SIRIUS ASTRONOMER

www.ocastronomers.org

The Newsletter of the Orange County Astronomers

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M31 the Andromeda galaxy imaged by Alan Lang from his yard in Long Beach in November 2020 using SkyWatcher Esprit 100mm refractor and ASI1600M camera with filters for red, green, blue and H-Alpha bands

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

. **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, 5 February at 7:30 to 9:30 PM The topic this month will be "How to Use Your Telescope"	ONLINE
Club Meeting	Friday, 12 February at 7:30 to 9:30 PM "What's Up?": Chris Butler from OCA Main speaker will be Dr. Brian Monacelli from JPL whose talk will be "Exploring Martian Geology"	ONLINE
Open Spiral Bar	Saturday, 13 February at 10:00 to 11:30 PM Want to socialize? Grab your images, experiences, questions, or none and see your fellow Orange County Astronomers face-to-face.	ONLINE

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

Response to COVID-19 Crisis

COVID-19 continues to affect all of our activities. All in-person club events remain cancelled through at least the spring of this year. 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	Cancelled indefinitely
Orange County Star Party	Cancelled indefinitely, until allowed by Orange County Parks
Outreaches	Cancelled indefinitely
Beginners Astronomy Class	Cancelled indefinitely, please contact Dave Pearson to attend Zoom classes
SIG Meetings	Cancelled indefinitely, depending in part on availability of facilities and when meetings could go forward safely. Some may schedule Zoom events.

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

From the Editor

Sirius wants photograph submissions from club members
If you would like your picture on the cover, please send it to me along with a brief description of the subject, where the image was taken, and the equipment used.

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
March	20 February
April	20 March
May	24 April
June	22 May

We Made It Ourselves

My request of the readers is to send me (newsletter@ocastronomers.org) a brief description of some more astronomy related things that they made themselves or with the help of friends. These will summarized in a future article and subsequently this column will feature short write-ups of some of these DIY projects which may inspire more of us to make useful things.

We have gotten only 5 submissions so far. Surely many more club members have made astro-things. When we get a few more we start the column.

President's Message

By Barbara Toy

Times change. I was confronted by this truism yet again as I was cleaning up a cache of papers and found a flyer and program for PATS for September 17-18, 2011. Which reminded me of certain past pleasures that are now gone…

PATS, RTMC, and Other Fun Events:
For those who may not have run across it, PATS was the Pacific Astronomy and Telescope Show, held in Pasadena from 2008 through 2012. It featured a big show area with booths for a wide range of astronomy vendors showing lots of great equipment and other astronomy-related items to appeal to our acquisitive instincts, along with booths for astronomy clubs, the Mt. Wilson observatories and other organizations. There was also a lengthy program of very interesting-sounding talks, which I mostly missed because I was either in our club's booth or checking on all the other booths in the show room, meeting up with old friends, talking to a lot of interesting folks and generally having such a good time I would forget about the talks until it was too late.

I mention Mt. Wilson in particular, because our booth was next to theirs the year of the Station Fire (2009), when the entire area around the observatory compound burned and they were even more threatened than during the recent Bobcat fire. They had some incredible pictures, video and stories, and I think that everyone at PATS came by to talk to them at some point to get information on what happened and express relief that the observatories survived.

I knew some of the regular volunteers at Mt. Wilson, and heard they had been doing a lot of work to clear the area of brush and other flammables as well as other measures to make it easier to defend the observatory area if there was a fire. All of that planning and work paid off as the Station fire raged around them, as the fire fighters were impressed by all they had done and were willing to push the limits to defend the observatories because of it. In contrast, they had to give up on parts of the neighboring antenna farm, where few preventive measures had been taken. I think the Mt. Wilson folks used what they learned from the Station fire to improve their protections even more in the years since then – but even with the best protective measures, there's no guarantee of safety with a major wildfire, so it was by no means certain that they would get through the Bobcat fire undamaged. Fortunately, their defenses gave the firefighters the edge they needed and they got through that as well, yet fire remains a constant threat.

PATS was organized by the talented and energetic folks who also brought us RTMC. At the time we were hopeful that it would become as big and long-lasting an event as NEAF (i.e. the Northeast Astronomy Forum), a big astronomy extravaganza held annually in Suffern, New York. I haven't been to NEAF myself, but understand from those who have that it features an incredibly big and varied vendor hall as well as talks and other great astronomical activities – but it's on the other side of the continent from us.

PATS, alas, fell victim to rising costs and a new event, the Arizona Science & Astronomy Expo in Tucson (ASAE), which drew off some of the vendors and potential attendees for PATS, particularly those who were closer to Tucson than Pasadena. It seems that ASAE has also faded out, as the last mention I can find of it is in 2015. NEAF still seems to be going strong, with plans for an actual in-person event sometime in 2021. It is, however, still on the other side of the continent from us.

We are not entirely without astronomy-related events with great vendors and informative talks on the West Coast, as the Advanced Imaging Conference is still going strong (the 2021 conference is set on October 8th through 10th at the San Jose Convention Center; for details, you can check their website at https://www.advancedimagingconference.com/). Of course, it's mainly aimed at capturing and processing images, and San Jose is a lot closer than New York.

