



Sunflower Galaxy (M63) captured by Bruce Waddington from the Anza site in April 2008 using a 10 inch SCT telescope with ST-2000XM camera.

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, 3 July at 7:30 to 9:30 PM ONLINE This is the "How to Use Your Telescope" session of the Beginners Astronomy Class.
Club Meeting	Friday, 10 July at 7:30 to 9:30 PM ONLINE "What's Up?": John Garrett from TVA "Cosmic Dawn: The Birth of Galaxies in Our Universe": Anson D'Aloisio from UC Riverside
Open Spiral Bar	Saturday, 11 July 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 of our activities. All in-person club events remain cancelled through at least July. 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 at least through September; please try our virtual meetings instead
Anza Star Parties	Cancelled through July, to be reconsidered by the Board at the July meeting
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

We need submissions for this year. I will also pull some from the OCA members images section on our website but those will be at my discretion. 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 and / 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

<u>Issue</u>	<u>Due date</u>
July	20 June
August	25 July
September	22 August
October	26 September

President's Message

By Barbara Toy

You May be Tired of Hearing About COVID-19...

...but it unfortunately is still very much with us. I hope all of you are doing well and somehow finding a way to navigate through these difficult times safely. As I write this, the numbers of coronavirus cases are rising again, amid understandable pressure to reopen businesses and resume more normal activities. Sadly, some are trying to politicize the simple, courteous act of wearing a mask when around other people to help protect them from anything we might spread and also protect ourselves – our masks are generally more effective at protecting others than ourselves, so if we all wear masks, we'll all be better protected.

Proven ways to reduce the chance of getting the virus are limiting in-person contact with others as much as possible, keeping social distance when you do have to be around others, and using masks, gloves, sanitizers and frequent hand washing to help reduce the chance of becoming infected by the virus. We as a club are continuing to do what we can to minimize the chance that the virus will be transmitted through club activities by continuing to have meetings remotely and not scheduling in-person activities, such as formal star parties, that would encourage groups to gather.

Again, please remember that we as a club don't have the ability to provide masks, gloves and sanitizer or to sanitize the premises for members who may use club facilities at Anza, or any other place that members may gather, and we strongly recommend that you keep supplies of your own with you and use them to protect yourself and others. Anyone using club facilities (right now that would be primarily the Anza site) should follow the CDC guidelines as well as applicable state and county guidelines – I know they've been changing, but fortunately the Internet allows us to check on the latest versions. When in doubt about what's required, please opt for what gives the most protection to you and everyone around you.

Other Concerns

Sadly, along with the pandemic, events of these last few weeks have highlighted the fact that our society still has systemic problems that, among other effects, too often result in police violence against Blacks in particular. As I write this, demonstrations are continuing over a rash of recent deaths, all tragic, particularly that of Mr. Floyd. Perhaps the period of more violent civil unrest seems to be behind us. I don't know how the civil unrest aspects of these events affected individual club members, though I know many of you live in areas where curfews were in effect during the more violent periods of the protests – I hope none of you had any losses from these events, only maybe some inconvenience. Even more, I hope none of you have lost loved ones or have been otherwise directly affected by the types of events that triggered this unrest. If you have, I am deeply sorry for your loss.

Although we have members who are actively involved in political and social causes outside of their involvement with our club, our club itself must be apolitical. We are an educational non-profit, and our primary purposes are to provide education on astronomical subjects to the general public and to provide opportunities for our members to advance their own astronomical knowledge and to pursue their astronomical interests. Our focus is astronomy and related education, and it's not within our purview as a club to attack broad social problems beyond the lack of scientific education in the general public.

However, it is most definitely within our purview to welcome all people who share an interest in any aspect of astronomy, regardless of their background, to any of our events they may attend and as members. If you think there is anything we can do to make members or would-be members feel more welcome in the club, please do let the Board know – there may be reasons we're not able to adopt a particular suggestion but we're always interested in exploring ways we can improve our members' club-related experience.

