The Los Angeles Astronomical Society

THE BULLETIN

June, 2020
Volume 94, Issue 6

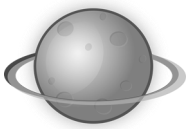
.M100 Galaxy in the constellation Coma Berenices. The image also contains several satellite galaxies associated with M100 and NGC 4312, the larger galaxy on the left. Image taken this past week/weekend at Lockwood, where the seeing was better than it has been over the last several months. This is a Luminance+RGB composite image made from a total of 9 hours of data. Processed in PixInsight. (AGOptical 10"iDK, 10Micron GM2000 HPS II mount, ATIK 16200 at -35C)

Photo Credit: Brian Paczkowski

Outreach Event Advisory

Until further notice, all outreach program events are cancelled. Please visit Page 2 for further information.

In This Issue



New Contact Info?

If you have recently moved, changed your email address or phone number, please contact our club secretary at secretary@laas.org.

Membership Renewal Notices

Keep your eyes open for email from the club secretary so you don't miss your renewal notice. Once your membership expires, you may need to reapply.

A Letter From The LAAS President

.It looks like most of the facilities and groups that LAAS use for public events will be closed until further notice because of Covid-19.

As a result, all LAAS public events will be cancelled until further notice.

This will mean cancellation of

1. All LAAS outreach events.

2. All LAAS public events at Griffith Observatory -- Public Star Parties and General Meetings.

3. All LAAS public events at Garvey Ranch Observatory -- Wednesday Evening Viewing.

4. All LAAS public events at all other LAAS Facilities.

As of the time of this notice, 60” and 100” viewing sessions at Mt. Wilson have not been officially cancelled but it is expected that Mt. Wilson will remain closed for the season. Tim Thompson is our direct contact person with Monterey Park, Griffith Observatory and Mt. Wilson officials and will keep us updated on their status.

The LAAS Board meetings have been conducted via telephone or video conferencing and are recorded.

In April, we had one resignation from the LAAS board of directors. John O’Bryan also resigned as committee chairman for Lockwood Valley. As a result of these resignations, I have appointed Kevin Gilchrist to fill the vacancy on the LAAS board and the Lockwood Committee chairmanship. The board is also considering alternatives for the general meetings, although much more difficult to implement at this time.

Private LAAS Facilities are scheduled to be open for LAAS membership over the Memorial Day weekend. Lockwood Valley and Ford Observatory are subject to limitations and guidelines set by Kevin Gilchrist, Lockwood Committee Chairman, and Joe Phipps, Ford Observatory Chairman. Social distancing guidelines and the use of disinfectant and hand sanitizer are highly recommended. High health risk individuals are encouraged to stay home.

The committee chairmen will send out information and guidelines for these events.

Thank You and stay healthy

Curtis Byrom

LAAS President

My Old Telescopes

By Jack Eastman

Over time folks have pulled my beard a fair amount to tell the story of how and where I was fortunate enough to acquire a couple of Old Classic Telescopes. While I don't really consider myself a collector, I have had occasion to obtain a couple of "Old Classics". A little hunting, and just plain stupid luck! Here's the story of my Broadhurst and Clarkson, London and two Alvan Clark 'scopes.

Way back, in the fog of antiquity, I had always wanted an old (brass?) telescope. Not easy to find these, but I kept rooting around. Kent Roller showed up at one of our Denver Astronomical Society (DAS) meetings with a really nice 3-inch brass refractor. It looked like an old one, not a modern reproduction. Several years later, I asked Kent if he had done anything with that 'scope, he said "no" and I broached the subject if he might want to unload it. He said "yes" He got it for a song, sold it to me for the same song. No idea who or what? No markings of any sort, no signature on the edge of the glass. Nothing. Being an avid cyclist, I'd go for almost daily rides, and the with the local bike paths being full of idiots on the weekends, I'd ride through the deserted streets in the industrial area of town. Discovered the Packrat, along Denver's "Antique Row". Looked like they dealt in instruments of all sorts, and there was my 'scope in the window! Rather older, I suspect, brass mount parts, and what I could see of the objective, glass somewhat greenish. With mine, the mount trunnions were iron and the front lens element is water white glass. The clot in this vein, for the next 10 or so years, I never ever found the Packrat open! (Somewhat recently I learned they finally went Belly Up). Quite a number of years go by and doggone, there's my 'scope on Ebay! This one had everything, all eyepieces, even what looked like an after market widefield! And, an instruction book with a 4-digit London phone number! That was it! Broadhurst and Clarkson, London. Mine only had the terrestrial eyepiece, I machined up a 1.25-inch sleeve and could use 1.25-inch eyepieces. Objective looked like a Littrow design, rather large (several millimeters) airspace. Performance rather good very slight zonal error at about 60% of the aperture. This sort of satisfied my lust for an old brass, real, not reproduction, telescope. Just the right size to sit in the living room.

