SIRIUS ASTRONOMER

www.ocastronomers.org

The Newsletter of the Orange County Astronomers

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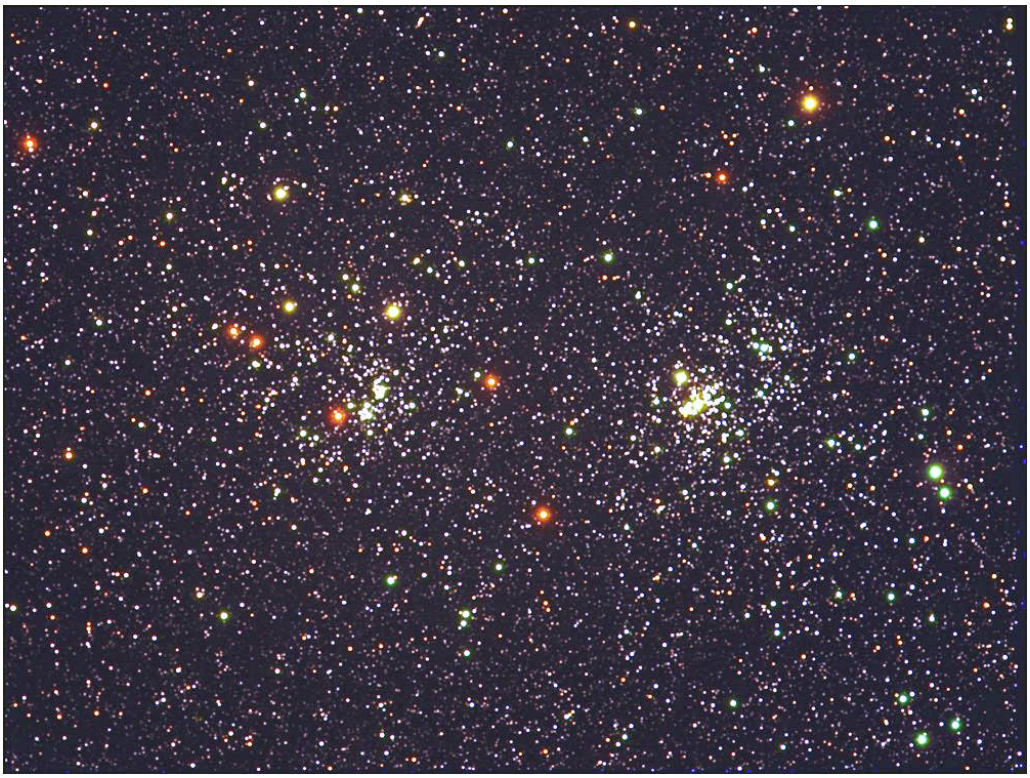


The Double Cluster – open clusters NGC884 and NGC869, imaged by Bob Bryant from Anza in Dec 2004 using a Tak FSQ-106 refractor and ST2000XM camera.

Because of the COVID-19 crisis and ongoing efforts to reduce exposure to the virus:

. **Most but not all in-person club events are cancelled**

. **Use of the Anza site is discouraged**

Please read more about how OC Astronomers has modified its activities on page 2.

Upcoming Events - free and open to the public

Beginner's class	Friday, 7 January at 7:30 to 9:30 PM ONLINE This is session 5 of the class. It covers how to use your telescope. Class materials can be downloaded from OCA website.
Club Meeting	Friday, 14 January at 7:30 to 9:30 PM ONLINE "What's Up?": Alex McConahay from Riverside Astronomical Society Main speaker: Dr. David A. Williams from Arizona State University whose talk will be "Psyche: Journey to a Metal World"
Open Spiral Bar	Saturday,15 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.

Please consult the calendar on the OCA website to RSVP (required)

Response to COVID-19 Crisis

COVID-19 continues to affect all our activities. Some in-person club events remain cancelled while others are beginning to occur or are in the process of being scheduled. Cancellation periods for specific events are detailed below. Please see the President's Message for additional information.

Any use of the club's Anza site by members is at their own risk as we have no way of cleaning or sanitizing the site to CDC standards. If you must go to the site, be sure to clean and sanitize surfaces you have contact with and make sure it is cleaner when you leave than it was when you arrived. You must bring cleaning supplies and sanitizer with you as it is not provided at the site. Be sure to take any trash that you generate or find on the site out with you, and please maintain social distancing if anyone else is out there.

If you have any questions, feel free to contact board members or post them to the email groups or through social media. We will do our best to respond, but please bear with us if there is a delay as we all have other responsibilities as well.

We hope you and your families and friends all remain safe and healthy, and best wishes to all of you!

Summary of Cancellations of OCA In-Person Events

Due to the ongoing COVID-19 crisis, all in-person club events are cancelled through at least the following periods:

General Meetings	Cancelled until further notice; please try our virtual meetings instead.
Anza Star Parties	Expect further updates on this.
Orange County Star Party	Cancelled until allowed by Orange County Parks, discussions are underway.
Outreaches	Have resumed in person.
Beginners Astronomy Class	Held only as Zoom meetings. Please contact Dave Pearson to attend.
SIG Meetings	Astrophysics SIG has resumed meeting in person. AstroImaging remains cancelled indefinitely, depending in part on availability of facilities and when meetings could go forward safely.

Please check the website, email groups and social media for updates.

From the Editor

Sirius wants photograph submissions from club members

Sirius is running low on pictures. Please send pictures to me along with a brief description of the subject, where the image was taken, and the equipment used.

We are also desiring to write up more projects. Please share something that you made with your fellow club members by sending an email with a brief description and the editor will work with you to produce an article.