We all share the same sky, as our friends at Astronomers Without Borders remind us, and one of the pleasures of viewing the night sky with a group is that differences in race, culture, religion – and anything else that might otherwise divide us – largely melt away in the dark and with the shared pleasures of seeing what's up there and talking about it and other astronomical topics. This is one reason I enjoy hosting at the Kuhn telescope on star party nights at Anza, and I've seen it at other club star parties, at RTMC when it was a going concern, at Outreaches and even at our How to Use Your Telescope classes. Interest in astronomy can cross all social, cultural and racial boundaries, which is one of the pleasures of getting involved in it as a hobby – there are people who share that interest in all walks of life, all around the world.

None of this is intended in any way to minimize the problems that too many people face daily simply because of their race or other conditions that set them apart. I know that a group viewing the night sky is essentially in a bubble, separated for a time from society at large and its concerns. Even if that can't solve larger problems, it can be refreshing to spend time in a bubble of good fellowship with fellow enthusiasts engaged in something you enjoy, and maybe that can make the burdens of daily life a bit lighter.

The Kuhn Telescope

On a more mundane level, as I write this the club's Kuhn telescope is out of action. The immediate problem is a failed hard drive in the computer that runs the controller for the telescope, and we are hoping to get it back up and running once we have a new backup drive, but unfortunately that is only a temporary fix.

The current system was installed around 2004, and has generally worked well after some initial bugs were worked out. It uses Comsoft to interface with the telescope; Comsoft is a DOS program that was never updated to Windows and also relies on circuit boards that modern computers can't handle. The hardware to keep it running is becoming harder to find, though we do have access to at least a couple of replacement computers when the current one dies completely. However, they're all aging, too, and it's been evident for a while that we need to update the control system to one that is more current, preferably one that is supported and likely to remain supported well into the future.

The Board is looking at some different options, and we are hoping that we can get the new system installed fairly quickly once the decision is made. If we have to change the motors as part of the upgrade, that would take more time as new mounts for the replacement motors would need to be machined. If we can use the existing motors, it would take a lot less time to do the installation, ideally a single weekend. We're hoping to get this project completed this summer, in spite of Covid-19 concerns. If all goes as planned, the new system should be more precise as well as reliable long-term, and should allow us options for imaging that we don't have with the current system.

Anza Site

Long-time Board member Gary Schones, who happens to be very skilled with a tractor, spent a long time repairing the road leading to the Anza site, including clearing the drainage pipe under our driveway and the drainage ditch on that side. Hopefully the current configuration will work better to keep the road drivable when we get rain again. At this point, thanks to his efforts, access to the site is a lot easier than it was after the winter and spring rains.

He and his crew also cleared most of the weeds around the Anza site – it took hours of hard work, and we're really grateful for their help. As a result, pad and observatory holders don't need to plan special trips out there to clear weeds, but we would appreciate it if anyone who is out there and observes weed growth that could obstruct traffic or could be a fire hazard would clear it.

And if you happen to see Gary, whether at Anza or elsewhere, please thank him (from a safe distance) – he does a tremendous amount to keep our Anza site going!

Best wishes to all of you, and I hope to "see" you at one our virtual meetings soon!

© Barbara Toy, June 2020

AstroSpace Update

July 2020

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

Dragon Launch – On May 30 from Florida the United States launched its 1st astronauts into space since 2011 when the Space Shuttles were retired. All rides to space for U.S. astronauts since that retirement have been aboard Russian Soyuz rockets. Bob Behnken and Doug Hurley rode in a Dragon space capsule atop a SpaceX Falcon 9 rocket to the International Space Station (ISS). Both astronauts have ridden Space Shuttles to the ISS before. This marked the 1st time people have launched to orbit on a rocket developed by a private company, not a government space agency. The Dragon has been tested for up to 4 months sitting idle then restarting, so the astronauts will likely stay on the Station nearly that long. Boeing is expecting to launch astronauts with their rocket and space capsule within several months to become the 2nd privately developed system to orbit people.

