



This is the Leo Triplet (M65, M66 and NGC 3628) captured by Jim Schellenberg on May 22, 2020 at the club's Anza site using an ASI071mc Pro camera with a Celestron C11 Edge cassegrain telescope in Hyperstar configuration

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, 6 November at 7:30 to 9:30 PM The speaker this month will be David Pearson talking about different methods of finding objects in the night sky	ONLINE
Club Meeting	Friday, 13 November at 7:30 to 9:30 PM "What's Up?": Chris Butler Main speaker will Dr. James Tuttle Keane from NASA Jet Propulsion Laboratory "NASA's New Horizons Mission to Pluto and Beyond"	ONLINE
Open Spiral Bar	Saturday, 14 November 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 end 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.

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.

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

Scope Pickups are on hold

President's Message

By Barbara Toy

It seems hard to believe that we're fast approaching the Holiday Season – so much has changed since this time last year. Hopefully for most of you the pandemic-related changes have been limited to staying home more, and protecting yourselves with social distancing, masks, sanitizers and hand washing. For those of you who may have become infected with the virus, I am sorry for what you suffered, particularly as most of us in the club are in demographics that are more likely to have serious symptoms if we get the disease.

Unfortunately, I know that some of you have lost loved ones to the virus, losses that are particularly hard with all the limits on direct contact with those hospitalized with the disease and limits on what can be done to memorialize those who have passed on. As time passes people tend not to say so as much, but you do have our sympathy and best wishes as you continue to cope with these losses. These are indeed sad and difficult times.

I'm sorry to say that, as I write this, it seems we are headed into another peak of infections as the Fall surge that was feared by the experts is materializing across the country. So far, we've been fairly stable in our case count in Orange County, and I hope it stays that way or – even better – goes down. Even so, please don't let your guard down – keep up those practices that keep you and all of us safe and healthy.

Club Activities:

Given what's going on in the world around us, all of our formal in-person activities remain on "hold," but our club is far from inactive. Here's an update and reminder of what you can participate in from the comfort of your own home as we work our way through our current challenges.

1. Our monthly meetings are continuing via Zoom and we don't have any estimate for when that might change, other than it won't be until sometime in 2021. Per their website, Chapman University is slowly trying to have more on-campus activities while monitoring for any increases in infections, but meetings like ours are very far down on their list of priorities. We have our own safety concerns – it's not worth risking the lives and health of anyone who might attend a meeting when we have a safe alternative that is working as well as our Zoom meetings have been. Check the "Meeting Info" page on our website for the link to attend the meetings. You don't have to be a member (or even in Southern California) to join the meetings, so if you know anyone who might be interested, please let them know about it.

Special bonus: we run the slide show of club announcements and other matters of astronomical interest starting at 7:00 p.m. Pacific (the meetings formally start at 7:30 p.m.). For the last couple months, Kim Kanahale has generously provided live harp accompaniment to the slide show, to enthusiastic response, and has agreed to continue doing that, so those who tune in for the slide show also get a live harp concert. She's been giving us a variety of selections, and they've all been sounding great in spite of Zoom's limitations. Thanks for doing this, Kim!

This part of the meetings, in particular, has developed a social side, as people who are attending have been posting comments, which is how I know Kim's music was enthusiastically welcomed.

2. The "Open Spiral Bar" on the night after the monthly general meetings has been a successful way to socialize more with fellow club members and other astronomy enthusiasts in an informal cyber-gathering (also via Zoom), and that is continuing. The link to attend is on the website calendar. If you're free at 10:00 p.m. Pacific on the Saturday night after the general meeting, please do check it out. One benefit it gives that our regular meetings couldn't give us is the chance to socialize with folks who are out of the area, so, as just one instance, we don't have to wait for Don Lynn to come back to Southern California from his current home in Colorado to be able to chat with him about matters of mutual interest.

3. Our Beginners Class is also continuing via Zoom, which actually makes life a lot easier for Dave Pearson, who teaches it, as he doesn't have to fight traffic to get to the Heritage Museum in Santa Ana from his home in South County, or worry about setting up the equipment, etc., for the classes. And it seems the students attending it are enjoying the format as well. It's not something we would have planned for the class, but the way it's working out is a bit of a silver lining to an otherwise difficult situation.

4. Our regular in-person Outreach activities have all been cancelled, probably for this entire school year, but our new Outreach Coordinator, Ceci Caballero (who is also an OCA Trustee) is experimenting with some cyber Outreach events. The initial attempt was quite successful, though it was cut short due to limitations on the version of Zoom she was using, and we're exploring what platform would work best for the kinds of programs she'd like to present. Keep an eye on the website and our social media accounts for more information as these activities develop, and please contact

her if you're interested in participating in (or developing) any kind of cyber outreach event. Even if we can't take telescopes out to schools this year, we'd like to give students as many memorable astronomical experiences as current circumstances allow.