Ideas for Future articles

The newsletter includes articles from members or about subjects suggested by our members. We seek ideas and writers to cover them. To contribute an article or work with the editor to produce one, please contact me at newsletter@ocastronomers.org .

Due dates for submission of articles, pictures and advertisements

Issue	Due date
February	22 January
March	19 February
April	19 March
May	23 April

President's Message

By Barbara Toy

Happy New Year, everyone! I hope 2022 will be a really great year for you and everyone dear to you! Let's hope that Covid-19 will be much less of a presence in our lives than it has been since early 2020, which now seems like a lifetime away…

It will be January when you see this, you may be noticing that the length of the days is slowly increasing, the sun has started its trek toward the north, and nights are slowly getting shorter. It may be hard to get a feel of shorter nights at this point, as January and February typically are our coldest months, and it's hard to see that those nights really are shorter under those conditions.

For those who may not have spent much time in winter out at our Anza site, we do on occasion get snow there, though generally it doesn't stay long. It's not really unusual for temperatures to be down in the 20s in the winter months so if you're going out there at this time of year, taking along a few extra layers is a good idea, and handwarmers can be helpful, too (I'm thinking here of those chemical packages that you squash or kneed to mix the contents, which then stay warm for quite a while, particularly in a pocket or somewhere that holds the heat. Extra gloves are good, too. And warm hats!).

Though I love looking at astronomical images, I'm generally of the camp that prefers to look at the universe myself through the eyepiece rather than take pictures of it, probably in part because viewing generally has a lot fewer technical difficulties than imaging. I can admit though, that as time slowly moves on during those cold winter nights when everything is getting colder, including my hands and face, there are times when I envy our imagers, who often set up their equipment to collect images on its own in the cold while they stay warm in a warming room or Anza House or anywhere else that's not a cold open area under the freezing sky.

Fortunately, there are some interesting activities and a lot of really great objects to look at in the winter sky which distract us from the cold. I remember spending an evening with a group of fellow-adventurers trying different ways of masking Sirius A so we could spot Sirius B, which happened to be about at its furthest from Sirius A from our perspective. We actually did get to see the "pup," and the challenge was part of the thrill – it's one thing to know from reading or what others tell you that Sirius is a double star, but it's so much more fun to see that it is with your own eyes. Even when it's cold…

Well, however you prefer your astronomy and whatever measures you take to stay warm, I hope you really enjoy your wintertime astronomical activities!

The OCA Election

As I write this, our election is in full swing, and preliminary numbers indicate that our electronic voting system is a great success. It looks like that'll be another innovation that will continue beyond Covid… Tim Hogle has generously agreed to continue dealing with the paper ballots (thanks, Tim!), so that's still an option as well. If you see this before our general meeting in January (which will be on January 14) and if you haven't voted yet, please do, either electronically or by mailing a ballot – if an electronic ballot is uploaded by or a paper ballot is postmarked by midnight that day, it'll be timely. It's always a good thing for us to have proof that our membership cares about its leadership even when the ballot only has just enough candidates to fill all of the available spots, though with spots for write-ins as well.

On the bright side, at least we do have a candidate for every spot this year, as some years it's hard to present even that. There have been occasions when we've had to go out and actively look for likely prospects, then cajole them into agreeing to be listed on the ballot. When I say that we encourage people to run for positions on the board and that we welcome new faces and names on the board, that's the absolute truth. And, if you don't get on the board the first time you run, please try again, as you never know what might happen (and there have been times when we've had candidates who lost in an election agree to become a board member to replace someone who had to leave the board unexpectedly during the year).

We've been very fortunate to have a succession of great people on the board during the time I've been in the club, and that is true of everyone on the 2021 board, who I hope to continue working with through 2022. Club members are welcome at our meetings, by the way, whether because they have something to present to the board for consideration or want to attend because they just want to see what's going on. If you want to attend a meeting for either reason, please let Alan Smallbone know as he'll need to send you the link when it's ready. If you have something to present, please email me about it as well, and Alan or I will be happy to help you determine what you need to provide so the board has what it needs when it considers your issue, and generally to help you through the process – and also to make sure you get on the agenda.

We Never Ask for Gift Cards
Unfortunately, scammers continue to be very active, and I periodically hear about people who've been contacted by someone purporting to be someone they know (such as a friend or their boss), asking for money, often as gift cards, to help deal with some urgent situation. There have been times when club members have reported getting this kind of email that seemed to be coming from me or other board members, which is unnerving. The reason they want gift cards, btw, is that it's very easy for the scammers to drain the money from them, and generally they can't be traced.

The only contacts you'll get from the club seeking money in any form are Charlie's emails or letters regarding renewals, or maybe something for a special event, like our periodic banquets. If you get an email asking for gift cards or asking you urgently to help out with some allegedly unexpected and urgent situation, don't respond. Those aren't from us, they're from scam artists trying to cheat you of your hard-earned money. PLEASE don't send them any!

A lot of email programs allow you to see the actual email address for the sender of an email if you hover over it with the cursor, which can show that a questionable email isn't actually from the person it purports to be from. If you can't do that, often the true address is shown when you hit "reply" – but don't send any actual reply to any questionable email itself. It's far safer to do a separate email with an address you know is right for the person who supposedly sent the email when you inquire about it.

It's sad that we have to be vigilant about these things, but that's the only way to avoid being taken in by one of these frauds.

On Other Updates…
We still don't know when we'll have access to the facilities at Chapman University again. If we get a big winter Covid surge, which unfortunately seems very likely with the spread of the highly contagious Omicron variant, it seems likely they'll continue to restrict access, maybe through the rest of the school year.

