private (not associated with NASA) flight with crew, dubbed the Fram2 mission, which lasted about 4 days. It had a number of unusual characteristics. It was the first time in history that people have orbited directly over Earth's North and South Poles. The crew of 4 were from Malta, Germany, Norway and Australia. All had previously studied Earth's polar regions. It was the 1st SpaceX mission that took off from Florida and landed off the coast of California. The crew performed 22 science experiments in space, including aurora observations. Because the mission did not dock with the Space Station, the docking mechanism was replaced by a large window.

Voyager 1 and 2, pioneering explorers of the gas giant planets, are powered by plutonium electricity generators, that after 47 years in space have diminished in their electrical output. In order to prolong the spacecraft lives, controllers turned off the cosmic ray instrument in Voyager 1 and the low-energy particle instrument in Voyager 2. Each spacecraft now has 3 of its original 10 instruments still operating. With more planned instrument retirements, the Voyagers should continue to operate at least one instrument each into the 2030s.

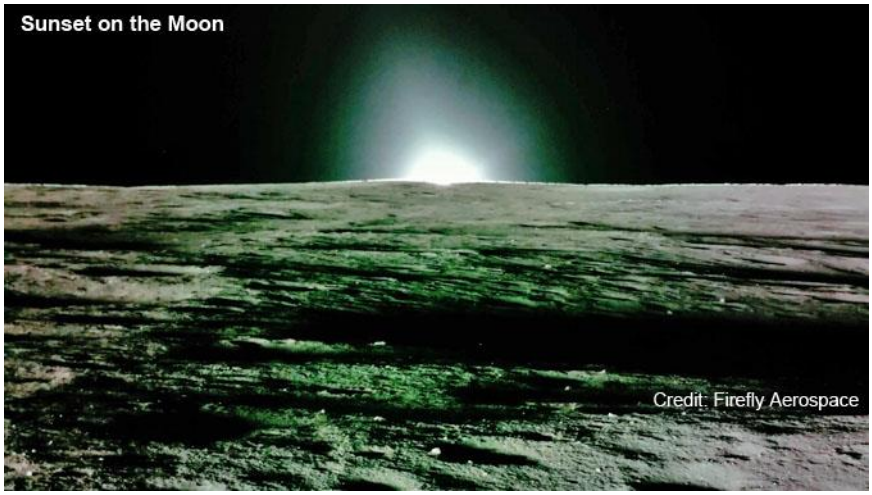
Europa Clipper spacecraft made a gravity slingshot pass by Mars in early March to aim it toward an encounter with Earth in December next year for an Earth gravity slingshot that will send it to Jupiter and its moon Europa in April 2030. Clipper's instruments were tested by observing Mars and its moon Deimos during the pass. Because Clipper is powered by solar panels, and sunlight is 27 times weaker at Jupiter than at Earth, Clipper is the largest planetary spacecraft ever, with its solar panels about as long as a basketball court.

The **EZIE** spacecraft were launched from California by a SpaceX rocket on March 14. EZIE consists of 3 spacecraft flying in a linear formation, which will map auroral electrojets. These are electric currents that flow through auroras.

SPHEREx and PUNCH Launch – The SPHEREx space telescope and the PUNCH 4-part spacecraft fleet launched from California on a SpaceX rocket March 11. SPHEREx will observe in infrared the entire sky 4 times over, creating a 3-dimensional map of 450 million galaxies. A goal is to determine how inflation, which occurred immediately after the Universe came into being, left an imprint on the distribution of matter in the Universe. Another goal is to determine how galaxies changed over the life of the Universe. With its spectrograph, SPHEREx will locate water, carbon dioxide and other materials across the sky. PUNCH will observe the area where the Sun's corona changes into the solar wind. Both SPHEREx and PUNCH circle the Earth in slightly tilted polar orbits.

SpaceX's **Starship** with Super Heavy Booster, the largest rocket ever built, launched from Texas for its 8th test flight. The second stage blew up and dropped debris across the Caribbean. The demise looked similar to the 7th test flight, though likely a different cause.

Assorted Lunar Spacecraft:



The **Blue Ghost** lunar lander, designed and built by the Firefly Aerospace company under contract with NASA, successfully landed on the Moon's Mare Crisium in early March. It operated for one lunar day (about 14 Earth days) and for 5 hours into lunar night. It demonstrated location of its position using Earth orbiting position satellites, tested drilling and sample collection capabilities, imaged the lunar sunset, observed the Earth's magnetic field in X-rays, measured electric and magnetic fields on the Moon, took about 9000 images of descent and landing, tested radiation tolerant electronics while passing through the Van Allen radiation belts, and observed and electrically removed lunar dust. While people on Earth observed the March 13 lunar eclipse, Blue Ghost instead saw the Earth eclipse the Sun.