5. Board meetings are continuing via Zoom and we've had some club members attend out of curiosity about what happens at these meetings, which is really cool. It's certainly a lot easier to do that when you don't have to drive a long way to get to the meeting location – if any of you are interested in attending one of these meetings, please contact Alan Smallbone (OCA Secretary), as he's the host and can send you the link. These cyber meetings have been such a success that we expect to continue with them indefinitely, as the format makes it much easier and less time-consuming for Board members to attend, as well.

6. Email Groups – I haven't been monitoring them closely, but from what I've observed in my in box, it seems that they have generally been more active in recent months. We have two long-standing groups for the club, OCAstronomers@groups.io and AstroImagers@groups.io, and they're a great way to connect with fellow club members and get information on astronomical or club-related matters. The OCAstronomers group is more general, and the AstroImagers group is more for imaging, but both groups share an interest in such things as weather, conditions at Anza, rocket launches, satellites and other things passing overhead, cool astronomical events (including but far from limited to comets, conjunctions and eclipses), etc. If you are a club member and haven't joined them, you can do so through Groups.io (you would need to set up an account). If you have any problems joining, please email Alan Smallbone, who is the main moderator for the groups. Because we've had problems with spammers in the past, your initial emails to the groups may be monitored.

7. Cosmic Adventures: This is a new venture, an "inreach program" put together by an industrious group that includes Doug Millar and Reza AmirArjomand from OCA collaborating with Global Hands-On Universe and others. There's a link to the dedicated pages for this on our website, and there are options for two different types of activities – remote imaging using telescopes at Las Cumbres Observatory and processing data for asteroid searches (which are in conjunction with searches by other groups all over the world). Citizen Science is a great way to help professional science, and it's also possible to join the Institute for Student Astronomical Research (InStAR) program to do double star and exoplanet research. So, if you want to use some of your time at home for remote imaging or research-related activities, do check this program out. If you have any questions about it, please contact Reza (our Vice President and Webmaster) or Doug (OCA Trustee and advisor to our Youth Group).

Times are tough, but its been great to see how resilient and creative people can be in meeting these challenges. I hope you take advantage of some of these options for ongoing club activities. Someday we'll be back to having regular star parties and other in-person activities that we all enjoy, but many of these new options are allowing us to expand what we do as a club in ways we never considered before we were forced to rely almost exclusively on cyber activities. It's going to be interesting to see where all of this takes us in the years ahead.

Our Very Own Election...

As a reminder, our very own election, small and non-combative as it may be, is ongoing. If you'd like to run for a position on the Board, you still have some time – please email Alan Smallbone so he can put you on the ballot (alan@ocastronomers.org). You have through the day of the November general meeting (which is November 11, 2020) to do this, but please don't wait until the last minute as sometimes the electrons carrying your message may not make it. The Board is a great bunch of folks, and I'm sure you'd enjoy hanging out as one of the group that deals with the club's business!

Once the ballot is finalized, please do vote, even if the only people listed as candidates are the members of the current Board, as that is a visible sign that our members care about their leadership and helps keep us accountable. We should have an electronic option for casting your ballot in place by the time the ballot is final – details to follow. And there's always the old fashioned paper ballot route, as well – Charter Member Tim Hogle, who graciously agreed to handle validation of the ballots and counting the votes for another year, can deal with either of them.

Returning to my initial thought, I hope you all had a fun Halloween (celebrated safely), and that you find a way to enjoy Thanksgiving fully (but safely) in spite of the pandemic. As we lurch toward the end of 2020, I think all of us are hoping that 2021 is a better year for everyone.

One point of happy anticipation – we're getting closer to April 8, 2024 and another American total eclipse... Its really not too early to be checking out weather patterns and thinking about where you want to be when the moon's shadow races across our continent again, less than 3½ years from now. May Covid-19 just be a memory by then!