Our general meetings are continuing online, and I urge you to attend, as Reza continues to get us excellent speakers and the meetings are fun and informative, even for those who may be suffering a bit of Zoom fatigue.

On other updates – with the Omicron variant spreading so fast, I'm hoping we don't have to step back on newly restarted activities, like the Astrophysics meetings and the Outreach program. As things change, we'll try to get updates posted promptly on the website as well as to the email groups and social media. Please keep an eye out for updates and take all the measures you can to stay safe and healthy yourselves.

Obviously, we've still got challenges ahead, and I'm sure we'll all continue to cope somehow. Regardless of the challenges, I hope you're all able to find enjoyment in your lives both through and outside of your astronomical activities. May you all have clear skies on those nights you want to indulge in a bit of astronomy!

Electronic Voting Available Again This Year

By John E Hoot, Trustee

We are offering two different voting options for the club's board of directors and officers. You can find a mail-in ballot in December's newsletter. Additionally, members with an email address in their club profile will receive emails with personalized voting ID's, confidential credentials and instructions that will allow you to vote electronically and anonymously on a cell phone, tablet or PC at a web site hosted by "Election Runner", a company we have hired to administer our 2022 elections.

https://electionrunner.com/

We want to encourage you to vote. It is easy and free to vote electronically. This is our club, your votes show that you support the trustees and officers who volunteer their time and effort to make OCA the fine organization we all enjoy.

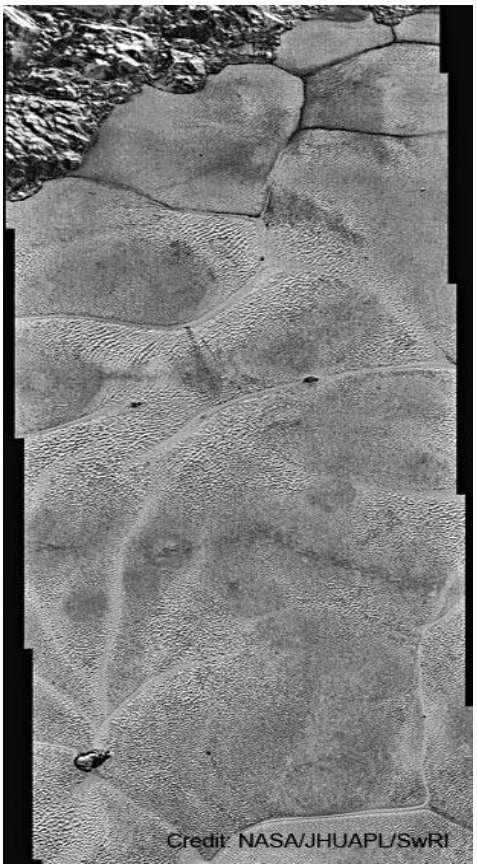
The deadline for all ballots (paper and electronic) is 14 January 2022.

AstroSpace Update

January 2022

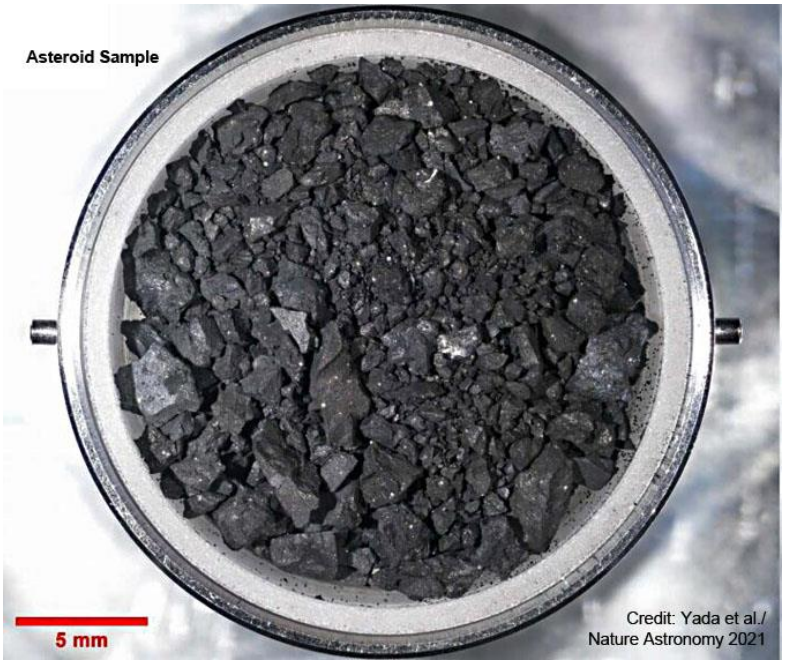
Astronomy and space news summarized by Don Lynn from NASA and other sources

Pluto Polygons – A new study explains how the polygonal areas on Pluto formed. These shapes, typically 12 miles across, are found in Sputnik Planitia, an impact crater filled with nitrogen ice. Previous analysis claimed that heat flowing from the interior caused convection (rising of material due to temperature difference) that broke up the nitrogen ice into the polygons, but the new study showed the convection is driven by cooling of the surface caused by sublimation, that is, the solid surface evaporating directly to gas without involving liquid. Computer simulations of the planet were run for the new study and they best matched the reality on Pluto when sublimation cooling was the driver of convection.



Mars Helicopter – Ingenuity, the Mars helicopter, completed its 17th flight in early December. There were tense times as it landed, because it lost radio contact with the rover Perseverance, which relays all helicopter radio communication to Earth. Controllers had not realized that a rise in the terrain would block the radio line-of-sight. Contact established a few days later showed the landing had been perfect. Current Mars flight records: 30 minutes total flying time, 2.2 miles total flying distance, 40 feet highest altitude, and 10 mph highest speed.