The **IM-2 Athena** lunar lander, designed and built by the Intuitive Machines company under contract with NASA, launched to the Moon in late February. It set down gently near the Moon's south pole, but tipped over, perhaps due to tilt of the crater it landed in or problems with the lidar. Unfortunately, this prevented nearly all its planned science from being accomplished. The company's previous lunar lander, IM-1, also tipped over upon landing, but accomplished much of its planned science because the solar panels luckily got some sunlight. Not so lucky with IM-2's solar panels.

The **Lunar Trailblazer** spacecraft shared the same SpaceX rocket to the Moon as IM-2. Its goal was to map water on the Moon. Unfortunately, radio contact with Trailblazer was lost.

Astroimaging SIG

The Astro imaging special interest group March meeting was held in person at Orange Coast College. Kyle Coker presented some image processing techniques relevant to solar eclipse photography. A program called Photomatix was demonstrated for its ability to make high dynamic range (HDR) images from a set of bracketed sub-exposures. Members shared some processed images. Open discussion covered a variety of topics including dew control measures. Two products mentioned were the Inkbird digital thermostat and a wireless dewpoint meter available as an accessory for iPhones.

The April meeting was held in person at Orange Coast College. This month the attendees were given a behind-the-scenes tour of OCC's planetarium and a brief demonstration of the projection system. There were discussions about the operation of the planetarium's Foucault pendulum and a mind experiment regarding motion on a rotating ring was proposed by Kyle Coker.

A pair of related presentations were made by Alan Lang and David Fischer on the topics of binning while imaging and doing Drizzle integration to improve sharpness and resolution of processed images. Kyle Coker presented some images that he had recently processed. Open discussion covered advantages of some specific types of telescopes and how to improve the quality of off-the-shelf Newtonian telescopes.

MARCH GENERAL MEETING RECAP

by Helen Mahoney

The March OCA General Meeting was another fun one. Since it was March 14 (Pi day) we had a contest to see who could recite the most digits of Pi. The in-person winner, who received an actual pie as a prize, was your Outreach Coordinator Martin Christensen with 16 digits, and the on-line winner was long-time OCA member and functionary Don Lynn with 67!

Both the What's Up and Main Speaker were in person this meeting, with John Garrett from TVA giving another outstanding What's Up, and Courtney Duncan from JPL giving a presentation on "Mars Helicopter Telecom".

Courtney retired from JPL after 35 years. He worked on numerous important space projects and led the telecommunications team for the Ingenuity Mars helicopter, part of the Perseverance Mars Rover mission. His long-time expertise in ham radio (call sign N5BF) was instrumental in allowing him to design a system for the rover and helicopter to communicate.

Since many of the Perseverance team did not believe the helicopter would be a success, his communication system had to be very light and inexpensive. His design used off-the-shelf parts which were designed into identical electronic boards for Ingenuity and Perseverance that weighed only 13.3 grams each! To keep the electronics warm enough to operate in the -40 C to -100 C Mars temperatures, they were enclosed in a mylar box, heated to -40 C.

Since the helicopter blade span had to fit into a 4-foot space under the rover while providing lift for the 1.8 kg Ingenuity in thin air (8 torr, like 100,000 feet on Earth), the blades had to rotate at 2585 RPM!

Not only was the helicopter successful, but it far exceeded its planned 5 flights, making 72 total. It flew reconnaissance to guide the rover's pathway, but also was able to fly over a dune field that the rover could not drive over, proving that a flying craft was valuable and could add to the imaging and science of a planetary mission.

If you were not at Chapman, or have not yet viewed the presentations on Zoom or You Tube, I encourage you to do so. Check the website at ocastronomers.org for information on the upcoming April 11 meeting, and I hope to see you there!

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. It will continue to be paginated for printing.

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

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

Issue	**Due date**	
May	26 April	Changed because we are no longer printing the newsletter
June	31 May	
July	28 June	
August	26 July	

Note to OCA membership about Western Amateur Astronomers

Those of you who have been around OCA for at least a few years are aware that the club is a member of the Western Amateur Astronomers (WAA), an umbrella organization of amateur astronomy societies in the western USA, founded in 1949. As an umbrella organization, WAA members are the astronomy societies themselves, with an individual from each member club representing their home organization at WAA meetings. I have represented OCA for most of the last 45 years as club representative, and more recently as WAA vice president. Cecilia Caballero and Jon Montgomery have taken on the former duty from me for the last few years.