© Barbara Toy, October 2020

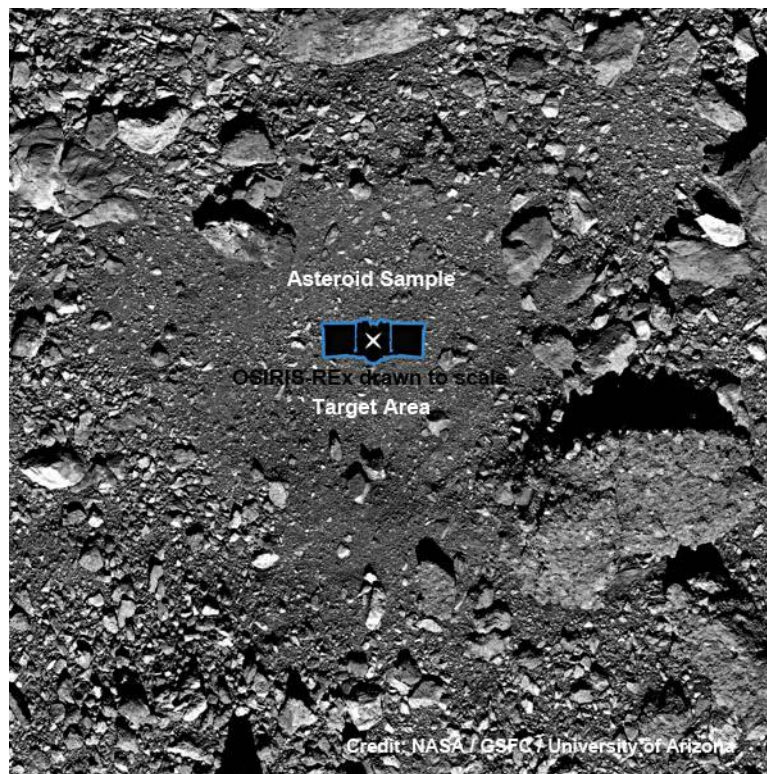
AstroSpace Update

November 2020

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

Nobel Prizes – As far as the Nobel Prize committee is concerned, astronomy is included as part of physics. So sometimes the Nobel Prize in Physics is awarded to astronomers. This year 3 astronomers split the physics prize. Roger Penrose got the award for his mathematical work on the properties and existence, of black holes. Andrea Ghez and Reinhard Genzel were recognized for tracking stars moving near the center of our Milky Way galaxy, showing that they were orbiting an extremely massive and relatively small object that could be nothing but a supermassive black hole. Ghez and her team used adaptive optics and infrared imaging through the Keck Telescope in Hawaii to do the observations, over a span of about 25 years.

OSIRIS-REx is the spacecraft that has been observing close up the small near-Earth asteroid Bennu for nearly 2 years. The primary goal of the mission is to bring back to Earth a sample of the asteroid surface material. When analyzed on Earth, this material should tell scientists a great deal about conditions when the Solar System, including the asteroids, formed about 4.5 billion years ago. On October 20, the spacecraft gently touched its sample grabbing mechanism to the surface and all indications are that the sampling worked as planned. Surface material is blown by a puff of nitrogen into a container, which is designed to hold up to about 5 pounds of dust and rock. However, anything more than about 2 ounces is considered successful. Arrival back at Earth is scheduled for September 24, 2023. This is planned to be the largest sample returned from space since the Apollo program.

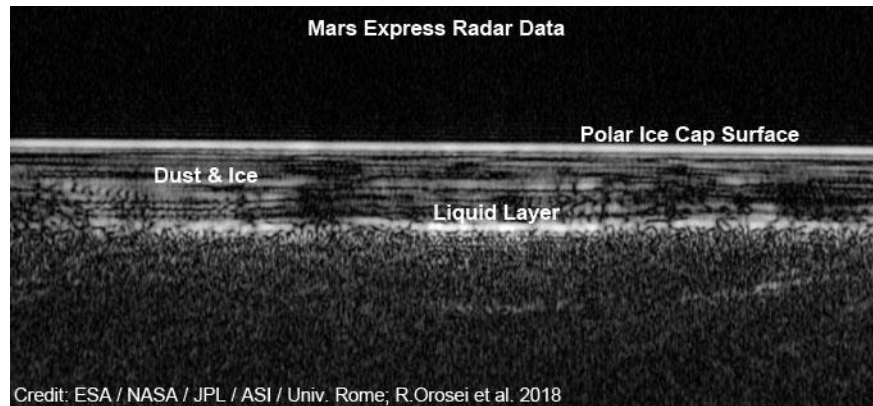


More From Bennu – A recent discovery by OSIRIS-REx is a series of 6 boulders up to 14 feet across that in color and brightness are unlike any other boulders on Bennu. These bright rocks stood out against the generally very dark surface of Bennu, caused by large content of carbon. Spectrometer observations of them showed that they are pyroxene-rich and match the composition of boulders seen on Vesta by the Dawn spacecraft. Certain types of meteorites that have fallen to Earth are known to have been blasted into space by an asteroid colliding with Vesta about 2 billion years ago. Bennu is thought to be a fragment of a larger parent asteroid that was broken up by collision very roughly a billion years ago. Scientists stated that the most likely way the 6 boulders ended up on Bennu is that fragments of the Vesta collision eventually landed on the parent body of Bennu, and that the boulders survived the breaking up of that parent asteroid, though the Vesta pieces could have later landed on Bennu rather than earlier on its parent.