Going back to PATS, it was kind of an adjunct to RTMC, where, among other benefits, you could see products from vendors who didn't want to subject themselves to the dust and other tribulations of RTMC, which was primarily an outdoor event in the San Bernardino Mountains near Big Bear City. For those who didn't have the good fortune to experience it, it started off in 1969 as the Riverside Telescope Makers Conference. I'm not sure when it formally became the RTMC Astronomy Expo, but that seems to have been a recognition that it wasn't just for telescope makers, though telescope makers were always important to it.

Other aspects of RTMC were important too – swap meets, the talks, raffles on Saturday and Sunday nights, equipment demonstrations on the Telescope Field, bargain hunting among the vendor booths, checking out the booths of other clubs and organizations, seeing old friends, making new ones, and the weather. I heard all kinds of stories about RTMC weather, though fortunately all I experienced in the years I went was heat and dust. There were years with snow, rain, clouds and wind, in varying combinations; one of the more recent wind events did a lot of damage to the vendor area. In the past, stories about hardships like that would become part of the lore relived in discussions at later RTMCs, but, very sadly for its many fans, RTMC was held for the last time in 2019, 51 years after it started, another victim of changing times.

All is not lost in Southern California, however. Nightfall Star Party and Imaging Conference in Borrego Springs (https://nightfallstarparty.com/), also organized by the RTMC folks, is still alive and well, and the 2021 event is currently scheduled for November 4th through 7th. The 2020 event had to be cancelled due to Covid-19, but we're all hoping the virus will be under control long before next November. Nightfall isn't really a vendor-type event, but definitely something to consider if you're interested in a regional star party – and it's hard to beat the dark skies around Borrego Springs, which prides itself on its status as an International Dark Sky Community.

If you're interested in regional star parties beyond that, the Golden State Star Party in Adin, California, is also still a going concern, and their 2021 star party is currently scheduled for July 7th through 11th, though their website (http://goldenstatestarparty.org/) warns that there could be changes depending on what happens with the Covid-19 surge and the vaccine roll-out. If you're interested, it's in Modoc County, in the northeast corner of California (unfortunately, not exactly close to Orange County). I'm told by members who have gone in the past that the sky is really dark and everyone there is very welcoming.

One benefit of regional events like PATS and RTMC was to bring a broad range of people who had an interest in astronomy together to share information and develop relationships beyond their individual clubs or institutions. Without such events there's less informal contact between clubs and with entities like the volunteer groups for Mt. Wilson and Palomar, which is a loss. There are also fewer chances to meet people who were important in our club in the past but moved out of the area (if it weren't for RTMC, I doubt I'd have become friends with John Sanford, who retired and moved away before I joined the club but was central to a lot of the club's activities in the decades before that – and I'd definitely have been the poorer for not knowing him). There are many places where you can get a good view of the sky, or hear talks on astronomical topics, or check out cool astronomical gear, but regional events allow you to share those activities with people you normally wouldn't be with, which can enrich those experiences in unexpected ways.

Not all change is bad or sad or unfortunate – for instance, look at the great equipment you can get now for reasonable prices, such as GoTo telescopes, that weren't even dreamed of back in RTMC's early days[1] – but some do leave gaps that are hard to fill. I hope our remaining regional events are able to continue indefinitely (and there are some broader regional events outside our state I didn't mention but that bring a lot of people together, such as the Texas Star Party). If you haven't had a chance to attend any regional astronomy event, you might want to put that on your wish list.

And, if you're willing to head across country, you could consider NEAF….

OCA Election

The results of the OCA election are in, and much to our shock and surprise, everyone who was on the 2020 Board was elected to the 2021 Board. Thank you to everyone who voted – and it's fair to say that we had a record turnout, mainly through the on-line voting option. Per Tim Hogle, our 2020 OCA Election Chairman, we usually get 60 to 75 ballots per election by paper ballot, but this time we got 257 valid ballots (there were 3 duplicates). Of these, 250 were cast electronically and 7 by paper ballot.

Our on-line voting experiment was therefore a tremendous success – thanks, John Hoot, for setting it up! – though the pattern of votes indicates that some people may just have voted for the offices that showed up on the initial screen and didn't scroll beyond that. Alternatively, people may just not have known some of the candidates as well those for president, vice president and treasurer, so I'll try to introduce you to them more in future President's Messages – they all bring incredible skills and enthusiasm to the Board, and it will be a real pleasure to make them better known to you.

We also had a write-in vote, for Jim Benet, a very worthy candidate who was on the Board before I joined the club in 2000. I'm not sure if he took over the Outreach Program while he was still on the Board or after he left it, but he made it incredibly successful. He's had to step back from it because of health concerns, but still is a generous and valuable resource for the current coordinator, Cecilia Caballero. Back when I was pretty new to the club he was the person who convinced me to run for the Board – not something I'd even remotely considered before that – but he declined any suggestion I made since then that he should run for the Board again himself, as he wanted to focus on the Outreach Program, which was certainly reasonable. He was an asset to the Board when he was on it in the past, and I'm sure would be an asset if he were to rejoin it in the future. Maybe someday he'll decide to try it again…

May you all stay healthy and safe - and may you all find good ways to continue enjoying our hobby in spite of these trying times!