Relativity Test – One of the principles of Einstein's general relativity is that all different objects will fall at the same rate of acceleration at any given strength of gravity. Another stringent test of this has been made by studying 8 years of radiotelescope data observing the orbits of a triple system consisting of a pulsar (neutron star that emits radio pulses) and 2 white dwarf stars. It found that the pulsar and one white dwarf fell toward the 3rd star at the same acceleration, to the limits of accuracy of the observations (2 parts per million). While other observations, such as the lunar laser ranging experiments, have measured this principle of relativity to much greater precision, none have done so with objects experiencing as extreme gravity as pulsars have. This result places stronger constraints on many theories of gravity other than general relativity. The studied pulsar is known as PSR J0337+1715, and is located Taurus. The Nançay radiotelescope in France was used.

FRB Pattern – Fast Radio Bursts (FRBs) last only a fraction of a second and it is a mystery how they are generated. Most do not repeat; that is, only 1 burst has been seen from that location. But a few of them do repeat. Astronomers have been trying to find a pattern to the repeaters, and a new discovery has done just that. From 8 years of observations of the 1st known repeater, astronomers were able to show that the bursts gather in a 90 day period, and then disappear for 67 days. The 157-day pattern repeats. This is only the 2nd repeating FRB for which a pattern has been found. The other has a 16-day period. The best theories of what would cause a repeating pattern are that the emitter is orbiting another body or that the magnetic field of the emitter is wobbling. Much more work needs to be done to understand FRBs.

New Class of Explosion – Three supernovas seen since 2016 resemble each other, but differ from previously seen supernovas, so apparently they represent a new class of explosion. They were quite bright initially and brightened and faded more quickly than usual. Follow-up observations in radio and X-rays showed further differences common to the 3. They are being referred to as Fast Blue Optical Transients (FBOTs). The best theory to explain the differences is that these occur when a massive star reaches its end of life (like a core-collapse supernova explosion) but then a rotating disk and jets form. This far, it sounds like the best theory explaining how gamma-ray bursts occur. But in this new case, a gamma-ray burst is not seen, apparently because there is surrounding material that blocks the gamma rays. The shock from the explosion hitting this surrounding material explains the bright flash seen for just a few days and the radio emission. The surrounding material contains substantial hydrogen, which explains the hydrogen spectrum seen in these 3 explosions. There is another theory to explain the 3 events involving black hole activity, so more work is needed to distinguish between the theories.

Early Solar System Water – It is known that 3 types of meteorites, including the type called howardites, are very likely pieces of the asteroid Vesta. Meteoroids colliding with Vesta knock material off the surface, some of which escapes Vesta's gravity and eventually falls on Earth. One particular howardite known as the Kapoeta meteorite was seen to fall in 1942 and was quickly recovered. It affords opportunities to study the surface of Vesta relatively unaltered by the Earth weathering that many howardites have suffered. A new study of Kapoeta found tiny inclusions that represent micrometeoroids that struck Vesta and embedded in surface material. Those micrometeoroid inclusions are believed to be the primitive material that formed the Solar System bodies, relatively unchanged. Minerals and textures found indicated the matter had interacted with water. But Vesta formed of fairly dry material. Theory says that water-bearing material in the early Solar System should have formed farther out from the Sun, where temperatures were cooler. So this is evidence that micrometeoroids in the forming Solar System brought water into the inner Solar System. This finding may help explain how the early Earth acquired its oceans, even though it should have been dry.