I sort of continued to root around for these, when I'd get wind of something I'd at least check it out. so, Next adventure, I found Dixie Telescopes and that they dealt with some oldies. We corresponded, and, the short of it, Tut Campbell made me an offer I sorta could ignore. It was a Clark 6-inch, 1888, as I recall, but he no longer had several of the parts, including the "Comet Eyepiece". He mentioned he had a "Museum Quality 6-inch Clark, dated 1877, at his home and should I ever end up in the area I had to stop in and see it." No mention whether it might be "on the market" or not, and that was pretty much that. Several months, maybe a year or so later I received a most elegantly written letter, sort of something one would expect from the Continental Congress or such. It was from a Bob Ariail, said to the effect of "With the unfortunate bankruptcy of Dixie Telescopes, I have been obliged to retrieve my 6-inch 1877 Clark telescope..." He made me an offer I'd would have been insane to refuse! I didn't answer his letter, we were on the phone the next day. Bob sent me a test report on the lens, I thought "no lens could be that good!! Bob said if I'd send him a check for half his asking price, he'd send me the lens! I said OK, the snail will ooze forth tomorrow with my check. I really had no idea who Bob Ariail was at that time, and I'm really sure he'd never heard of me! I'm also sure the snail couldn't possibly get my check to Columbia SC in less than a week, on a good day.

Two days later I get a call from Cathie Havens, owner of S&S Optika, our late local Telescope Emporium. "Jack! There's a huge box on my doorstep with your name on it!" It was the lens! Holy pink pigwarts! Bob sent the thing overnight air express, and I'm double darned sure there was no way he could have gotten my check! (had him send this to Cathie, at S&S, so it'd be sure and get a home, should I be at work (yes working back then!)). Yes, the lens was that good! Bob said he was well aware I didn't need to get the lens that fast, but his thinking, the less time it spends with the gorillas in the shipping department, the better! "Please do not send the rest of the stuff until the ice storms out your way go away!" Too many reports of 18-wheelers and such sliding off the roads! No I don't want my glorious new old telescope to end up in a ditch!

Bob said there was some sort of big fat lens that screwed into the focuser and accepted the regular eyepieces, of which there were two. One was a conventional looking Huygens, about a 16-mm or so focal length, the other an unusual design, a Ramsden? But with the field lens in with the convex side out. All the lenses in these things are nicely bunished .

in their cells, but this "Ramsden's" eyelens was sorta "gunked in" with some sort of black gooey stuff. Ok, a bit of fiddling, I discovered this "Ramsden" sans the gunked in eyelens, was the eyelens, the "unusual big lens" the field lens, of a glorious 75-mm Huygens "Comet" Eyepiece! It yields a field of view, on the sky, of 1.2-degrees, at a magnification of 32X, and is razor sharp to the edge. All in all, a beautiful instrument, yes, the mount is a bit "undernourished" but usable. At the last few RTMCs Dan Schechter would jury-rig this on his AP-900. Much improved. Too bad RTMC went belly up now that I have a set of the proper mounting rings for the AP-900!

Alvan Clark #2, sort of. I got wind of a 4-inch, dated 1878, on Ebay. Bidding got ridiculous in the extreme. Being dumber than a sack of rusty doorknobs, I don't have my own computer, used to use the one at work. The auction for this was over on a Sunday night, and I had tickets to the Jefferson Symphony that night. I stopped at a friend's and made a totally outrageous bid, and I got instantly outbid! Again! I thought Dan was gonna call the white coats with the butterfly nets to come haul me away! He probably should have! Monday, there was lots of traffic on this, seems the telescope was terribly misrepresented, it was only a 3.5-inch and the mount was a basket case! A couple of weeks later the fellow that won the bid backed out. I offered the seller 15% above the third highest bid, I thought that completely reasonable. He rejected my offer and, I think, he ended up donating the instrument to a local college. Oh, well, that's the way the Sea Slug (Pickle? Grapefruit?) squirts. I was led to believe that 3.5-inch Clarks that are signed and dated are rarer than hen's teeth! Well this whole thing turned into a turnip, that 'scope got away.