[1] I have heard some long-time astronomers complain that using GoTo telescopes is cheating, and that people should learn the night sky and how to star hop to find things before being allowed to use them. For my part, I prefer to view interesting objects rather than spend the whole night struggling to find them even if that would improve my star hopping skills. So, while I think GoTo telescopes are great and make astronomical viewing much easier and more interesting, I can't claim that this is a universal opinion.

AstroSpace Update

February 2021
Astronomy and space news summarized by Don Lynn from NASA and other sources

Exoplanet Seen in Radio – Scientists using data from the LOFAR array of radiotelescopes in Europe have detected bursts of radio emission that are believed to originate at an exoplanet. If confirmed, this would be the first radio detection from a planet outside our Solar System. The planet orbits the star Tau Boötis and is about 51 light-years distant. It was discovered in 1996 and is known to be a gas giant. The radio signal resembled that emitted by Jupiter, but of course far weaker due to Tau's distance. Other exoplanets were targeted in the search, such as the 55 Cancri system, but no significant radio was detected.

Polarized Planet Light – A team of astronomers has for the first time detected polarized light from an exoplanet. Polarized light is defined as having its light waves vibrate in only one direction. The planet orbits the star DH Tauri, located 437 light-years away. It is a gas giant planet with 11 times the mass of Jupiter. It is a young planet, only about 2 million years old, and so is still glowing in infrared from the heat of planet formation. It is believed that the infrared glow is scattered off a disk of gas and dust surrounding the planet, and that the scattering polarizes the light. The planet is unusual in that it is located quite far from its star (10 times Neptune's distance from our star), and that the disk around the planet is tilted with respect to the disk around the star. These may be related, because astronomers believe that planets forming close to a star will have their disks form in the same plane as the star's disk. The observation was made with an instrument on the Very Large Telescope in Chile that can block starlight to make it easier to see planets nearby. The study looked at 20 exoplanets, but the one orbiting DH Tauri was the only one showing polarization.

Lithium Found – As the Universe cooled during the minutes after the Big Bang, the temperature and pressure created large amounts of hydrogen and helium with a little lithium. All other elements (and more helium) were made later in stars, supernovas and stellar collisions. Calculations produced theoretical amounts of hydrogen and helium that closely match reality, but lithium to match the calculations has not been found, despite careful search. New observations probably found the lithium. The observations were of planetary system remnants crashing into white dwarf stars. Spectral measurements showed lithium. The conclusion is that the lithium from the Big Bang ended up inside planets and asteroids. The only time that observations can pick up that lithium is when the planets and asteroids collide with stars, so at any given time, most of the lithium is hidden.

Old Exoplanet – Astronomers have discovered a rocky planet orbiting a very old star that is very poor in heavy elements. The star is about 10 billion years old and has 3 known planets orbiting it, 2 being gas planets and 1 rocky. The latter is about 1.5 times the size of Earth. The star is known as TOI-561. The "T" in TOI stands for TESS, the planet-finding space telescope that found this planetary system. The rocky planet orbits so close to its star that it takes only about 10 hours per orbit and is heated by its star to over 3000°F. Most of the exoplanets known are in the thin disk of the Milky Way, but TOI-561 orbits in the thick disk, and is thus a bit out of the central plane of the galaxy. Some astronomers had surmised that it would be difficult for stars with very low amounts of heavy elements to form substantial planets, but this discovery shows that is not necessarily true.

Outbursting Black Hole – ASASSN is a sky patrol searching for supernovas. Among the other things it has found is a galaxy whose central supermassive black hole repeatedly outbursts, which has been designated ASASSN-14ko. It has been imaged for several years in various kinds of light. It is the most consistent such outburster, doing so about every 114 days, sort of an Old Faithful of black holes. Each outburst builds in brightness for about 5 days, then fades. The observations support the idea that there is a star in close eccentric orbit about the black hole, and every time it passes close to the black hole, pieces of the star are gravitationally pulled off. That star material hits the accretion disk of the black hole and causes the bright outburst. Images from the TESS planet-finding space telescope were particularly helpful in understanding ASASSN-14ko because it took images every 30 minutes of an area that included the outburster while looking for planets transiting stars in that area. The galaxy is known as ESO 253-3, which is over 570 million light-years away in the constellation Pictor. The supermassive black hole has a mass of 78 million Sun's masses. The galaxy surprisingly has 2 supermassive black holes, but the other one is not involved in the outbursts.