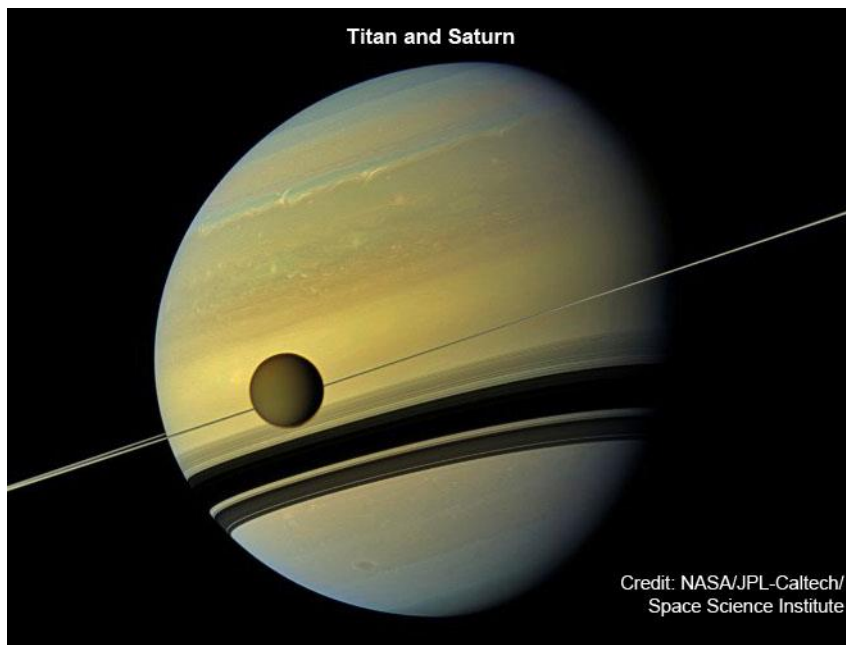
Planet Formation – A new study using the ALMA and VLA radiotelescope arrays observed the dust content of young (0.1-0.5 million years) planet-forming disks. The dust was found to be sufficient to form average exoplanet systems. The Perseus molecular cloud was the star-forming region studied. Previous studies of somewhat older (1-3 million years) disks had found insufficient dust to form exoplanet systems, and this was worrying astronomers. What the new study says is that planets form, and therefore use up the dust in the disk, faster than previously thought. So astronomers don't have to worry about insufficient dust, but have a new worry: How do planets form so fast?

Earth-like Planet – Astronomers have discovered a planet quite like Earth. It is known as KOI-456.04. It was found in Kepler (planet-finding space telescope) data by using a new computer program that better separates planet transit dips in brightness from noise in the data. It is 1.9 times the diameter of Earth, likely a rocky planet, and orbits a very Sun-like star with a year of 378 Earth days. Its distance from its star makes its temperature likely several degrees cooler than Earth, but still in the "habitable zone", that area where liquid water can probably exist. It is 3000 light-years away. Its star is just 10% larger diameter than our Sun and just 5% cooler. The planet is technically a "planet candidate" until further verification is completed. There are 2 previously known planets orbiting this star, but they are much larger than Earth and much closer to their star, making them hotter.

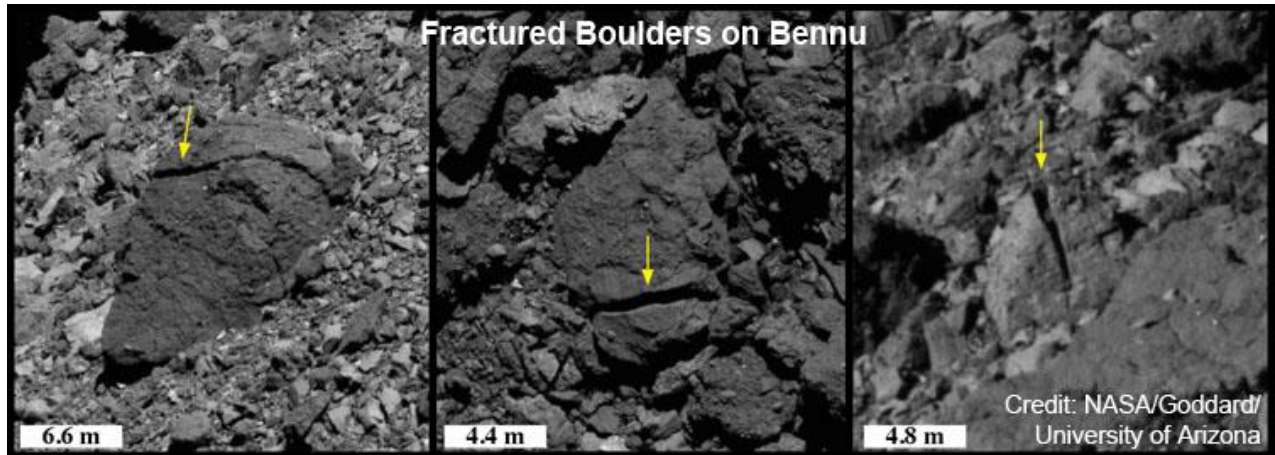
Planet-forming Disks – A study using the Hubble Space Telescope observed the crowded young open star cluster Westerlund 2. It found that in the areas close to particularly massive stars, the other stars had fewer planet-forming disks. This indicates that massive stars destroy the disks around nearby stars. Probably strong ultraviolet light and stellar winds from the massive stars do the damage. The cluster is fairly dusty so Hubble had to use its infrared instrument to penetrate that dust. The disks were detected by their fluctuating effects on their stars' light, even if the disks were too small to see. 1500 disks were found. Within 4 light-years of the center of the cluster, the most crowded region, no disks were found. The same disk-destroying effect may explain why planets are rare in globular clusters.