Darrell Dodge, Denver Astronomical Society (DAS) Dark Sky Site acting Chair and our hard working (in the extreme) webmaster Emailed me last year "There's a fellow that has an old-looking telescope, he'd like to know more about it...". I contacted this fellow, and the short of it, it was, he said, a 4-inch Alvan Clark! Eric had the forethought to research this thing, and yes, contacted the ATS among other things. Turned out this was really a 3.5 inch aperture, signed and dated 1870! He said he'd gotten this at a flea market, thought it'd make a nice object'd'art on his mantle! Interestingly enough it had all the plumbing, star and solar diagonals, a box of little tubes and a bunch of lenses that made a matched set of four Huygens eyepieces with an (after market?) Ramsden. That one had a reticle with a fine crosshair and 0.01-inch scale. Everything is absolutely mint! I doubt that it had ever been out in the elements. the downside, no mount/tripod. A bit of jury-rigging will solve that in short order! (Assuming I can shake the current attack of Procrastinitis) I did try it out a couple of times, absolutely no doubt why Alvan Clark is considered the Stradivarius of astronomical optics! What is rather unusual was three tubes, 33.3-mm diameter, containing biconcave lenses, ~26-mm aperture that fit tightly in the 'scope end of the diagonals and drawtube. Barlow lenses of some sort I suspect. The eyepieces were marked, very lightly, almost unreadable, 33, 66, 105 and 210. Focal length of the telescope as best I can measure 1224-mm (F/13.75). Measured the eyepieces; 38mm, 18.5mm 11.7mm and 5.83mm. All rather consistent. That last one has an eyerelief of about a millimeter or a bit less! Oil Immersion? But it worked amazingly well! The Ramsden was about 28mm, 44X. And the finder is 10X21. Object'd'art? Flea market? Nope no provenance on this one! The Ebay and this one were "discovered" long after Ariail's book. There was a threat of a Vol. 3 of Artist in Optics, I seem to recall Richard Berry and I talking at some length about this at RTMC a number of years ago. Seems to have died off. Too bad! (Since I started this note, I became aware of two more 3.5", both, interestingly enough, dated 1878)

That's the story in a very big pea pod. It's always a thrill to use these instruments, and think what all they have shown and to who over the years. The workmanship is unrivaled, truly a privilege to have these wonderful examples of yesteryear's superb craftsmanship.

The vitals for the 6-inch. From Alvan Clark and Sons, Artists in Optics by Ariail and Warner, P-74

"Central University in Richmond Kentucky had a 6-inch Clark equatorial refractor dated 1877. This was provided with tripod slow-motion control and accessories, and an unusual giant 4-inch focusing sector that accommodated an equally unusual giant comet eyepiece also supplied by the Clarks. In 1901 when Central university consolidated with Centre College, the Clark telescope moved to Danville Kentucky. The tube assembly is now owned by Jack Eastman and the mount by Robert B. Ariail."

I thought that was interesting, is Bob coming up to RTMC to reclaim the mount and make me hand-hold the 'scope? Turns out the original tripod for this was much taller, 79-inches as opposed to the "normal" 66-inch tripod. These are shown (with the Central University's original) on P-225 of Ariail & Warner.

Continue to the next page to view the images.

6-inch Clark 1877, at the 2016 Okie-Tex Starparty. Procured this gem in 1986.

(Other 'scopes, the Joe Meyers 23.4-mm Newtonian (Celestron 0.8) and my 40-mm Newtonian. Ridiculously tiny telescopes, or how we beat Aperture Fever)

My newest oldest telescope, 3.5-inch Clark, procured late 2019

Sent from my iPad. No! Mike's iPad, through *his* wormhole.