Galaxy Evolution – When galaxies lose their cold gas, they stop forming stars and become "red and dead" galaxies; "dead" because they are not forming new stars, and "red" because the remaining old stars are red. Hot gas will not collapse to form stars, so only the supply of cold gas counts in this process. Observations made by the ALMA radiotelescope array have discovered a galaxy that is rapidly losing its cold gas but has not yet stopped forming stars. Astronomers hope to understand how the process of becoming a dead galaxy occurs by studying this discovery. The galaxy, dubbed ID 2299, is losing gas with the mass of 10,000 Suns every year. It should be a dead galaxy in a few tens of millions of years. The loss of gas may have been triggered by a collision with another galaxy, since a faint tail has been found, which is characteristic of galaxy collisions. ID 2299 is so distant that we are seeing it as it was when the light left there about 9 billion years ago.

High Velocity Stars – A relatively small number of stars within our Milky Way move with substantially greater speed than that of stars in roughly circular orbits around the galaxy. About 550 of these high velocity stars were known before a new study went looking for such and found 591 more of them. Of these, 43 have such high velocity that they can escape the gravity of the galaxy, and are therefore known as hypervelocity stars. The data searched to find these stars came from the LAMOST telescope in China and the Gaia astrometric space telescope. The new discoveries were found in the inner halo of the Milky Way, and were found to be low in heavier elements. The discoverers believe that indicates that they (and the stellar halo generally) were acquired from dwarf galaxies that collided with our galaxy, because stars low in heavier elements are common in nearby dwarf galaxies, and high speeds would be the result of capture during galaxy collision. It is hoped that tracking of high velocity stars will allow astronomers to locate concentrations of dark matter in the halo of our galaxy.

Shrinking Planets – It has long been thought that Neptune-sized planets, if warm enough, would slowly lose atmosphere and shrink in mass and diameter. New study has shown that this is indeed true. The study used precise distances and colors of a selection of stars that host 2600 known planets to calculate the stars' sizes and ages, then used planet transit data to determine the sizes of planets relative to the sizes of their stars. The Neptune-sized planets receiving great warmth from their stars were found to shrink over periods of a billion years or so.

Rare Magnetar – The Chandra X-ray space telescope has supported the idea that a magnetar discovered last March, known as J1818.0-160, is also a pulsar. A neutron star with extremely strong magnetic field is known as a magnetar. A neutron star that gives off pulses of light (in any form: visible, radio, etc.) every rotation is known as a pulsar. The rate of the studied magnetar changing spin energy into X-rays was found to match the rate exhibited by pulsars. This supported recent observations in radio that matched pulsar properties. This object is only the 31st known magnetar, out of about 3000 known neutron stars, and is only the 5th magnetar to be found to also be a pulsar. It is probably the youngest magnetar known, with an estimated age of only 500 years. It is the fastest rotating magnetar known, with a period of 1.4 seconds.

Unusual Gamma-ray Burst – Study of a brief (fraction of a second) burst of gamma rays seen last April shows that the cause was not the usual one for such bursts (colliding neutron stars), but instead was a magnetar in the nearby galaxy NGC 253. Brief bursts of gamma rays have previously been attributed in a few cases to magnetar activity, but only for magnetars located in our Milky Way galaxy. This means that magnetar bursts are inherently much weaker than colliding neutron star bursts in order to appear roughly the same brightness though the source is far closer. This new magnetar observation raises the question of whether some other gamma-ray bursts have been mistakenly attributed to the wrong cause. The correct cause can be distinguished from detailed records of the brightness level as a burst progresses.

Black Hole Activity – Astronomers have observed some supermassive black holes with 2 different radiotelescope arrays that are sensitive to different radio frequencies. The LOFAR array was used for low frequencies and WSRT-Apertif for high. They found that differences seen at the different frequencies can be used to tell if a supermassive black hole is currently active (that is, consuming large amounts of matter), and if not active, can tell how long it has been since the previous active period. Astronomers believe that active periods of supermassive black holes last tens or hundreds of millions of years, and that they probably repeat several times. This new result with differing radio frequencies will help scientists put together histories of black hole activity and test the beliefs about active periods.

Supernova Age – A new analysis of a supernova remnant in the Small Magellanic Cloud shows that the supernova should have been visible on Earth (but only far south on Earth) 1700 years ago. No record has been found of it having been seen. The new analysis measured the speed of knots of material thrown out by the supernova, but only selected ones that appeared not to have been slowed by interference from other gas or dust. Then their paths were traced back to give the time of the explosion. Previous attempts to date this supernova using slightly different techniques have given widely differing age estimates. The speeds perpendicular to line-of-site to the remnant gas clouds were obtained from Hubble Space Telescope images taken 10 years apart.

Brown Dwarf Catalog – A team of astronomers has released the most comprehensive catalog of brown dwarfs in the Sun's neighborhood. Brown dwarfs are stars that failed to have sufficient mass to sustain the nuclear fusion that powers ordinary stars. Much of the search work for this was done by volunteer citizen scientists participating in the Backyard Worlds program. The catalog has 525 brown dwarfs within 65 light-years of us, with their 3-dimensional positions. A surprise is that there are roughly equal numbers of brown dwarfs and genuine stars in this neighborhood. Perhaps this is normal for all regions of the disk of our galaxy, but brown dwarfs are simply too dim to be found at any great distance away.