The purpose of WAA is to facilitate collaboration between astronomy groups, encourage and promote interest in astronomy with various activities, and to present awards for outstanding contributions to the hobby. Our major award is the G. Bruce Blair award, named in honor of the founder of WAA. This is a truly prestigious award in the format of a large gold-plated bronze medallion that has had many well-known personalities as recipients, including several members of OCA.

This year's Blair award is to be presented to Mr. John Wright Briggs. Mr. Briggs has been contributed greatly to many activities than have been of benefit to amateur astronomy, including assistant editorship at Sky and Telescope, research engineer at several observatories, held leadership positions at the Antique Telescope Society, Historical Astronomy Division of the American Astronomical Society and others. The details of the presentation have not yet been determined, as the award was just announced after a WAA meeting and vote last week.

I will be stepping down from my WAA duties very soon, and OCA needs a volunteer to take over the position of OCA representative. The only requirements are to participate in approximately bi-monthly virtual meetings. The venue is Zoom, and meetings have mostly been on Thursday evenings away from new moon, though subject to change to accommodate individual schedules. Participation may include giving brief updates about OCA activities, presenting communications of interest (if any) from the club to WAA, and briefly summarizing any significant WAA activities to the OCA Board, as well as voting on awards and various other issues.

Representatives also have the opportunity to present award nominations from the OCA, suggest, promote and lead new activities for WAA, and even help to grow the membership of the group to other clubs to expand its influence and scope. In years past, WAA has organized its own major conferences, joined with other groups (member and outside) in putting on seminars and conferences, helped member clubs coordinate special projects, and even arranged to get telescopes donated and shipped to astronomy clubs in developing foreign countries (two occasions I can recall) who did not have access to such equipment. Any special organizational skills and ideas would be welcomed.

There is no specific commitment duration for this position, although it would be desirable to maintain continuity for a year or more (about 6 meetings). If you would like to volunteer, talk to Barbara Toy. If you have additional questions, my contact information is and will be on the back of the Sirius Astronomer for the next two months.

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

Here's a picture of Jake Brown and Barbara Toy awarding Joe Pomathy the February raffle prize, a Celestron CPC 800 telescope with mount, tripod, and accessories.

Just to be clear – there was no raffle planned for the March meeting.

Raffle at the OCA Club Meeting in April 2025

Prize: Celestron Nexstar 8i Schmidt Cassegrain Telescope (8 inch diameter),
"GoTo" Single Fork Arm Mount in ALT/AZ setup,
Nexstar hand controller with GPS assisted alignment,
12vDC power supply,
Accessories (eyepieces, diagonal, manual, etc.)

When: April 11, 2025, 7:30 pm.
Where: OCA General Meeting at Chapman University.

This Raffle is OPEN to all in attendance at the meeting, members and non-members alike. Tickets for the RAFFLE are FREE to those in attendance.

Outreach Activities

Upcoming Outreach Events

Event Date	Type	Site Name	Address
27 April	Outreach	Crystal Cove	Crystal Cove State Park

This event coincides with a planned Grunion run at the park.

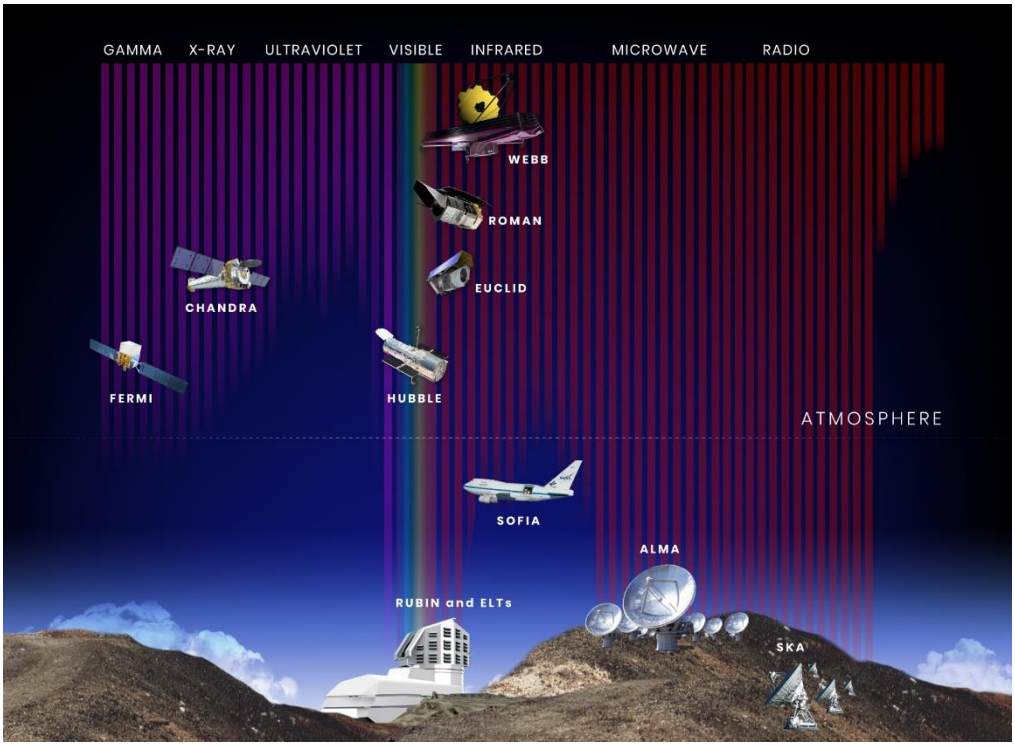
Please also check OCA website for start times and with Martin Christensen for updates to this list.