Disintegrating Planet – A project called DMPP has for the past 5 years been making high-precision radial velocity observations to find low-mass planets orbiting close to their stars. Their 1st find of 3 so far announced consists of 4 planets orbiting a star about 200 light-years away. Follow-up observations with TESS (planet-finding space telescope) did not find the hoped-for transits (passages in front of their star) of any of these 4 planets, but did find transits of a 5th planet with a shorter orbital period (about 3.3 Earth days) than any of the 4. The varying amount of light blocked, combined with orbiting quite close to its star and its small size indicate it is likely a small rocky planet being destroyed by the heat of its star.

Titan's Orbit Drifting – It has been believed that Saturn's moon Titan is slowly moving farther away from the planet for the same reason our Moon is expanding its orbit about us. Tides raised on a planet by a moon drag the moon gravitationally. If the planet rotates faster than the moon revolves about the planet, then the moon's orbit slowly rises. Calculations show that Titan should be rising about 1/25 inch per year. A paper published in 2016 proposed that gravitational interactions between the moons of Saturn would magnify the expansion of Titan's orbit. So astronomers measured the changes in Titan's orbit from archived Cassini spacecraft images and radio data. It's 4 inches per year, 100 times larger than previously calculated, supporting the 2016 paper. This may change the estimates of the age of Titan and other Saturnian moons, and the age of the rings.



Asteroid Rock Weathering – The OSIRIS-Rex spacecraft has been exploring asteroid Bennu at fairly close range since December 2018. Comparison of old and new pictures taken of surface rocks show that many of those rocks are cracking on their surfaces or are flaking off. It appears that this is being caused by day and night heating and cooling. A day on Bennu is only a little over 4 hours long. Scientists managed to rule out the possible causes of rock weathering other than daily heating. It had long been believed that this type of weathering would occur when asteroids are close enough to the Sun, but this is the best observation of it.