Lost Moons Found – In 2003 a team of astronomers used the 3.6 meter Canada-France-Hawaii telescope to search for small moons orbiting Jupiter and found 23 new ones. Because they were tracked for only a short time, their calculated orbits were not very precise, and over the years after discovery many of them became lost, that is, they were not found where expected from the imprecise orbit parameters. Search efforts eventually found all but 5 of the lost moons. An enterprising amateur astronomer, who has revealed only his first name Kenneth, decided to search for the still-lost 5 and was successful for 4 of them. His method was to use an online search system that finds archived images taken of a particular location in the sky at a particular time that should include a specified object with a given orbit. This yielded a few images that included some of the lost moons shortly before or after discovery. He then recalculated a more precise orbit using the newly found image positions. Eventually he was able to extend this method to recent images, so those moons were declared no longer lost. The most difficult of the 4 took about 10 days at the computer to find. He found the most helpful images were taken by the same telescope that discovered the moons. This is probably because that telescope has an exceptionally wide field of view for a large telescope, so yields images of very dim objects in wide fields that are more likely to fulfill search requests. Two of the 4 found moons were also found independently by the original discoverer during the same time period.

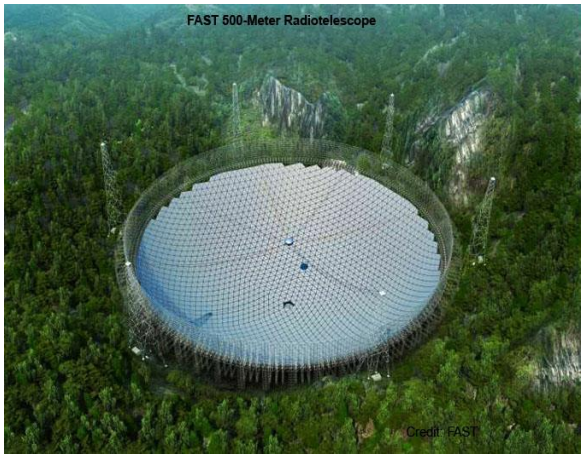
Lunar Goals – The NASA team assigned to establish science goals for the Artemis Moon landing released their report. The stated goals are:

- Understanding planetary processes
- Understanding the character and origin of lunar polar volatiles
- Interpreting the impact history of the Earth-Moon system
- Revealing the record of the ancient sun and our astronomical environment
- Observing the universe and the local space environment from a unique location
- Conducting experimental science in the lunar environment
- Investigating and mitigating exploration risks

The report made many further recommendations to achieve these goals, including that the astronauts be trained in geology and planetary science, that at least 330 lbs of lunar rocks and soil be returned, including subsurface and volatile (as in ice) samples, establishing long-lived power, communications and environmental monitoring capabilities at the landing site, and creating a sustainable exploration program.

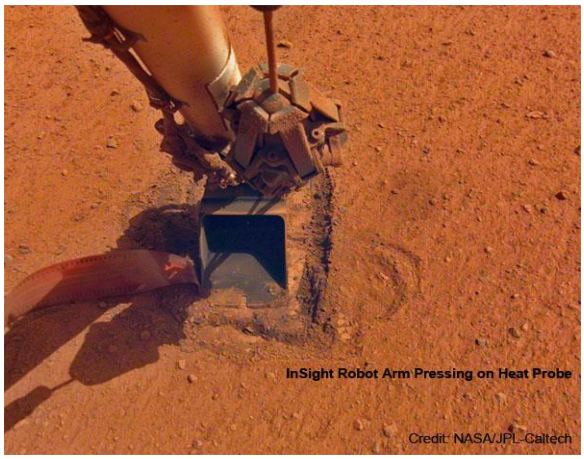
Missing X-rays – A stellar-mass black hole in a binary system known as GRS 1915+105 has been for decades gravitationally pulling material from its companion star at irregular intervals, which produces bursts of X-rays. Then more than a year ago the X-rays stopped. Recent analysis shows that some object is blocking our view. Similar obscurations have been seen in other X-ray systems, but not lasting so long.

500-Meter Availability – In response to the collapse of the Arecibo radiotelescope, the staff of the Chinese 500-meter FAST radiotelescope of similar design has announced that they will now accept applications to use their telescope from astronomers outside China. Initially outside astronomers will be allocated 10% of observing time, but that may increase later. The FAST radiotelescope has roughly similar capabilities to that Arecibo had, except that FAST does not operate at quite as high frequencies and has no transmit capability, so cannot do radar. However FAST covers more of the sky because it can be aimed farther from the zenith than Arecibo could.