Mars's Subsurface Properties – Scientists analyzed seismic data from the Mars lander InSight to determine the structure of the ground under InSight's landing region, the area known as Elysium Planitia. The seismic vibrations were caused by wind. The analysis showed, going down from the surface, a sandy layer about 3 yards deep, 15 yards deep of blocky ejecta (material thrown out from impacts), about 150 yards of basaltic (lava) rocks, but with a sedimentary layer between lava flows. Counting impact craters in the lava flows determined that shallower lava flows were 1.7 billion years old, and deeper lava is 3.6 billion years old. The data were good to about 200 yards below the surface.



Pristine Asteroid Material – Analysis of the material brought back from the carbon-rich asteroid Ryugu by the spacecraft Hayabusa 2 shows that it is the most primitive Solar System material yet seen. It contains hydrated materials and organic material that appear never to have been heated since they formed during the formation of our Solar System. Material like this is probably present in some primitive meteoroids, but gets destroyed by high-speed passage through our atmosphere, so is not seen in meteorites. The grain size of the primitive material ranges from dust to about 1/3 inch. It is quite dark, reflecting only 2% of visible or near-infrared light. It is extremely porous, having density less than any meteorites. There are no chondrules, as are often found in meteorites.

Probable Martian Ice – The Trace Gas Orbiter (TGO), a part of the European ExoMars missions, has discovered large amounts of water or ice in the bottom of the Valles Marineris huge canyon system. The previous large deposits of Martian water or ice have been near the poles or below the surface of mid latitudes, not so close to the equator as Valles Marineris. The TGO instrument used is sensitive to hydrogen-containing material that is within about a yard of the surface. That instrument detects neutrons given off when cosmic rays strike the ground. The area of the water-rich region is about the size of the Netherlands. It is not clear whether the water detected is in the form of ice mixed with the soil or water chemically bound to the minerals of the soil, though experts have opined that it is likely ice. Conditions near the equator tend to evaporate ice on or near the surface, so scientists need to explain how Valles Marineris conditions protect the ice from loss, or how loss is replenished.

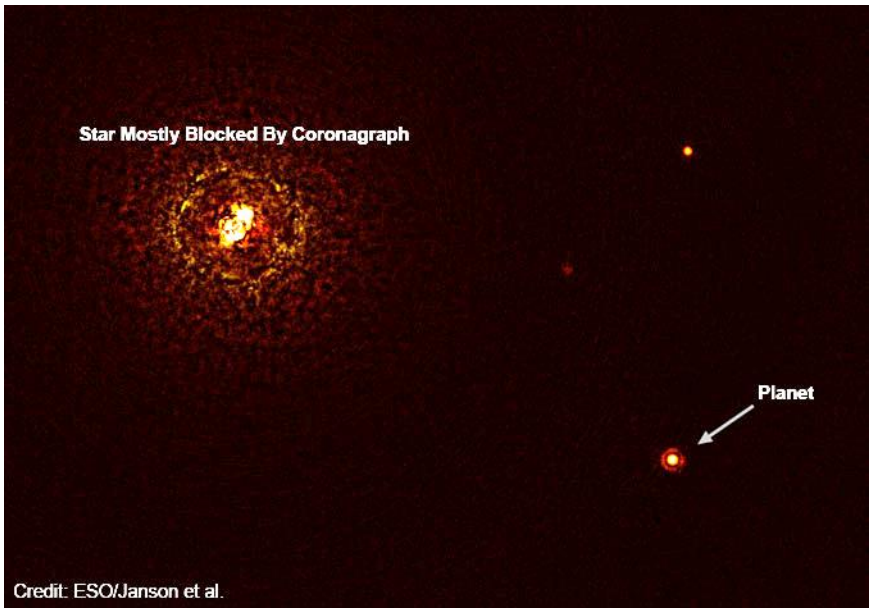
Fastest Exoplanet Revolution – Astronomers discovered an exoplanet that revolves about its star in only 16 hours, making it the shortest known year of any gas giant planet. The planet is named TOI-2109b, was found by the TESS planet-finding space telescope, has a mass about 5 times that of Jupiter, and is about 855 light-years away. It is extremely hot due to its proximity to its star, and its dayside temperature is estimated above 3500°F. The planet is slowly spiraling into its star, shortening its period by a fraction of a second every Earth year. So it would be continuously setting the record for shortest exoplanet year, except …

Yet Faster Exoplanet Revolution – Shortly after the above discovery, astronomers found an exoplanet, dubbed GJ 367b, that orbits its star in just 8 hours. However this newer discovery appears to be an iron planet, due to its high density, so TOI-2109b still holds the record for a gas giant. GJ 367b is about 60 times closer to its star, a red dwarf, than Mercury is to our Sun. The system is 31 light-years away. The planet is a bit larger in diameter than Mars, but 5 times as massive, resulting in a huge density. The planet was discovered by the transit method and was subsequently detected also by the radial velocity method, which allowed its mass to be measured. Its surface temperature is estimated at 2700°F. It could have molten lava on its surface. It is possible that it formed as more Earth-like, but almost all of it but the iron core boiled away from the heat. Astronomers plan to look for other planets at this star, hoping to learn how this planet ended up so close to its star.