Summer Triangle Corner: Vega

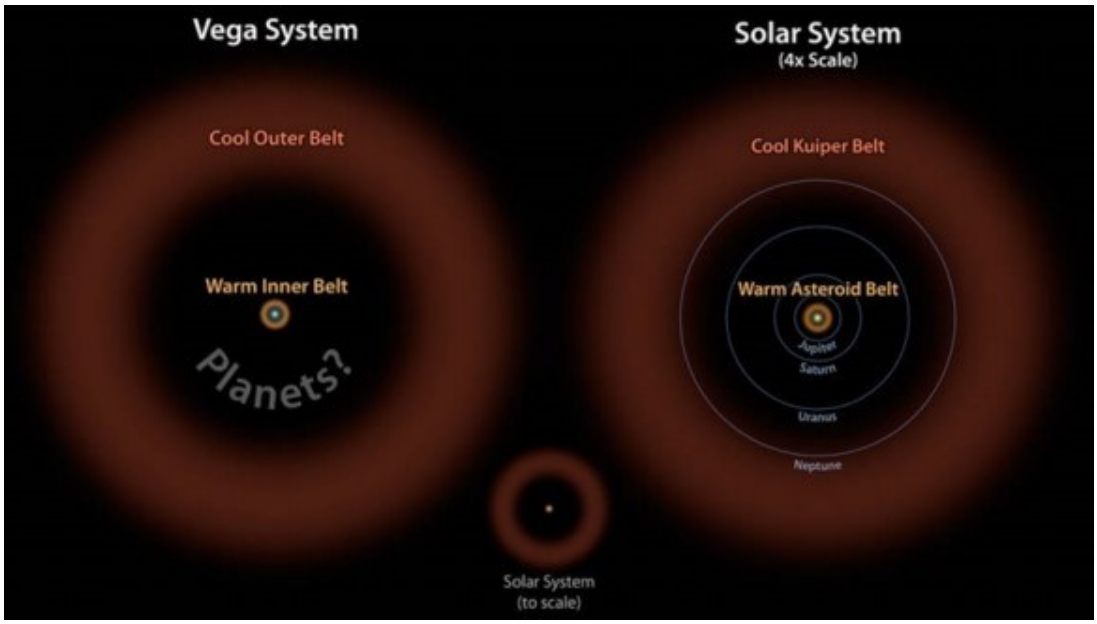
By David Prosper and Vivian White

If you live in the Northern Hemisphere and look up during June evenings, you'll see the brilliant star Vega shining overhead. Did you know that Vega is one of the most studied stars in our skies? As one of the brightest summer stars, Vega has fascinated astronomers for thousands of years.

Vega is the brightest star in the small Greek constellation of Lyra, the harp. It's also one of the three points of the large "Summer Triangle" asterism, making Vega one of the easiest stars to find for novice stargazers. Ancient humans from 14,000 years ago likely knew Vega for another reason: it was the Earth's northern pole star! Compare Vega's current position with that of the current north star, Polaris, and you can see how much the Earth's tilt changes over thousands of years. This slow movement is called precession, and in 12,000 years Vega will return to the northern pole star position. Bright Vega has been observed closely since the beginning of modern astronomy and even helped to set the standard for the current magnitude scale used to categorize the brightness of stars. Polaris and Vega have something else in common, besides being once and future pole stars: their brightness varies over time, making them variable stars. Variable stars' light can change for many different reasons. Dust, smaller stars, or even planets may block the light we see from the star. Or the star itself might be unstable with active sunspots, expansions, or eruptions changing its brightness. Most stars are so far away that we only record the change in light, and can't see their surface.