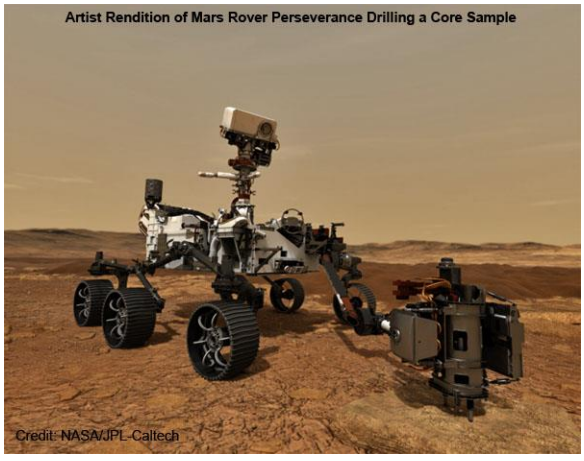


Juno Extended – Jupiter orbiter Juno's mission has been extended until September 2025. During the extension, its orbit will be changed to allow for the first time in its mission flybys of moons Io, Europa and Ganymede, and study of the Jupiter rings. It is standard practice for a review to be made at the scheduled end of every space mission to determine if expending money to continue operation longer will result in scientific discovery worth the cost.

InSight Extended – Mars lander InSight's mission has been extended through December 2022. InSight's robotic arm will, during the extension, dig dirt and use it to cover the cable from the lander to the seismometer to reduce noise being picked up by that instrument. More than 480 marsquakes have been recorded. The more marsquakes recorded, particularly the rarer large ones, the more scientists can calculate about the makeup of the interior of Mars. The extension recognizes the valuable science being done by the seismometer, weather station, and planet wobble radio experiment, in spite of the failure of the heat probe that was to measure heat flowing from the planet's core to the surface. That probe was designed to pound itself about 5 yards into the soil, deep enough to be unaffected by weather. After nearly 2 years of trying every means to get the probe to depth, spacecraft controllers finally gave up after the probe had reached only its own length (16 inches) plus an inch below the surface. The failure was due to the soil on Mars having far different properties (principally lower friction) than every soil that the heat probe was tested on here on Earth.



Mars Sample Return – NASA approved moving ahead with the plan to return samples of Martian rock and soil to Earth. A plan with the European Space Agency (ESA) is in place to share spacecraft missions to accomplish this. The NASA Perseverance Mars rover, landing February 18, was built with capability to drill and scoop to gather samples and seal them in containers. ESA will provide a Mars orbiter with return-to-Earth capability, and NASA will provide a Mars lander with ascent-to-orbit capability. Perseverance or a future ESA rover will place the sample capsules in the ascent rocket. The samples should arrive at Earth in the early 2030s.



Proposed Missions – NASA has begun a program named Pioneers to build extremely low cost (under $20 million) space missions. The first 4 mission concepts were funded for planning, after which they will be reviewed to decide whether to build and launch. The 4 are: Aspera, which will study galaxy evolution and gas flow, using ultraviolet light; Pandora, which will observe 20 stars with planets to study planets' atmospheric compositions, using visible and infrared light; StarBurst, which will observe high-energy gamma rays from sources including neutron star collisions; and PUEO, a balloon-launched mission to observe ultra-high-energy neutrinos emitted by black hole creation and neutron star collisions.

Novel Spacecraft Propulsion – A small (loaf-of-bread size) satellite known as MiTEE-1 is being launched to test a method of maintaining orbit without propulsion fuel. It will have 2 parts connected by a wire about a yard long, through which electric current from solar panels is passed. The magnetic field of that current will interact with the Earth's magnetic field to apply a small force to the spacecraft. If it works, another spacecraft in the series will use a wire 10-30 yards long, which should provide sufficient force for a small satellite to maintain its orbit against the small drag forces of the Earth's atmosphere at typical satellite altitudes. Small satellites are particularly prone to loss of orbit by atmospheric drag because of their small mass-to-area ratios. MiTEE-1 was built primarily by college students.

Adopt A Scope Update

By John E. Hoot, Scope Program Director

The response to our "Adopt A Scope" program has been overwhelming. Ten scopes have found happy new homes and nine more have been reserved for pickup on January 30th at our storage facility. I have been swamped with email requests and questions. I would like to take this opportunity to thank those of you who have been patient with my sometime slow response to this deluge of email.

I would like to clarify a couple of things about the program that may not have been well articulated.

1) This program is open only to current members of the OCA. These scopes were donated to OCA to support our members' interest in the hobby. We will not turn it into the astro-craig's list.
2) Because the number of scopes in our inventory is dwindling, we are limiting the adoptions to one scope per member/family per year. We do this to prevent abuse of the program and to spread the scopes to as many members as possible.
3) Because the inventory is constantly changing, and to give fair access to all members, the inventory available for adoption will be published monthly in the Sirius astronomers. If you are looking for a scope, check the club's web page for the upcoming month's issue starting about the 20th of the month. It will appear on the web page a within a couple of days. If you wait till you get your mailed copy, many of the scopes may likely already have been claimed.
4) I handle emails in the order in which I receive them, but I may not get to my scope emails for up to a week after they have been sent. Please be patient. This is not my only job.
5) Once you have an email confirmation that a scope has been reserved, you will receive another email announcing when the scopes can be picked up. Pick up will be at:

   South Coast Self Storage
   3480 W. Warner Ave.
   Santa Ana, CA 92704

6) At time of pickup I will accept cash in the exact amount or, preferably, a check made out to: "Orange County Astronomers".
7) Remember that if you are having trouble operating your scope, our online beginner's class is here to help. Should frustration continue, the program gives you a 6 month window in which to return the scope for a refund, or to swap it for something else.
8) For members that are currently in possession of a loaner scope, if you wish to adopt your scope permanently, please contact me and I will give you a price.