Yet More – Another recent discovery by OSIRIS-REx consists of rocks on Bennu that were likely formed in liquid water soon after the Solar System formed. This is possible only in a much larger body, likely the parent body that later broke up to produce Bennu and a large family of other small asteroid fragments. The rocks formed in water are crystallized calcium carbonate. Bennu is about 1/3 mile across and appears to be made of broken rubble that accumulated into a single body by gravity.

Comet Aurora – Archived data taken a few years ago by the Rosetta spacecraft at comet 67P/Churyumov-Gerasimenko show ultraviolet aurora activity at the comet. This is the first aurora ever seen at a comet. The aurora was found to be caused when charged particles in the solar wind hit the sparse gas surrounding the comet's nucleus. That nucleus has no magnetic field and hardly any atmosphere, both of which play parts in auroras at most of the planets in our Solar System. Aurora at a comet was therefore unexpected. It was so unexpected that scientists at first thought the ultraviolet glow seen by Rosetta was from dayglow, a phenomenon caused by light photons hitting gas, as opposed to aurora, where charged particles hit gas.

Martian Lakes – Two years ago, astronomers reported finding radar data evidence for a lake of liquid salty water under Mars' south polar ice cap. Further research using new techniques and more radar data has now found several smaller lakes or ponds nearby. The new techniques were developed and successfully used to find lakes under glaciers here on Earth.



Binary TNO – New observations by volunteer high-school students have shown that a previously known trans-Neptunian object (TNO) is actually a pair of closely orbiting (about 200 miles apart) bodies. The observations were possible because the TNO happened to pass in front of a star, blocking (occluding) its light. In fact the star was a double star, so it was a case of a double TNO occulting a double star. Timing the 2 blockages gave sizes of the 2 components, and the time between gave the distance apart. The TNO is too far away (beyond Neptune, as the term implies) to resolve in any telescope the object as being double or the component sizes. Hence the occultation observations yielded information obtainable in no other way.

Very Hot Exoplanet – Cheops, a European space telescope designed to follow up discoveries of exoplanets, has been making science observations since April, and its first major discovery has just been announced. That discovery is one of the hottest planets known, named WASP-189 b. The heat is due to orbiting about 20 times closer to its star than our Earth orbits to the Sun. Its year (orbital period) is just 2.7 Earth days. Also its star is considerably hotter than our Sun, adding to the infernal climate. Metals such as iron evaporate there. The planet is about 1.6 times the diameter of Jupiter. It is spinning so fast that its equator bulges considerably out of spherical. Its orbit is surprisingly inclined, so that it passes nearly over the poles of its star. Likely gravitational disturbance from other planets or a star forced it into this inclination.

Another Hot Exoplanet – A different team of astronomers studied another very hot exoplanet, named WASP-121 b, located 850 light-years away. It too is very close to its star, taking less than 2 Earth days to orbit. They were able to get a spectrum of the planet's atmosphere. 7 vaporized metals were found: vanadium, iron, chromium, calcium, sodium, magnesium and nickel. Strangely titanium was not found.

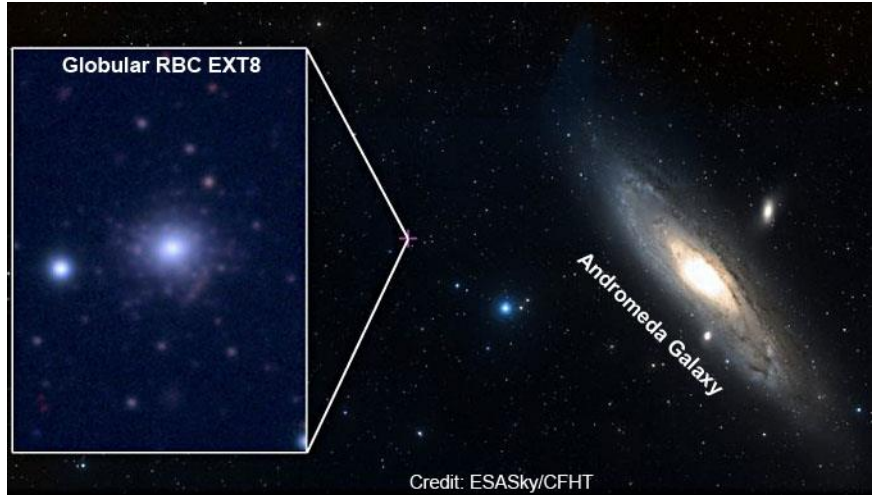
Exoplanet Imaged – Astronomers have taken the first direct image of an exoplanet that was discovered using the radial-velocity method. The planet is Beta Pictoris c. The image was made using adaptive optics and interferometry on the Very Large Telescope (VLT). Its neighboring planet Beta Pictoris b was directly imaged in 2008. Only about 2 dozen exoplanets have been directly imaged.