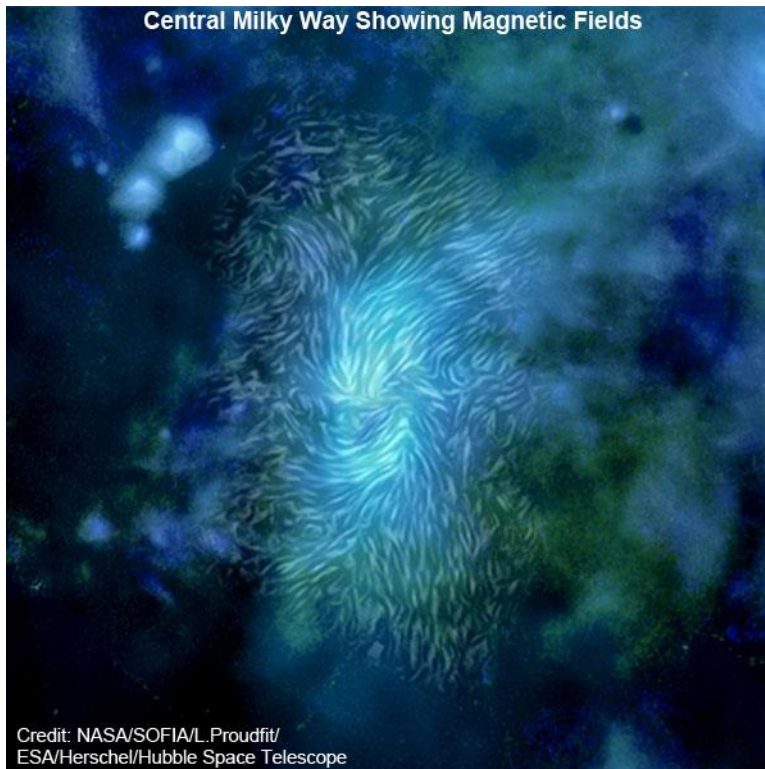


InSight Progress – The Mars InSight spacecraft landed on the Red Planet in November 2018, and since February 2019 has been trying to get its “mole” to pound itself into the soil. “Mole” is the nickname for the heat probe instrument, which from about 5 yards deep will be able to measure heat flowing out from the planet’s core. This will tell scientists a lot about the internal structure of the planet. Months of use of the hammer, which is internal to the mole, were not successful, as the mole kept slipping back out of the ground, never reaching even 15 inches deep. After trying many tricks to get the mole burrowing, these past few months have been spent placing the spacecraft arm with downward pressure on the mole while carefully hammering, frequently checking that the arm was not hitting anything fragile. The spacecraft team reports that the mole has disappeared below the surface with this technique. More hammering will be done with the arm pressing on the soil above it. Then hammering without any help will begin. With luck the mole then will be into soil with enough friction to prevent backsliding.

Hot Galaxy Halo – Most past observations of our Milky Way galaxy’s halo have found gas up to 1 million degrees Kelvin. In January this year, it was announced that an X-ray measurement in one direction through our galaxy halo showed gas up to 10 times as hot. A new follow-up study shows that this one location was not a fluke, by confirming those hot temperatures in 4 directions. The new study used observations made with Suzaku (Japanese orbiting X-ray telescope). The same study also measured the temperature of the halo of galaxy NGC 3221, about 200 million light-years distant, and found similar temperatures. This probably indicates that 10 million degree gas in galaxy halos is not unusual.

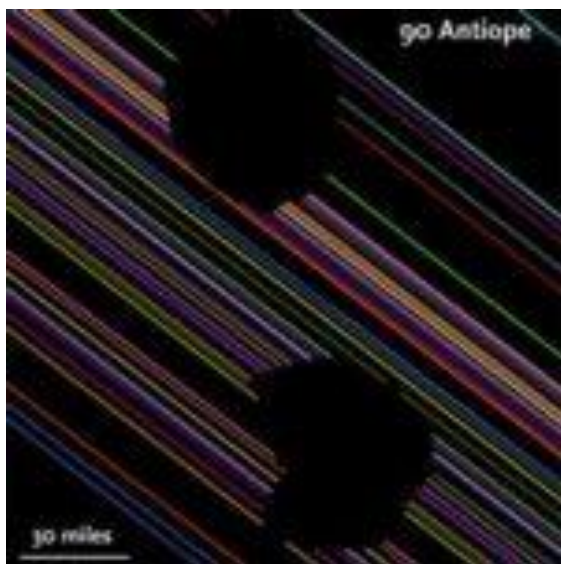
Dim Galaxies Found – The Dark Energy Survey (DES) uses the 4-meter Blanco Telescope in Chile, fitted with a very sensitive and very wide-field camera, to study how the structure of the Universe has changed over billions of years. From this astronomers hope to learn how dark energy has changed that structure over the life of the Universe. About 1/8 of the entire sky is included in DES. A team of astronomers searched the DES data to try to find low-surface-brightness galaxies (LSBGs). This class of galaxy is defined as having surface brightness at their centers dimmer than the glow of the night sky. This means that LSBGs often go undetected. Previous searches for them have indicated that their total mass as a percentage of the mass of all galaxies combined likely is far greater than their total light contribution to that of all galaxies. Theories based on galaxy data that excludes LSBGs may be flawed. The new study aimed to find the frequency and other properties of LSBGs, and so correct this problem. It found nearly 21,000 LSBGs. This included both red and blue galaxies. Blue galaxies have substantial star formation going on, while red galaxies do not. Red and blue LSBGs were found to average similar sizes, but the reds appeared to have somewhat dimmer surface brightness. The reds tended to be more clustered than the blues, and those red clusters tended to be where brighter galaxies existed. This LSBG study will give galaxy formation theorists a lot of constraints to try to match.