Exoplanet Composition – When a white dwarf star forms at the end of the life of a Sun-like star, it ends up with a thin atmosphere of just hydrogen and helium, unless some of its planetary system has fallen in to pollute that atmosphere. Scientists made a study of 23 such polluted white dwarfs to see what their inner planets were made of. What they found were more exotic materials than the silicates, iron and other materials found in the inner planets of our Solar System. Only one of the white dwarfs appeared to have consumed a planet of Earth-like composition. This may be an indication that our Solar System is not typical.

Inclined Orbits – It is thought that planets form in a disk of material orbiting around a forming star. The disk and the star's rotating equator should be in the same plane. A new study of the star HD 3167, located 150 light-years distant in Pisces, found 2 of its 3 known planets orbit almost perpendicularly to the star's equator and steeply inclined to the other planet. The planes of the planets' orbits are determined by the Doppler shift of the starlight occulted by the planets during transit. The Doppler shift of any part of a star is determined by the star's rotational speed at the point in question. The best hypothesis for how these planets ended up in unexpected orbits is that there is a massive planet in the system, as yet undetected, whose gravity has been perturbing orbits. The known planets of the system are, from small to large orbits, a super-Earth and 2 mini-Neptunes. Astronomers hope that further observations will establish the eccentricities of the orbits (how far from circular), because eccentricity is often introduced by gravitational perturbations.

Validating Exoplanets – Scientists took a machine-learning computer program named ExoMiner and trained it on thousands of exoplanet transits, both verified and false alarms, then told it to find the real exoplanets among thousands of planet candidate transits observed by the Kepler space telescope. That produced 301 instances that ExoMiner was sure were real, adding to the more than 4500 exoplanets validated by other means. The scientists plan to run ExoMiner on TESS transit data and data from future planet-finding space telescope missions.



Extreme Exoplanet – A group of astronomers has taken an image of an exoplanet orbiting b Centauri, a 4th magnitude binary star about 325 light-years away, not to be confused with Beta Centauri, which is much brighter as seen in our sky. It is the hottest and most massive star known to have a planet. The planet orbits 560 times as far from its star as Earth is from the Sun. All these are extremes not expected of any planet. The binary star pair has combined at least 6 times the mass of our Sun, and is only 15 million years old. It was thought that the extreme ultraviolet and X-ray radiation from such a massive star would disrupt planet formation, but here is a planet. Perhaps its great distance from its star could explain its existence. It is a very massive planet at about 11 times Jupiter's mass. The image of it was taken with the SPHERE instrument on the Very Large Telescope in Chile. SPHERE uses adaptive optics and a coronagraph to block the star's light from overwhelming the planet's light. After discovery, an image of the planet was found in archived images over 20 years old taken by a 3.6-meter telescope in Chile. Previous planet imaging searches have tended to ignore such massive stars, so the discoverers of this planet are wondering if there are many planets waiting to be discovered if massive stars are searched.

Battered White Dwarf Companion – White dwarf stars typically emit low-energy X-rays, but recently 3 white dwarfs were caught brightly emitting high-energy X-rays. A team of scientists investigated and found that one of them, a star known as KPD 0005+5106, was regularly cycling in X-ray brightness every 4.7 hours. This indicated something was orbiting about it, perhaps a planet or a very low-mass star. Material from the orbiting object is being pulled onto the white dwarf, and where the material strikes it creates a hot spot that glows in X-rays. That spot periodically goes out of view, causing the cycling X-ray brightness. Though a search was made in visible light, the orbiting object has not been found. If the orbiting object is anything brighter than the dimmest of stars, it would have been seen. The white dwarf is about 1300 light-years away, and is one of the hottest known white dwarfs. To have a 4.7 hour period, the orbiting object must be 30 times closer to its star than Mercury is to our Sun. This must result in the object being blasted by radiation, and its material gravitationally stripped by the white dwarf.

Milky Way's Black Hole Weighed – By combining the light of all 4 Very Large Telescopes in Chile, using interferometry, astronomers have produced the highest resolution, most sensitive images ever of the center of our Milky Way galaxy. A star, dubbed S300, was discovered in the images quite close to the supermassive black hole there. By tracking this star's motion, the mass of the black hole was calculated more precisely than ever before: 4.30 million times the Sun's mass. The observations, combined with further observations from the Keck and Gemini Telescopes, confirmed that the motions of the stars near the black hole were conforming to Einstein's General Relativity extremely precisely and the distance to the black hole was measured to be 27,000 light-years.

Magnetic Propeller Star – The second known magnetic propeller star has been discovered. The properties of such a star are that it is a white dwarf rotating extremely fast, with a strong magnetic field, and with a companion star from which it gravitationally draws material, then flings out that material magnetically at about 2000 miles per second. The new discovery is known as LAMOST J024048.51+195226.9, is about the diameter of Earth, but roughly the mass of a Sun-like star, and rotates every 25 seconds.

Powerful Ejection – Observations of the star EK Draconis caught a really massive coronal mass ejection, much more powerful than any seen from our Sun. The star is roughly the mass of our Sun, but probably much younger. Some astronomers have questioned whether such powerful ejections are possible with stars as old as our Sun, as such could be quite damaging to Earth.

Cow explained – Astronomical transients, that is, flashes in the night, are given consecutive identifiers, ending with 3 letters, using aaa for the first of each year. One such transient that has resisted classification or explanation was AT2018cow, of course, shortened to "the Cow". It was much too bright to be a supernova and didn't match the rise and fall times of a supernova. Follow-up observations found that the Cow was emitting regular pulses of X-rays every 4.4 milliseconds, which continued for a couple of months. A new study based on the X-ray observations claims that the transient was caused by a star collapsing into either a neutron star or a black hole, and that material kept falling into it after the collapse, adding much more brightness than an ordinary star-collapse supernova. The study ruled out other proposed explanations. The periodic X-ray emission is likely from a fast-spinning accretion disk. X-ray data was provided by NICER, an X-ray telescope on the International Space Station. The Cow was seen in the galaxy CGCG137-068, which is about 200 million-light years away in Hercules. It is being classified as a "fast blue optical transient" or FBOT, which is a catch-all for unexplained blue transients. This is the only one of several FBOTs that has been caught immediately and follow-up observations made.