Bright Non-Quasar Discovered – The first galaxy ever seen to be as bright in ultraviolet (UV) light as a quasar, but is not a quasar, has been discovered. It was dubbed BOSS-EUVLG1, because the BOSS sky survey found it, and it emits Extreme UV light. Follow-up observations in radio and visible light showed that the extreme UV is being emitted by intense formation of massive stars, at about 1000 times the rate of star formation in our Milky Way galaxy. It was found to be surprisingly free of dust, permitting transmission of the UV emissions which otherwise would be blocked from our view. The content of elements heavier than helium was also found to be very low, consistent with low dust content, since few previous generations of stars would produce both little dust and little heavy elements. This was unexpected because most galaxies with high star formation rates are quite dusty, resulting in their being bright in infrared, not UV. Astronomers predicted that the dust-free stage could last only a cosmically short time, and that is why most high star-formation galaxies would have left that stage and become dusty. The galaxy is so distant that we are seeing the galaxy as it appeared when the Universe was less than 20% of its current age.

Captured Globular Cluster Found – Scientists have identified a population of stars found near the center of our Milky Way galaxy that differ in properties from the other stars in the region. They then showed that this population was the result of a globular cluster being captured by our galaxy about 3-5 billion years ago. The differentiating properties included heavy element content, velocity and orbital inclination. The population was found in a study of about 700 stars in the Milky Way center made with the Very Large Telescope (VLT) in Chile, done in infrared, so as to penetrate the dust blocking visible light from this region. About 7% of the stars in the region were found to belong to the newly discovered population. The likely source (globular cluster) was determined by comparing observations to computer simulations of the various ways a population of stars could be created there.

Spaghettification – Strength of tidal force depends on the mass of the gravitating object and your closeness to it. So if you get close to a black hole, the tidal force strongly pulls your near side from your far side. This rips apart planets or stars that are foolish enough to closely approach a black hole. The planet or star parts are stretched into strings, and the process is called spaghettification, or more formally, tidal disruption event (TDE). Astronomers happened on such an occurrence last year in a galaxy 215 million light-years away, when a star got too close to the galaxy's supermassive black hole. Astronomers watched the event proceed in all kinds of wavelengths, from radio to X-rays. Surprisingly the black hole developed jets and threw some star material outward at about 6000 miles/second, while devouring the rest. It was the closest TDE yet observed, so astronomers learned the most about such events.

Deficient Globular – Astronomers have found a globular cluster orbiting the nearby Andromeda galaxy that has a record low content of heavier elements (heavier than helium). The cluster, known as RBC EXT8, has 3 times less iron than the previous globular record holder and extremely low amounts of magnesium. This means that the cluster has had extremely few generations of stars form in it, since each generation adds heavier elements formed within stars and supernovas. Star cluster formation theories may have to be adjusted to account for this globular. The astronomical team plans to look for other heavy-element-deficient globulars to try to understand how they form.



Mass In the Universe – A different method has been used to calculate the total mass content, including dark matter, of the Universe. The result is 31.5 ± 1.3 % of the mass and energy content consists of mass. Essentially all the rest (68.5%) must be dark energy. The technique used was to measure from sky surveys the mass density of galaxy clusters and compare that measurement to the results of computer simulations of the Universe developing, each simulation with a different total mass content, until simulation and observations matched. To do this, the team had to develop a computer tool that measured galaxy cluster mass by its influence on galaxy motions within clusters. The general technique has been used before, but this new study is believed to be the most precise, because it best agreed with other cosmological studies, including that of the cosmic microwave background anisotropies, baryon acoustic oscillations, supernovas and gravitational lensing.