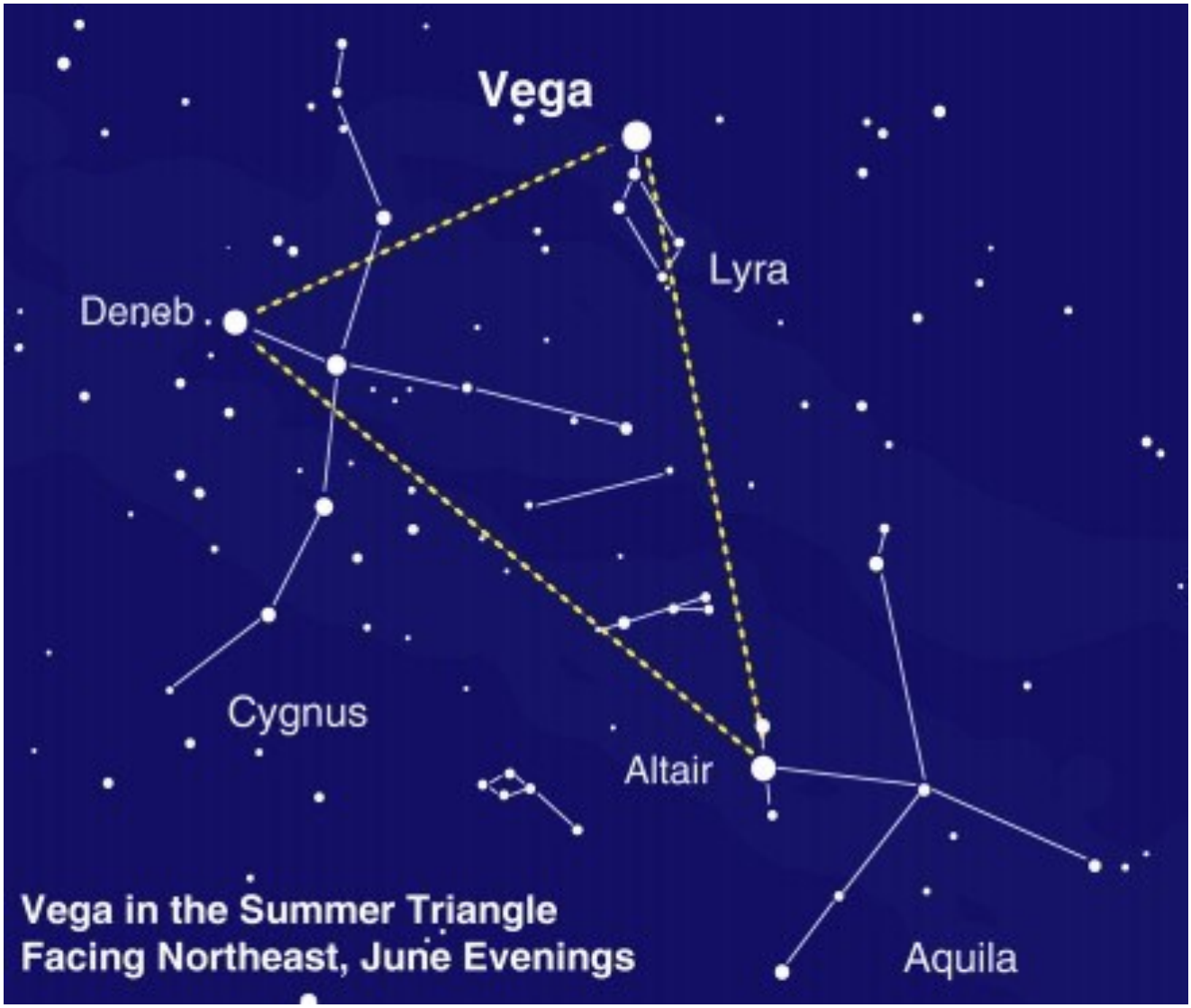
NASA's TESS satellite has ultra-sensitive light sensors primed to look for the tiny dimming of starlight caused by transits of extrasolar planets. Their sensitivity also allowed TESS to observe much smaller pulsations in a certain type of variable star's light than previously observed. These observations of Delta Scuti variable stars will help astronomers model their complex interiors and make sense of their distinct, seemingly chaotic, pulsations. This is a major contribution towards the field of astroseismology: the study of stellar interiors via observations of how sound waves "sing" as they travel through stars. The findings may help settle the debate over what kind of variable star Vega is. Find more details on this research, including a sonification demo that lets you "hear" the heartbeat of one of these stars, at: bit.ly/DeltaScutiTESS

Interested in learning more about variable stars? Want to observe their changing brightness? Check out the website for the American Association of Variable Star Observers (AAVSO) at aavso.org. You can also find the latest news about Vega and other fascinating stars at nasa.gov.



Vega possesses two debris fields, similar to our own solar system's asteroid and Kuiper belts. Astronomers continue to hunt for planets orbiting Vega, but as of May 2020 none have been confirmed. More info: bit.ly/VegaSystem

Credit: NASA/JPL-Caltech



Can you spot Vega? You may need to look straight up to find it, especially if observing after midnight.

If you live in the Northern Hemisphere and look up during June evenings, you'll see the brilliant star **Vega** shining overhead. Did you know that Vega is one of the most studied stars in our skies? Find out why in this issue of **NASA's Night Sky Notes!**

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Download **Star Map for Vega**
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Download **Vega System Comparison**
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This article is distributed by the NASA Night Sky Network, a coalition of hundreds of astronomy clubs across the US dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, stargazing info and more.

From The LAAS Archives

Shared By Lew Chilton, Club Historian

If any one person deserves credit for the founding of the Amateur Telescope Makers' Society (LAAS) in 1926, that honor should go to Charlton F. Chute (1906-1985), seen here in his R.O.T.C. uniform during his 1925 senior year at Long Beach Polytechnic High School. In 1929, he earned a political science degree from UCLA and a Ph.D. in public administration from the University of Chicago in 1935. He was a lifelong amateur prestidigitator.