Thank you for your interest in the program!

Adopt A Scope Inventory

INV#	Type	Size	Mfg	Model	Accessories/Notes	Price
2	Newtonian	4.5"	Meade	DS2114ATS	4.5" Newtonian reflector or a single fork mount Goto telescope with tripod. It operated of 8 D cells, or 12VDC	$60.00
8	Cassegrain	8"	Hand made		A hand made 8" cassigrain telescope with an AltAz telescope. A nice visual instrument.	$25.00
20	Newtonian	8"	Oriion	SkyVeiw	8" Dobsoian Telescope	$100.00
24	Reflector	4.5"	Meade	4504	A 4.5 inch Newtonian reflector mont on Goto German Mount with tripod. An OK visual instrument. Not suitable for astrophotography	$50.00
28	Schmidt-Cas	11"	Celestron	Fastar 11	Al/Az Goto fork mount With Tripod, Fastar Compatible	$400.00
35	Newtonian	4.5"	Meade	DS-2114	4.5" newtonian reflector or an Alt/Az single fork mount Goto telescope with tripod. It operated of 8 D cells, or 12VDC	$60.00
56	Newtonian	6"	Celestron	???	6" refractor on a manual GEM with tripod	$45.00
61	SCT	10"	Meade	LX200 OTA	OTA with dovetails - no mount	$150.00
62	SCT	10"	Meade	LX200 GPS	Goto Scope with Wedge, Tripod & Acc.	$400.00
63	SCT	8"	Meade	2080	Fork Mount , quartz Drive, No Tripod/wedge	$150.00

The OCA AstroPhysics Special Interest Group

By David Pham

General Information:
In addition to the general meetings and beginner classes, OCA offers several special interest groups (SIGs) for club members with specific pursuits of knowledge within the vast field of astronomy.

The Astrophysics SIG provides a convenient opportunity to meet with fellow OCA members once a month and discuss the elements that entail astrophysics, cosmology, and science in general. The SIG is hosted at the Heritage Museum in Santa Ana where members routinely come together on the third Friday of each month to talk and learn about the universe.

Group activities consist of updates on interesting cosmic events that occurred during the specific month, discussion about personal experiences and current news related to astrophysics, and watching two half-hour lectures provided by the Great Courses and reviewing notable points afterward.

The SIG welcomes members of all ages and those who have a passion for astrophysics are strongly encouraged to join the group. Many participants find themselves returning each month, as they enjoy the social aspect that comes with being a part of a smaller, topic-oriented group that enables them to share their personal stories and learn from the knowledge of others. The small nature of the group also allows for more free-flowing conversation and oftentimes insightful discussions that may be limited in larger settings such as the general club meetings.

Origin and History of Operation:
The Astrophysics special interest group (SIG) was started by Gordon Pattison in the 1980s/90s (specific date unknown) and was added to the Orange County Astronomers club several decades after OCA's founding in 1967. The SIG has not witnessed a drastic shift in attendance over the years but has seen many regular participants as well as individuals who come and go. While participation of younger age groups tends to vary, some older members continue to return to the meetings even after ten to twelve years! With an average of about a dozen members, the group has five or six regulars who are retired and in their sixties that attend the meetings each month with the occasional teenager or young adult joining in. Don Lynn originally volunteered to be the group's technical discussion leader and has remained as a periodic guest speaker at group meetings since. The SIG has also invited Reza AmirArjomand to be a guest speaker in the past but group discussions during meetings have mostly been led by the members themselves. Since its start, the group has been chaired by three different coordinators (years of operation unknown): Gordon Pattison, Chris Buchen, and Robert Sharshan who has held the job in recent years.

The Great Courses Overview:
One hour of these SIG group meetings is spent watching two thirty-minute lectures provided by the Great Courses. These videos help expand the information covered during the meetings and are a great way to introduce members to new knowledge and topics in the field of astrophysics. The Great Courses offers a good blend of basic and challenging material that can be enjoyed by an audience with a wide range of scientific knowledge. The content of the lectures is quite versatile, covering introductory quantitative topics that can be easily understood by beginner members while also occasionally delving into the complex mathematical analysis behind a particular phenomenon to keep more experienced members interested.

The Great Courses is also flexible in the sense that it is not only limited to lectures about astronomy. Depending on the flow and content of the meeting, members have the option to browse through a vast collection of science videos on the Great Courses website and simply select a lecture they find interesting or relevant to what is being discussed. No degree is needed to engage with the Great Course videos but SIG members who do hold advanced science degrees can still benefit from the course by refreshing their memory on an old topic or even learning something new! SIG members often enjoy the Great Courses for its diverse and insightful content that opens up room for more conversation by giving them new ideas to talk about during the meeting's question-and-answer period. In the group's earlier days, members used to watch the Great Courses on DVD but recently switched to a monthly digital subscription on their website which gives them unlimited access to topics and lectures.