Closest Supermassive Black Hole Pair – Astronomers have discovered in galaxy NGC 7727 a pair of supermassive black holes that is the closest known such pair to us at 89 million light-years distant. They are the closest to each other of any known such pair, and will eventually (in perhaps 250 million years) merge into one large black hole. The masses of the black holes, determined by star motions about them, are 154 million and 6.3 million Sun's masses.

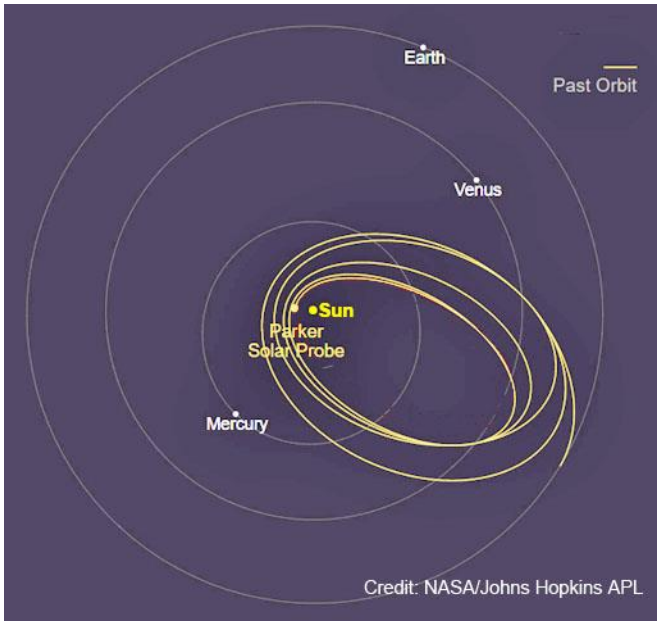
Strange Galaxy – Astronomers have measured the mass of the supermassive black hole at the center of Leo I, a small satellite galaxy of our Milky Way. Most supermassive black holes in small galaxies have small masses, and large galaxies have massive black holes. So the astronomers were surprised that Leo I has a black hole nearly as massive as our Milky Way's black hole even though the galaxy itself is 30 times smaller in mass than our galaxy. The astronomers also measured the dark matter profile of Leo I, that is, the density of dark matter from the galaxy center out to its farthest reaches. Again they were surprised because Leo I has abnormally small amounts of dark matter.

IXPE Launched – The Imaging X-ray Polarimetry Explorer (IXPE) launched from Florida in early December. It is the first X-ray space telescope dedicated to measuring the polarization of X-ray light. Targets will include black holes, supernova remnants, neutron stars, and other high-energy cosmic objects. IXPE has 3 telescopes with detectors sensitive to polarization. The polarization measurements are expected to give astronomers clues to how the X-rays were generated.

DART Launched – NASA's Double Asteroid Redirection Test (DART) was launched from California in late November. In late September next year DART will smash, at 4 miles per second, into the asteroid Dimorphos (diameter about 530 ft), which is in orbit about a somewhat larger asteroid Didymos (about 2560 ft). The idea is to see exactly what the effect is of hitting an asteroid with a spacecraft in terms of changing its orbit. This effect cannot currently be accurately predicted due to uncertainties about the structure and material inside asteroids. Neither of these asteroids is any threat to impact Earth, but this exercise will prepare us for the future time when an asteroid is found that is on course to impact Earth. Changing an asteroid's orbit just slightly years in advance of a collision can avoid the crash. A small spacecraft with camera will separate from DART to image the collision. DART will test automatic navigation using imaging designed to hit a specific target and a new Xenon ion engine. The choice of Dimorphos was made because tiny changes in the orbit of a binary asteroid can be very accurately measured by Earth-based telescopes. After the collision, the European Space Agency will launch the Hera spacecraft to visit Dimorphos to investigate the damage.

Approach To the Sun – The Parker Solar Probe is planned to make 24 orbits about the Sun, each approaching our star more closely than previously. Parker just completed its 10th close pass to the Sun, coming within 5.3 million miles of its surface, and setting a new record for spacecraft solar proximity. Johannes Kepler told us that a planet at its closest to the Sun will be moving at its fastest. Indeed Parker was moving fast, at 364,660 miles per hour, another spacecraft record.

LCRD Launched – Laser Communications Relay Demonstration (LCRD) was launched from Florida as part of the STPSat-6 mission. LCRD will demonstrate communication between satellites and ground using infrared lasers rather than radio, which should increase data rates by 10 to 100 times and decrease power required. Planned experiments will measure the effects of weather and atmosphere on laser communication. LCRD will operate from geosynchronous orbit, about 22,000 miles above Earth. It will also demonstrate laser communication with the International Space Station later in its mission.



Another Look

Dave Phelps, January 2022

New moon Jan 2	Wolf Moon
New moon Jan 31	Black Moon

We have been spending a lot of time in the third and fourth hours of right ascension recently, and it seems that won't change much going forward this month... except with one notable exception. It has been my intent to take another look at those constellations that are earlyish evening for us. It seems that many of our star parties began at evening twilight and faded off by midnight, though now, it seems, I'm only good till about nine.