Galaxy Magnetic Field – SOFIA (airborne 100-inch infrared telescope) has measured the polarization of light from dust near the center of our Milky Way, and from that the magnetic strength was calculated. The result is about 100 times weaker than the Earth’s surface magnetic field. Yet this is strong enough that the magnetic forces on particles in this region could be stronger than gravitational forces. This may require computer simulations of the cores of galaxies to take into account magnetic fields, which has not always happened in the past because magnetic fields are difficult to simulate. Magnetic fields near the center of our galaxy could explain 2 surprises that have long been known: the star formation rate in this area is surprisingly low, and the consumption of matter by the central black holes is surprisingly low.



Nancy Grace Roman Space Telescope – NASA has announced that it is naming its next large space telescope after Nancy Grace Roman, the 1st NASA Chief of Astronomy. She championed the development of space telescopes, particularly the Hubble Space Telescope. This next telescope has been known as the Wide Field Infrared Survey Telescope (WFIRST). Its mirror is the size of the Hubble, but has a wide field optical design that takes in 100 times the area of a Hubble image. It will have both imaging and spectral capabilities. A coronagraph will be able to block light from a particular star in order to study closely-spaced dim objects, such as exoplanets. Launch is scheduled in the mid 2020s.

Occultation Web site for Anza OCA Observatory & Southern California



I enjoyed attending your Open Meeting on June 14, talking with many of you about occultations. This is just a quick note to say that I’ve set up a web page about occultations for the OCA Observatory at Anza, and for southern California, at <http://iota.jhuapl.edu/SCalOccs.htm> - please visit it.

There is also much information on the International Occultation Timing Association’s (IOTA’s) main site at <http://occultations.org/>.

More later, good luck with your observations.

David Dunham, email dunham@starpower.net
Fountain Hills, AZ but Greenbelt, MD during the summer

OCA Loaner Scope Program

From John E. Hoot, Program Director

Due to the CoVid-19 pandemic, the OCA Telescope Loan Program is on hold. Those of you who have telescopes checked out are encouraged to continue to enjoy them rent free until such time as it is deemed safe to resume the scope exchanges.

I am still accepting reservations for scope checkouts when the program resumes but no firm date has yet to be set. Please see the current inventory list below. If you have questions I can be reached at scopes@ssccorp.com.

INV#	Type	Size	Mfg	Model	Accessories/Notes	Status
Active Inventory						
1	Mac	3.5"	Meade	ETX90	Alt/Az Goto	Available
2	Newtonian	4.5"	Meade	DS2114ATS	Alt/Az Goto	Available
5	SCT	8"	Meade	LT8	Alt/Az Goto	Available
6	Newtonian	4.5"	Celestron	1114EQ	Wt Bars In Storage	Available
10	SCT	8"	Celestron	Orange Tube	w/Encoders, Wedge, Tripod & SlowMo. Ctl	Available
16	SCT	10"	Meade	LX200 Classic	Alt/Az Goto	Available
17	Newtonian	8"	Celestron	????	electronics not working	Available
19	Mac	2.25"	Meade	ETX60	Alt/Az Goto	Available
20	Reflector	8"	Orion	SkyView	German Mount w/Tracking & SloMo 2 axis	Available
22	Reflector	4.5"	Celestron	NexStar	Alt/Az Goto	Available
24	Reflector	4.5"	Meade	4504	German Mount Goto	Available
26	Dobsonian	8"	Celestron	Starhopper	Alt/Az Manual	Available
29	Schmidt-Cas	8"	Celestron	NexStar 8	Alt/Az Goto	Reserved
31	MAK-Cas	5"	Meade	ETX-125	Alt/Az Goto	Available
32	Newtonian	4.5"	Meade	DS-114AT	Alt/Az Goto	Available
33	Schmidt-Cas	10"	Meade	LX90-AFCF	Alt/Az Goto	Reserved
34	Dobsonian	12"	Meade	Light Bridge	Alt/Az Manual	Available
35	Newtonian	4.5"	Meade	DS-2114	Alt/Az Goto	Available
36	Schmidt-Cas	8"	Celestron	Ultima 8	Fork Mount w/Wege, Tripod Motorized	Available
37	SCT	8"	Meade	LX200GPS	Needs Spreader & Handbox	Available
45	Refractor	4"	Tashihaki	106FSQ	Motorized German Mount AstroImaging	Available
49	Dobsonian	4"	Orion	Dobsonian	Table Top Dob - Easy to use	Available
Available For Purchase						
39	Black C8 OTA	8"	Celestron		OTA Only	\$250
41	SCT	14"	Celestron	C14 Classic	w/Wedge, and Tripod	\$1,200
48	SCT	12"	Meade	LX200 Classic	Az/EI Goto w/Tripod (no wedge)	\$1,200
50	Dobsonian	10"	Orion	Classic Dob		\$200
51	Dobsonian	12"	Odyssey	Red Tube Dob		\$250