(Image credit: www.Ancestry.com)

LAAS ARCHIVE

Brian Bell, an LAAS member from the late 1940s to 1962 is retired and living near Woodinville, WA with his wife Penn. He is pictured in his backyard with the only telescope he has ever owned, a 6-inch Cave Astrola that he purchased new in1956. Brian noted that he, Leif Robinson and a few other LAAS members painted the white Parks fiberglass tube black to minimize distractions while observing. (Photo credit: Penn Bell)

LAAS ARCHIVE

Walter Lynn Hildom (1908-1975), above, and brother Victor Avery Hildom (1903-1997), not pictured, both joined the Amateur Telescope Makers' Society (LAAS) in 1928 and became life members and expert opticians. Of the two, Lynn was the photographer and documented old Los Angeles landmarks, the 1933 Long Beach earthquake and "Old Ironsides" during its 1933 visit to San Pedro harbor. The Image above is undated but probably from the early 1930s. Lynn was murdered in a home invasion robbery in 1975.
(Image credit: Security Pacific National Bank Photo Collection, via the Los Angeles Public Library.)

LAAS ARCHIVE

Monthly Star Report

By Dave Nakamoto

.In June we have a month without planets, and the nights are the shortest in the year.

The Summer Solstice will occur on June 20th. This means the Sun will be as high as it gets in the sky at noon. This is the reason why this date marks the start of Summer. It also means the shortest nights of the year since the Sun sets a little past 8pm Pacific Daylight Savings time, and rises around 5:40am, and because twilight lasts half an hour or more on either end, that means less than nine hours of night.

June is this year's month without any easily visible planets. In fact, the only one is Mercury, and this will be a challenge. On June 4th, Mercury is separated as far east of the Sun as it can get, and therefore it's as visible as it can get. Unfortunately, it sets at 9:50pm while the Sun set at 8:00pm. This means you'll have about an hour to try and see Mercury before it also sets, given that you need to wait until twilight darkens enough, since it is the faintest of the five planets visible to the unaided eye. If you mark the point where the Sun sets, extend one arm and extend your fingers and thumbs widely, so the tip of your thumb and little finger are as far apart as they can be. Now place the tip of your thumb on the flat horizon, so your little finger is as high in the air as possible. If you don't have a flat horizon, then imagine where it would be. Mercury should be approximately at the tip of your little finger. I've used this technique to see it, but at best it will just be visible to the eyes as a relatively faint star. Binoculars will help.

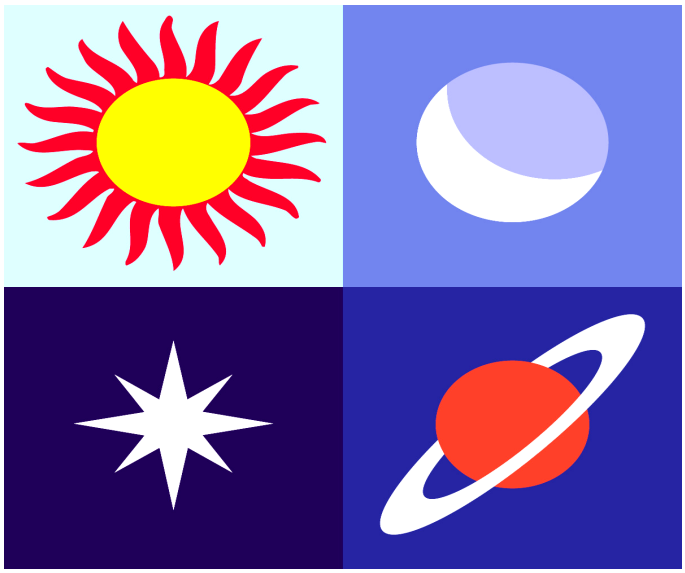
Venus is passing between us and the Sun, passing out of the evening skies for the rest of the year. Jupiter and Saturn will not rise in the east until around 1am on June 1st, rising earlier each evening until on June 30th it does so at 10pm.

Through a telescope or powerful binoculars, the moon presents a fascinating and ever-changing panorama of shifting shadows and differences in greys across its surface, especially along the terminator, the line between lunar daylight and night. This is the lunar cycle for June.
Full Moon – 4th
Last Quarter – 13th
New Moon – 20th
First Quarter – 28th

The bright stars continue their slow march across the sky. Regulus in Leo the Lion shines with a white light to the west. Along the meridian, the line in the sky that goes directly from due north to due south, orange-tinged Arcturus in Bootes shines high overhead, while cold-white Spica in Virgo lies about half way between Arcturus and the horizon as you gaze due south. You might spy copper-tinged Antares in Scorpius in the southeast, while Vega in Lyra shines blazingly white in the northeast.