The exception this month will be Auriga because I associate Auriga with Perseus. We are also going to travel south to Taurus, Eridanus and Fornax and pick up a few faint fuzzies.

As I mentioned before, Idyllwild had a good negative southern horizon. Back then the only lights were the distant San Diego light dome and by midnight any extraneous lights seemed to have calmed down. Those of you in Anza or in the mountains outside San Diego and especially those fortunate few with their homes in Hawaii or Cabo will be able to find the Fornax Dwarf, maybe.

Fornax is another one of those "modern" constellations with modern names, Fornax- the Furnace. I don't really know how to tell you to get there. Have dark skies, dark adapted eyes, a faint red light to see your planisphere and follow a line down from the Perseus waterfall. Once you've identified the 3rd and 4th magnitude stars that make up α and β Fornacus look 4.5 telrad fields south and a little east of Beta and you will find the location of the Fornax dwarf near the two Lamba λ's. You may not see it. It is difficult in amateur telescopes even though it has a surface brightness of 9. Surface brightness… that's a sham inflicted upon us poor amateurs to give us false hope that we might actually be able to see that blasted object. Good luck.

Image of Fornax Dwarf galaxy from ESO/Digitized Sky Survey 2, Creative Commons by way of Wikipedia

NGC1365 image. Credit: Dark Energy Survey /DOE/FNAL/DECam /CTIO/NOIRLab/NSF/AURA Image processing: Travis Rector (University of Alaska Anchorage/NSF's NOIRLab), Jen Miller (Gemini Observatory/NSF's NOIRLab), Mahdi Zamani & Davide de Martin (NSF's NOIRLab)

NGC 1316 with smaller companion galaxy NGC1317

Credit: ESO

Once you've added the Fornax "System" to your life list, move your Telrad about three fields towards the left, that is towards Canis Major and put a wide-angle eyepiece in your scope. You will see practically the whole Fornax Cluster in your one degree field of view. Ellipticals, barred, spirals, edge-on, they're all there, but almost all at 11th magnitude or fainter. If you are up to the task, pull out a finder chart and check out NGC 1316 (Fornax A) which is known to be a bright radio source and NGC 1365, an 11th magnitude version of a terrific barred spiral. (No, I did not see the bar.) Fornax A is 9th magnitude, so it should be identifiable in your moderate backyard telescope. Big scopes show its resemblance to Centaurus A. APOD posted a pretty remarkable image last January.

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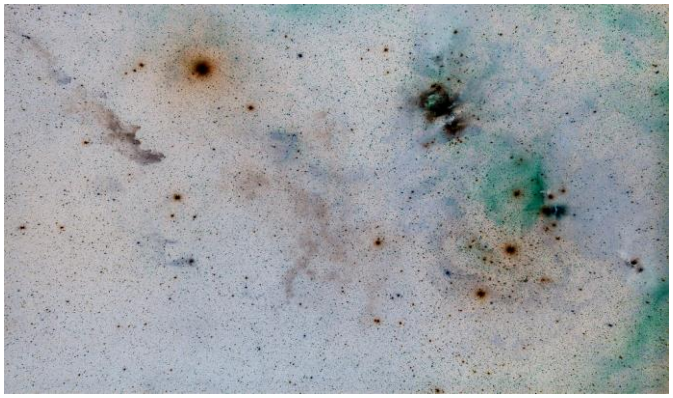
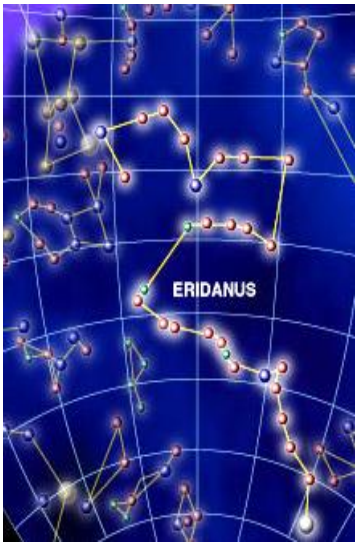
My total interest in Eridanus was limited to seeing how far down I could follow its stars into the muck at the horizon. Not all that far as I remember. Now it seems, all at once, we are inundated with images of the Witch Head Nebula; as if it were our fault that we haven't been taking snapshots of it all these years. I checked my memory, my atlases and my books and have found no special identifying characteristics that tells me I let a big one get away. I spent many hours at or around M42 searching out neighboring objects and never once looked for the Witches Head. It is definitely a photographic object- a reflection nebula, big at 3x1 degrees, and visually it is 13th magnitude. I expect to need a biggish telescope and filter to see it. It's right next to Rigel, so I guess it will have to go into the bucket. This negative picture shows the Witch Head along the upper part of the left edge and Rigel is that dark spot to its right.



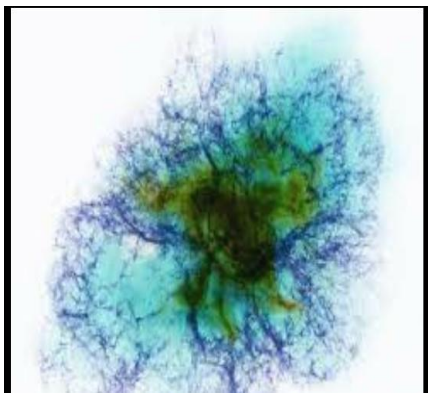
Eridanus is one of the 48 Greek constellations, first catalogued by the Greek astronomer Claudius Ptolemy in the 2nd century CE. It is associated with the Greek myth of Phaëton and usually depicted as a river flowing from the waters poured by Aquarius. The constellation's name was later used as a Latin name for the river Po in Italy. In Sanskrit, Eridanus is called srotaswini, which means "current or "course (of a river)." (Thank you to the interweb for the last paragraph, the awesome wide field image above and the highly massaged graphic on the next page.)