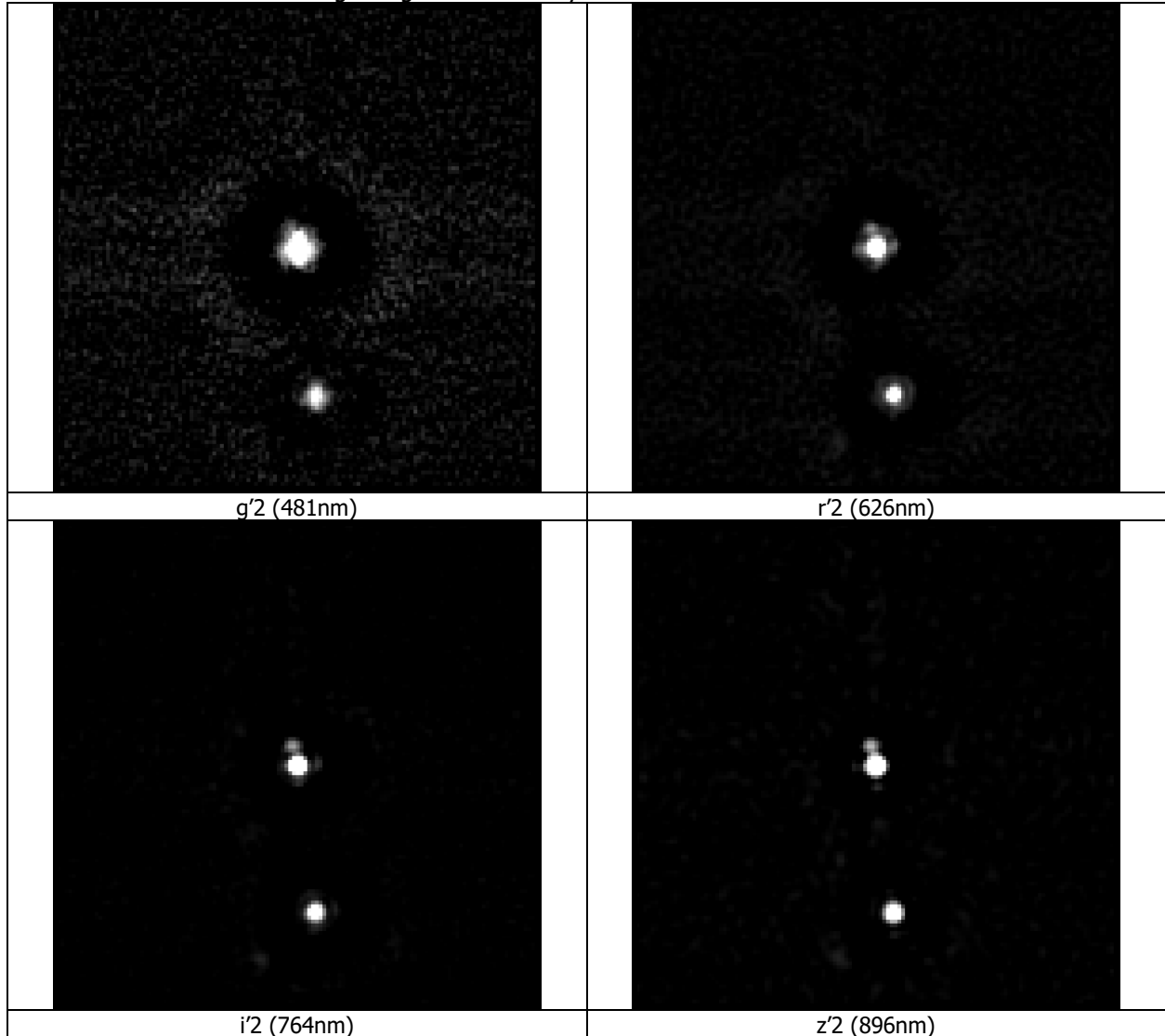
Early Galaxies Discovered – 6 galaxies clustered around a supermassive black hole have been found using the VLT. They are so distant the light left there about 0.9 billion years after the Big Bang. This is the earliest such a grouping of galaxies has been found to exist. They lie in a cosmic web of gas, which apparently supplied sufficient gas to form galaxies full of stars and a supermassive black hole so early in the life of the Universe. The web is seen to extend about 30 million light-years. The black hole has about a billion solar masses. The galaxies are near the limit of what can be seen with current telescopes, so there are probably more galaxies somewhat dimmer in the vicinity that have escaped detection.

New Sky Catalog – Pan-STARRS1 is a wide-field 70-inch telescope in Hawaii that has been for about a decade imaging in 5 colors the entire currently visible night sky every week or so. The goal is to find everything that moves or changes brightness. However the Pan-STARRS team also stacks all the images and occasionally releases the most detailed maps of everything in the sky that does not move. The latest such release includes $\frac{3}{4}$ of the entire sky (the remaining $\frac{1}{4}$ is too far south to image) and additionally includes a classification for every object and a distance for every galaxy. These were calculated by a computer program that has been found to be 96-98% accurate in classification, and to provide galaxy distances accurate to 3%. It contains about 3 billion stars, galaxies and quasars. This is the largest catalog of the sky made to date.