April's Night Sky Notes: Catch the Waves!

By Kat Troche

The Electromagnetic Spectrum

If you've ever heard the term "radio waves," used a microwave or a television remote, or had an X-ray, you have experienced a broad range of the electromagnetic spectrum! But what is the electromagnetic spectrum? According to Merriam-Webster, this spectrum is *"the entire range of wavelengths or frequencies of electromagnetic radiation extending from gamma rays to the longest radio waves and including visible light."* But what does **that** mean? Scientists think of the entire electromagnetic spectrum as many types of light, only some that we can see with our eyes. We can detect others with our bodies, like infrared light, which we feel as heat, and ultraviolet light, which can give us sunburns. Astronomers have created many detectors that can "see" in the full spectrum of wavelengths.



This illustration shows the wavelength sensitivity of a number of current and future space- and ground-based observatories, along with their position relative to the ground and to Earth's atmosphere. The wavelength bands are arranged from shortest (gamma rays) to longest (radio waves). The vertical color bars show the relative penetration of each band of light through Earth's atmosphere. Credit: NASA, STScI

Telescope Types

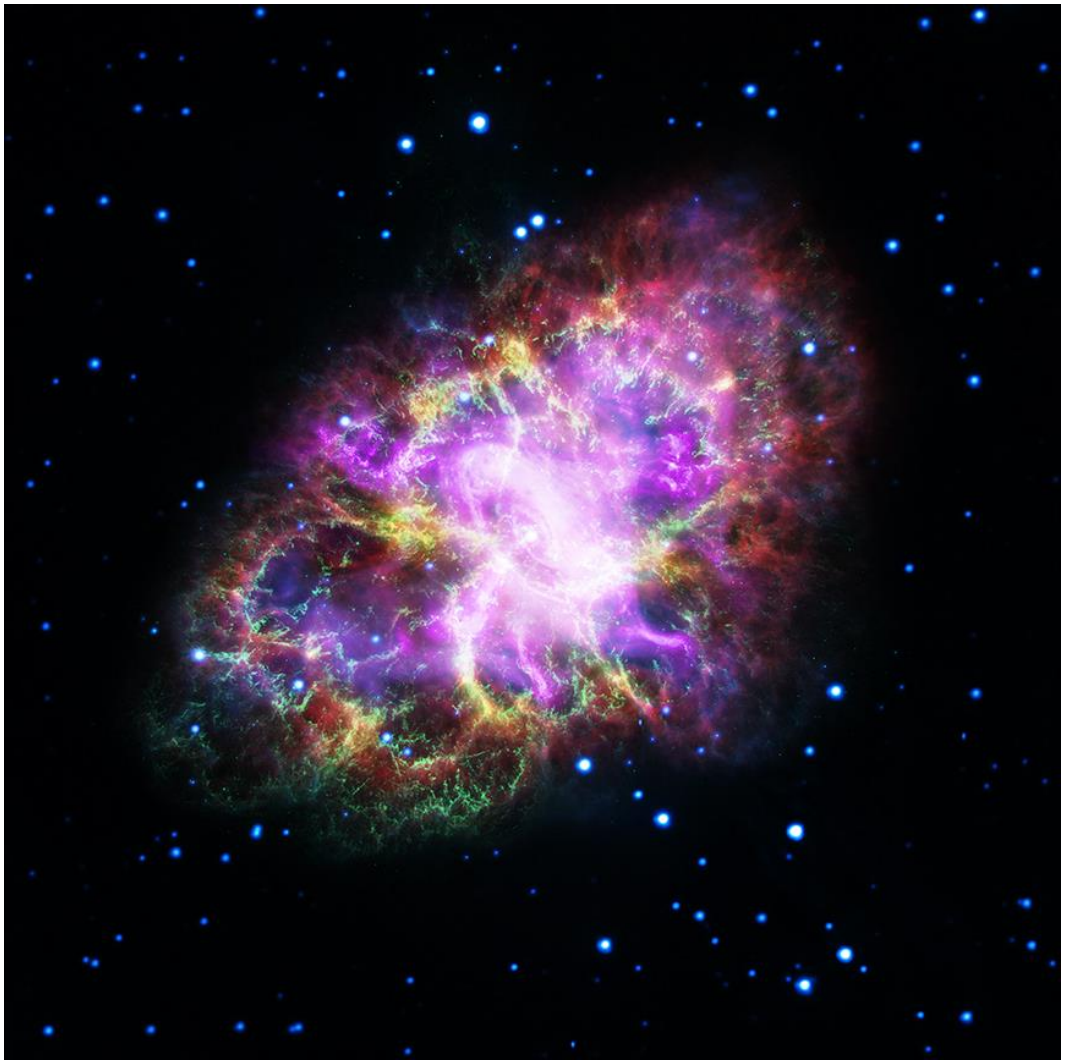
While multiple types of telescopes operate across the electromagnetic spectrum, here are some of the largest, based on the wavelength they primarily work in:

- **Radio:** probably the most famous radio telescope observatory would be the Very Large Array (VLA) in Socorro County, New Mexico. This set of 25-meter radio telescopes was featured in the 1997 movie Contact. Astronomers use these telescopes to observe protoplanetary disks and black holes. Another famous set of radio telescopes would be the Atacama Large Millimeter Array (ALMA) located in the Atacama Desert in Chile. ALMA was one of eight radio observatories that helped produce the first image of supermassive black holes at the center of M87 and Sagittarius A* at the center of our galaxy. Radio telescopes have also been used to study the microwave portion of the electromagnetic spectrum.

- **Infrared:** The James Webb Space Telescope (JWST) operates in the infrared, allowing astronomers to see some of the earliest galaxies formed nearly 300 million years after the Big Bang. Infrared light allows astronomers to study galaxies and nebulae, which dense dust clouds would otherwise obscure. An excellent example is the Pillars of Creation located in the Eagle Nebula. With the side-by-side image comparison below, you can see the differences between what JWST and the Hubble Space Telescope (HST) were able to capture with their respective instruments.

NASA's Hubble Telescope captured the Pillars of Creation in 1995 and revisited them in 2014 with a sharper view. Webb's infrared image reveals more stars by penetrating dust. Hubble highlights thick dust layers, while Webb shows hydrogen atoms and emerging stars. You can find this and other parts of the Eagle Nebula in the Serpens constellation. Credit: NASA, ESA, CSA, STScI, Hubble Heritage Project (STScI, AURA)

- **Visible:** While it does have some near-infrared and ultraviolet capabilities, the Hubble Space Telescope (HST) has primarily operated in the visible light spectrum for the last 35 years. With over 1.6 million observations made, HST has played an integral role in how we view the universe. Review Hubble's Highlights here.



The Crab Nebula, located in the Taurus constellation, is the result of a bright supernova explosion in the year 1054, 6,500 light-years from Earth. Credit: X-ray: NASA/CXC/SAO; Optical: NASA/STScI; Infrared: NASA/JPL/Caltech; Radio: NSF/NRAO/VLA; Ultraviolet: ESA/XMM-Newton

- **X-ray:** Chandra X-ray Observatory was designed to detect emissions from the hottest parts of our universe, like exploding stars. X-rays help us better understand the composition of deep space objects, highlighting areas unseen by visible light and infrared telescopes. This image of the Crab Nebula combines data from five different telescopes: The VLA (radio) in red; Spitzer Space Telescope (infrared) in yellow; Hubble Space Telescope (visible) in green; XMM-Newton (ultraviolet) in blue; and Chandra X-ray Observatory (X-ray) in purple. You can view the breakdown of this multiwavelength image here.

Try This At Home

Even though we can't see these other wavelengths with our eyes, learn how to create multiwavelength images with the Cosmic Coloring Compositor activity and explore how astronomers use representational color to show light that our eyes cannot see with our Clues to the Cosmos activity.

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