If you go back far enough, you can usually find some sort of connection to the name and lore of the Pleiades and the Hyades. The Pleiades is thought to come from the Greek gerund "to sail" and the Hyades probably marked the beginning of the rainy season. Did the rising of the Pleiades mark the time of the year when it was customary for the merchant and fishing boats to safely leave harbor? How about the Hyades weeping for their brother marking the beginning of the rainy season?

Surely the lore of the two asterisms goes back thousands of years. Cuneiform in Mesopotamia identified the sisters by seven (7!) dots. The Old Testament has three references where the Pleiades are named, the Indian references are too confusing and the Japanese have named a car after them. Go figure. Honors though, probably go to the Persians who named a Shah's wife after them. One reference I read said human stories of them could go back 100,000 years. I don't need to say a lot about them. All of us have tried to take a picture using an old 35mm, some more successfully than others. Mine pretty much stink. What I remember best about them, however, is the night at RTMC years ago when a pair of 5" binoculars was set up on the telescope field. The cluster and the nebulosity around the cluster was one of the more beautiful things I ever seen through a telescope.



The Pleiades and the Hyades are in Taurus and this is a really big constellation. Stretching from Cetus west to Auriga (which shares a star) to Gemini. It has the Pleiades, Hyades, Aldebran, Open Clusters, Supernova remnants and a variable nebula. This month though, I think we'll stick with one thing, M1, the Crab nebula. If β is the star at the end of the bull's northern horn, then ζ (Zeta) is the star at the southern one, closest to Gemini and Orion.



We all know that the Chinese described a "guest" star seen a thousand years ago. It's not too hard to find. A degree of so from ζ and rather bright at 8th magnitude. I don't think I've ever seen any colors, though maybe one of you can take a spectroscopic image that will pull some up. The Crab is very active in the radio spectrum. Its core is a pulsar that shines like the dickens in the radio frequencies and Hubble has found shock waves moving outward from the core. An interesting historical note is that it was the Crab that inspired Messier to start a list of comet-looking objects. I still remember the special feeling I had the first time I found it.

If we go to the end of the northern horn we find β Aurigae, or Elnath, the Horn star shared between Taurus and Auriga. Auriga is a fortunate constellation for us. It is far enough north to be easily visible and it has a bunch of really cool objects. A supernova remnant, open clusters, nebulas and a wild variable star lighting the nebulosity around it.

Let's travel from Elnath to Capella. You will find Simeis 147, a big, hard to find supernova remnant. Instead of star-hopping you can Messier-hop from the open clusters M37, M36 and M38. From there to open cluster NGC 1907. Very nearby are reflection nebulas NGC 1931 and difficult but impressive IC 417. There is more to find as we hop to IC 405, the Flaming Star Nebula. This nebula was a destination before it was ever named because we thought AE Aurgae was a Wolf-Rayet star. It's not, but it is very hot, very blue and very energetic. It lights up the gas giving us a reflection and emission nebula. Very cool indeed.

Our last object this month has been described as "enough different from something to be nothing". It's Barnard 34, a dark hole in the Milky Way close to M37. Its finder chart is below. I believe that you will find it a challenge. *Thank you to APOD for the image of IC 405 and Deep Sky Hunter the finder chart to B 34.*

Dark Skys

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For Sale contact Ron Choi rongrace2@cox.net
- Orion StarShoot AutoGuider further reduced price $ 200

For Sale contact Jerry L Floyd jlfloyd720@gmail.com 562-252-5666
- ZWO Electronic Filter Wheel, 7x36mm $ 600
- Includes set of ZWO brand 36mm LRGB, S2, H-Alpha, O3 narrowband (7 nm) filters

This item was originally purchased in May 2020. It has been used a few times (with a ZWO ASI1600MM camera) but is in virtually new condition. I am selling it because I replaced it with a filter wheel that accommodates my 7 1.25" Astrodon filters.

The cost of the items as purchased new from a vendor such as OPT would be $299 for the filter wheel, $199 for the LRGB filter set, and $479 for the SHO filter set, a total of $977.

I am willing to deliver in person to the OCA Anza site or other Southern California locations.

For Sale contact Stephen Lauro colormaker13@gmail.com 1-714-393-5467 cell
- Meade LS-8 in excellent condition $ 2100
- AutoStar 3 handbox controller
- Upgraded Stellarvue 7x50 finder scope
- Meade electronic micro-focuser
- Has the most recent firmware: version 1.6e

I am asking $2100 but will accept a reasonable offer.

For Sale contact David Cook 1-949-689-0853
- Celestron wedge #93658 for Nexstar SE5/SE6/SE8 telescopes Free

The original cost of this wedge was about $400. This wedge has been superseded with an updated version #93665 for a list price about $500, also for the SE6/8 telescope mounts. This wedge was for a Celestron SE8i, which I gave to my grandson, but he uses it in a strictly azimuth mode.

Upper Pads Warming Hut at Anza

Clean-up continues at the warming hut and the storage container located on the upper pads area of the OCA Anza site. In the hut there are a very old PC, mouse-eaten seat pads, fuel cans for Coleman stoves and some older astrometric references that may be disposed of. The storage container has loose packing material, unused boxes and pieces of scrap lumber among the things being eyed for disposal. Anybody having items stored in that shed or the storage container is encouraged to contact David Fischer (949-831-1163 or newsletter@ocastronomers.org) to ensure that those items are not categorized as trash.

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