SIG Content Syllabus:
The order in which Great Courses videos are watched do not follow a set theme but are determined by the group members themselves based on their interest on a specific topic or idea. Video collections are divided into individual topics with each containing a long series of half hour lectures (usually out of 24) that carries on from month to month or even year to year. At each meeting, members watch lectures from different topics and will usually continue the series at next month's meeting or explore another topic that seems interesting. The content of the Astrophysics SIG has changed somewhat over the years but you can always expect to watch a video related to astronomy and/or science in general. (See list below for examples of past lectures watched)

Robert Sharshan has provided some examples of Great Course lectures that have been shown:

- **2-Course set: Exoplanets/ Introduction to Astrophysics (Professor Joshua Winn)**
- Course Description:

Introduction to Astrophysics plunges you into this exciting quest, taking you step by step through the calculations that show how planets, stars, and galaxies work. In these 24 illuminating half-hour lectures, taught by noted astrophysicist Professor Joshua Winn of Princeton University, you tour the universe of exploding stars, colliding black holes, dark matter, and other wonders, just as in a traditional astronomy course.

Join a modern-day Magellan on a voyage beyond our solar system to worlds that are stranger than science fiction—countless exoplanets are out there.

- **A Field Guide to the Planets (Professor Sabine Stanley)**

Lecture 3 of 24: Venus, the Veiled Greenhouse Planet

- Description:

While the Venusian carbon dioxide atmosphere has resulted in a runaway greenhouse effect and the hottest surface temperature in the solar system, the Earth and Venus actually contain about the same amount of carbon. Explore the forces that resulted in the extreme atmospheric differences between these two otherwise-similar planets.

Lecture 4 of 24: Earth: How Plate Tectonics set up Life

- Description:

Given the striking similarities between the four terrestrial planets, why is Earth the only one teeming with life? Proposed as a bold theory less than 70 years ago, could plate tectonics be a main driver of life on Earth? Explore the fascinating movement of our planet's surface and the many ways in which a geologically active Earth has sustained our biologically active planet.

- **Radio Astronomy (Felix J. Lockman)**

Lecture 24 of 24: The Future of Radio Astronomy

- Description:

You will learn about new radio telescopes and research areas that are unfolding.

- **What Einstein got Wrong (Professor Dan Hooper)**

Lecture 1 of 12: What Einstein Got Right: Special Relativity

- Description:

Einstein is the most famous and influential scientist of modern times. But no one is perfect, and his powerful intuition led him astray in several key areas of physics, which are now among the most fruitful areas of the discipline. Begin your study of Einstein mistakes by looking at what he got spectacularly right, starting with his revolutionary special theory of relativity.

This SIG is not meeting currently due to COVID-19 precautions. Announcement of future meetings and additional information will be available on the OCA website and through contacting the Astrophysics SIG coordinator. When meetings are permitted to resume, the first order of business will be to select (or recruit) a new SIG coordinator. In the meantime, if you are interested in becoming the new meeting coordinator for this special interest group, please contact Robert Sharshan at rsharshan@aol.com.

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.

For Sale contact David Hobbs david_hobbs714@yahoo.com

- 20" F5 Research grade early Coulter mirror and secondary mirror $2800
- Primary mirror is 2 ¾" thick, Secondary is 4" x 5 5/8"

For Sale contact Ron Choi rongrace2@cox.net

- Orion StarShoot AutoGuider reduced price $ 220
- Orion Mini 50mm Guide Scope reduced price $ 50
- Baader Planetarium Classic Ortho 6mm eyepiece reduced price $ 40
- Hotech 1.25" SCA Laser Collimator (Dot) $ 60

For Sale contact Dave Cook 949-689-0853

- Televue 5X Powermate $ 175

The Televue 5x Powermate is different from a traditional Barlow lens because it has a 4 element lens design (Four Glass Elements) that delivers full field sharpness with virtually no aberration. The Televue 5x Powermate will outperform any Barlow lens because the additional lens elements within the Powermate body.

I purchased this Powermate new ($218), did an on-telescope test, and found that the magnification was too much for my my f/10 Celestron SCT. I am now using the 2.5 Powermate, which is more ideal for my telescope. This 5X powermate would probably be ideal for small telescopes or short focal length Newtonian telescopes.

This Powermate is in its original Televue box, and looks brand new in every way.

For Sale contact David Fischer Leyes-Fischer@cox.net

- ATS Portable Pier, 8 inch diameter, 52 inch height $1,500
- Excellent condition
- Detachable aluminum shelf and eye-piece holder
- No pier adapter (top plate) is included – these are specific to the user's mount

- Orion ST-80 refractor model 09948 - f/5 achromat, used for a while as guide scope $ 70
- Just the telescope – no rings, no diagonal, no eye-pieces, no case

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