Speckle Observations of Triple Star 003234.2+671404 = VYS 2AB + MCY 1AaAb with the OCA Kuhn 22-inch Telescope

By Rick Wasson

These observations were made with the OCA 22" Telescope at the Anza site by OCA member Rick Wasson on October 10, 2019, using the Speckle Interferometry technique. Much like that used for planetary imaging, the instrumentation uses a flip mirror and eyepiece for finding/centering, a ZWO 5-position electronic filter wheel, a 2x Barlow, and an uncooled ZWO ASI290MM back-illuminated CMOS camera. 1000 frames of 0.1-second exposures were recorded for each filter. No guiding was necessary.



This system was part of an observing program for binary stars containing a Red Dwarf star, located in the Sun's neighborhood. Red Dwarfs (spectral type late K and M) are normal dwarf stars fusing Hydrogen on the Main Sequence like the Sun, but much less massive, cooler and fainter. Red Dwarfs are very common, but their masses are not as well defined by observing binary star orbits as for earlier type stars, because they are so dim. The Gaia satellite Data Release 2 (DR2) catalog was "data mined" for likely binary stars with very nearly the same parallax (accurately measured by Gaia), within 100 parsecs of the Sun, and having a very red color index for one or both components. The wide VYS 2AB pair, although not a "new" binary (discovered in 1923), was observed because it was bright and "easy" at 3.7" separation. The close MCY 1AaAb binary, not resolved by Gaia, was discovered in 1989 by speckle. It was resolved by the Kuhn telescope, with separation measured at 0.478" (+/-0.010").

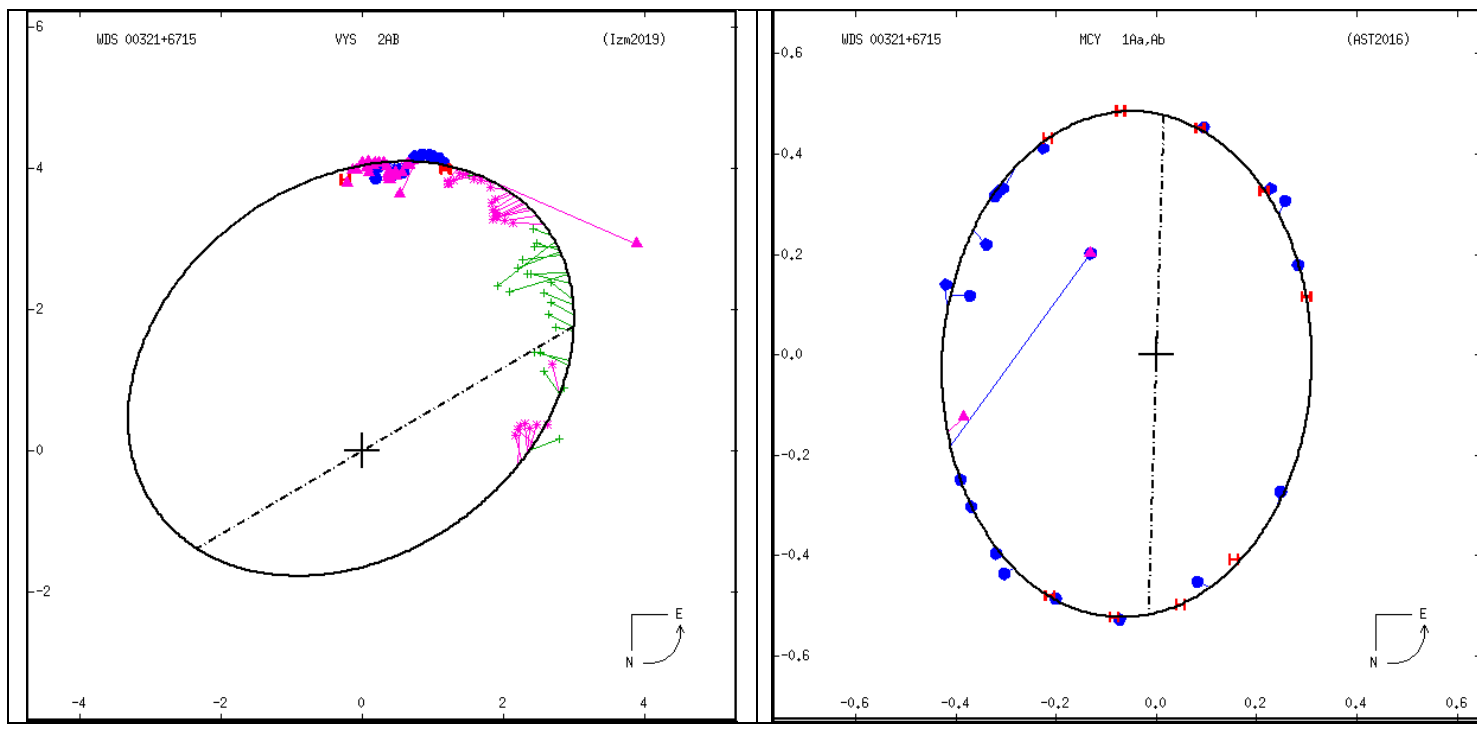
The diffraction-limited images above were reconstructed by an advanced speckle technique known as BiSpectrum Analysis (BSA). They show a 12"x12" Region of Interest, taken in four Sloan (SDSS) photometric filters, Gen2 interference filters from Astrodon, and processed by Speckle Tool Box (STB) freeware. Unlike "lucky imaging" or