Email: scopes@ssccorp.com with question or for details

Scope Pickups are on hold

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 Jeff Gortatowsky jeff.gortatowsky@gmail.com
• Jupiter Ridge pad 5 lease privilege – for sale to any OCA member \$1200
This is a pad with no pier on it. Price is negotiable

For Sale contact Val Akins akins7821@gmail.com
• Orion Astro View 120ST f/5.0 Richfield refractor OTA with two inch mirror star \$175
diagonal, rings and dove trail attached.

For Sale contact Bill Prats b.bill.p@gmail.com
• Meade LX-70 Tripod & Mount 20lb capacity, Meade Polar Scope (#670010), \$300 OBO
Dual axis motor drive with Controller (#670011), original accessories, fresh 6 volt battery.
Very clean, Used 1 year.

For Sale contact John Derks derksjm@yahoo.com
• Meade 14" LX200 GPS UHTC w/ complete original accessories package: \$2700
2" diagonal, 8x50 finderscope, zero image shift focuser, Autostar II handpaddle, ^ reduced ^
Series 4000 26mm Super Plossl 1.25 eyepiece, vibration iso pads
• Meade Giant Field Tripod
• Meade Superwedge
• 14" SCT Dewshield

OTA is in like new condition in original Meade foam lined box . Located in So. Orange County

For Sale contact Tom Kucharski astrophd50@gmail.com
• LEASE FOR SALE - Cinder Block observatory (Anza Site OBS-A) \$38,000
• 400 Sq ft raised observatory floor with automated roll off roof
• 2 pier footers in place with room for a third
• 2 private bedrooms of approx. 60 sq ft each and 120 sq ft common area with desks and bookshelves
• Great for TWO astro buddies!
• Private driveway and parking

For Sale contact David Hobbs david_hobbs714@yahoo.com
• 20" F5 Research grade early Coulter mirror and secondary mirror \$2800
• Primary mirror is 2 3/4" thick, Secondary is 4" x 5 5/8"

Advertisements

For Sale	contact	Ron Choi	rongrace2@cox.net	
•	Orion StarShoot AutoGuider			\$240
•	Orion Mini 50mm Guide Scope			\$ 60
•	Baader Planetarium Classic Ortho 6mm eyepiece			\$ 50
•	TeleVue 10mm Delos 1.25 eyepiece - Like New			\$280
•	TeleVue 17.3mm Delos 1.25 eyepiece - Like New			\$280
•	Orion SkyView Pro 8" f/4.9 reflector telescope with EQ mount Tripod with 25mm Orion Sirius Plossl telescope eyepiece 10mm Orion Sirius Plossl telescope eyepiece Padded Telescope Case, Finder Scope, Polar Alignment Scope, Orion Dual Axis TrueTrack Telescope Drive installed			\$300

More Images from the Club

Here's a bonus picture from the club archives.



Comet Machholtz taken by Gary Schones, Greg Pyros and Bill Patterson in January 2005 from our Anza site using an STL11000 camera and Takahashi FSQ106 refractor

SIRIUS
www.ocastronomers.org



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