David Nakamoto has been observing the heavens through various scopes since he was in the 5th grade. He can be reached at

Almanac



June 4 - **Mercury at Greatest Eastern Elongation.** The planet Mercury reaches greatest eastern elongation of 23.6 degrees from the Sun. This is the best time to view Mercury since it will be at its highest point above the horizon in the evening sky. Look for the planet low in the western sky just after sunset.

June 5 - **Full Moon.** The Moon will be located on the opposite side of the Earth as the Sun and its face will be will be fully illuminated. This phase occurs at 19:12 UTC. This full moon was known by early Native American tribes as the Strawberry Moon because it signaled the time of year to gather ripening fruit. It also coincides with the peak of the strawberry harvesting season. This moon has also been known as the Rose Moon and the Honey Moon.

June 5 - **Penumbral Lunar Eclipse.** A penumbral lunar eclipse occurs when the Moon passes through the Earth's partial shadow, or penumbra. During this type of eclipse the Moon will darken slightly but not completely. The eclipse will be visible throughout most of Europe, Africa, Asia, Australia, the Indian Ocean, and Australia.(NASA Map and Eclipse Information)

June 21 - **New Moon.** The Moon will located on the same side of the Earth as the Sun and will not be visible in the night sky. This phase occurs at 06:42 UTC. This is the best time of the month to observe faint objects such as galaxies and star clusters because there is no moonlight to interfere.

June 21 - **Annular Solar Eclipse.** An annular solar eclipse occurs when the Moon is too far away from the Earth to completely cover the Sun. This results in a ring of light around the darkened Moon. The Sun's corona is not visible during an annular eclipse. The path of the eclipse will begin in central Africa and travel through Saudi Arabia, northern India, and southern China before ending in the Pacific Ocean. A partial eclipse will be visible throughout most of eastern Africa, the Middle East, and southern Asia. (NASA Map and Eclipse Information) (NASA Interactive Google Map)

June 20 - **June Solstice.** The June solstice occurs at 21:43 UTC. The North Pole of the earth will be tilted toward the Sun, which will have reached its northernmost position in the sky and will be directly over the Tropic of Cancer at 23.44 degrees north latitude. This is the first day of summer (summer solstice) in the Northern Hemisphere and the first day of winter (winter solstice) in the Southern Hemisphere.

Need Help With A New Telescope?

Due to the Covid Virus, the Garvey Ranch Park Observatory will be closed until further notice.

If you need assistance over the phone, call 213-673-2755. We'll try to find someone who can help you.

Meet The New Members

Alina, Vadim and Valentina Gorobets

LAAS Board Meetings

Our LAAS Board Meetings take place once a month at the Garvey Ranch Park Observatory. You can find the dates for these meetings on our event calendar. All members are welcome to attend all Board meetings. These meetings begin at 8 PM.—**Note: All meetings will be held over the phone or virtually until the observatory reopens in mid-April or May.**

All current members may listen to recorded meetings by logging on to our website at LAAS.org and clicking on the "Members Only" tab to find the files. Contact Spencer at laassecretary@laas.org for further information

Volunteer Opportunities

Every LAAS member is a volunteer at some point. Some members volunteer to share telescopes with the public, while others tackle administrative duties, help out at our community and public events, or join a club committee. Taking photos at our events and writing articles about events for our club newsletter are great ways to volunteer.

Participating at one of our outreach events is another fine and fulfilling opportunity. This is YOUR club. Don't sit back and let other members do the work and have all the fun! Speak with a club officer and find out how you can volunteer and get more involved in the LAAS as a member.

Time To Renew Your Membership?

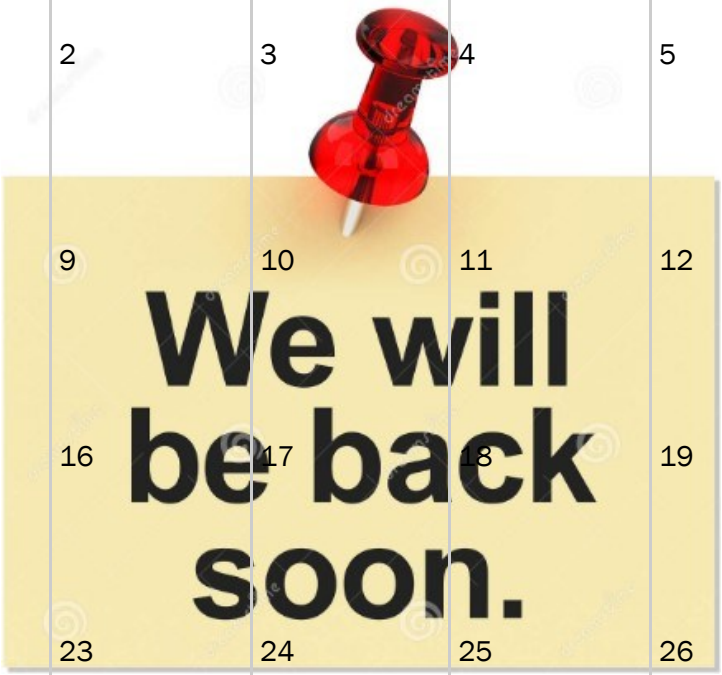
Please remember to renew your membership once you receive notice from the Club Secretary in your email inbox. Use this link to learn how to renew your membership:

https://fs30.formsite.com/LAAS/MemberRenewal/index.html

Please send any new contact information to the club secretary at secretary@LAAS.org.

June 2020

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				



LAAS Outreach Program

The mission of LAAS is to promote interest in and advance the knowledge of astronomy, optics, telescope making and related subjects. In furtherance of its mission, LAAS conducts public star parties and other outreach events that are intended to enhance the public's understanding of astronomy and its enjoyment and appreciation of the beauty and wonders of our universe.

We provide outreach events at local schools, Griffith Observatory, Mt. Wilson Observatory, various state and county parks, and community events.
Join our Outreach team of volunteers today.
Contact Heven Renteria, our Outreach Coordinator at Outreach@LAAS.org

Want to include astronomy outreach at your school's science night or open house? Follow the link below to access the request form:

https://nightsky.jpl.nasa.gov/club-eventrequest.cfm?Club_ID=1344

LAAS Club Swag

LAAS Jackets, T-Shirts, and Caps

Share your club spirit with the public and wear your club colors to help identify you as a member of the LAAS today by ordering a new jacket, t-shirt or cap.

To order club swag, please use the following link:
https://fs30.formsite.com/LAAS/Apparel/index.html

Amazon Smiles

The LAAS is now listed on Amazon Smiles. When you purchase any goods on Amazon.com, Amazon will donate a small percentage of the funds they receive from you, back to the LAAS. Here's some information to help bring in funds for our club projects:

What is AmazonSmile?

AmazonSmile is a simple and automatic way for you to support your favorite charitable organization every time you shop, at no cost to you, with the added bonus that Amazon will donate a portion of the purchase price to your favorite charitable organization., such as the LAAS!

Learn more by following this link:

http://smile.amazon.com/

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John O'Bryan, Jr.

Treasurer

Astronomy Magazine Discounts

Discounts for astronomy magazines can be found on the internet. Look for the best deals possible. Send a copy of your LAAS membership card with your check or payment to receive a club member discount.

Astronomy magazine

As a member of the Night Sky Network, you may use the above link to renew your Astronomy Magazine subscription (or enter a new subscription) at the club discount rate. If this is a renewal, Astronomy Magazine will match your entered name and address and extend your subscription. For inquiries, please contact Astronomy Magazine customer service & sales at 1-800-533-6644.

Click here to subscribe to Sky and Telescope Magazine.

Join the Astronomical Society of the Pacific and help support the cause of advancing science literacy through engagement in astronomy. Member benefits include a **subscription to the online *Mercury* Magazine**, published quarterly, and **Astronomy Beat**, a monthly on-line column written by "insiders" from the worlds of astronomy research and outreach.

Subscribe or renew to the McDonald Observatory's StarDate Magazine and receive a special discount. Go to this page and press "Add to Cart" under the kind of subscription you want:
http://stardate.org/store/subscribe
Then, on the Checkout form, enter "network" in the Coupon Code box.

Club Contact Information

President: Curtis Byrom

Cbyrom484@yahoo.com

Vice President: Alecia Hurst

hurst.alecia@gmail.com

Treasurer: John O'Bryan, Jr.

treasurer@laas.org

Secretary: Spencer Soohoo

secretary@laas.org

Outreach Coordinator: Heven Renteria

outreach@laas.org

Youth Coordinator: James Rochford

jcrochford@gmail.com

Club Communications: Andee Sherwood

communications@laas.org

Mt. Wilson Coordinator: Darrell Dooley

mtwilsoncoordinator@laas.org

Bulletin Editor: Andee Sherwood

communications@laas.org

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Club Contacts

Club Phone Numbers

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Griffith Observatory:

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The Los Angeles Astronomical Society
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The Los Angeles Astronomical Society (LAAS)
c/o Griffith Observatory
2800 E. Observatory Road
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