stacking, speckle techniques use all the images, finding shreds of diffraction-limited information in each frame, unless smeared by excessively long exposure. The *g'* filter shows the effects of seeing - "faster" motion occurs at short wavelength, degrading quality for such a "long" speckle exposure. The seeing improves at longer wavelengths.

All three components of this triple star are Red Dwarfs: the bright Aa component, $V=10.6$, M1V; the B component (below), $V=12.2$, M3V; the close Ab component, probably $V\sim 14$, M5V. Notice in the images above that the faintest, latest-type Red Dwarf component Ab becomes relatively brighter at longer wavelength. The system is only 9.9 parsecs (31.7 L-Y) from the Sun, based on the Gaia parallax, and has an extremely large Proper Motion of $1.7''/\text{year}$. It is also the variable flare star V547 Cas, but it is not certain which component(s) produce active flares.

Orbital Plots of the two binaries in the Triple Star system are shown below. The black "+" sign marks the location of the primary (brighter) star, and symbols mark the observed relative position of the secondary star, with scales in arc-seconds. Only a portion of the wide pair's 222-year orbit (at left) has been observed. The symbols represent different methods of observation, with the blue circles being speckle interferometry.

Note the cyclic pattern of separation in the wide orbit, which was a clue to the existence of a third star in the system. It was discovered by speckle observations in 1989 and confirmed by Hipparcos (red "H") in the much closer, faster 15.6-year orbit at right. This binary has completed two orbits since its discovery.



OCA 22" observations of 35 nearby binaries with a Red Dwarf were published by Rick Wasson in the June 15, 2020 issue of *Journal of Double Star Observations*, <http://www.jdso.org/>.

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	
<ul style="list-style-type: none"> • 20" F5 Research grade early Coulter mirror and secondary mirror • Primary mirror is 2 3/4" thick, Secondary is 4" x 5 5/8" 				\$2800

For Sale	contact	Ron Choi	rongrace2@cox.net	
<ul style="list-style-type: none"> • Orion StarShoot AutoGuider • Orion Mini 50mm Guide Scope • Baader Planetarium Classic Ortho 6mm eyepiece • Hotech 1.25" SCA Laser Collimator (Dot) 				reduced price \$ 220 reduced price \$ 50 reduced price \$ 40 \$ 60

For Sale	contact	Dave Cook	949-689-0853	
<ul style="list-style-type: none"> • 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	
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- ATS Portable Pier, 8 inch diameter
- 52 inch height
- Excellent condition
- Detachable aluminum shelf and eye-piece holder
- No pier adapter (top plate) is included – these are specific to the user's mount

\$1,500



OCA Youth Group

New Opportunity- International Astronomy Club

From Doug Millar

By the time you read this we will have a new opportunity for our OCA younger members and friends.

Along with Cosmic Adventures we have also been invited to participate in an international youth astronomy club for 10 to 18 year-olds. This club is a joint sponsorship of clubs from USA (our club), Chile, Uganda, Kenya, and Iran and is just now getting organized. That is the list so far. Participating clubs will be doing remote imaging as well as local eyepiece astronomy and sharing their ideas and images with the other clubs. The group will meet on Zoom about once a month. Other clubs from all over are also welcome and we have heard that groups in Nepal and Australia may join. We will also meet by ourselves to see what we would like to do.

If you would like to participate and meet other astronomers who are your age, or even if you just have questions, please contact Dr. Millar at doug@ocastronomers.org. Once you email me, I will keep you up-to-date via group email. Doug

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>
December	21 November
January 2021	19 December
February	23 January
March	21 February

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ASTRONOMER
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