Volume 48 Number 7 July 2022

The Celestial Mechanic

The Official Newsletter of the Astronomy Associates of Lawrence

Coming Events

Monthly Meeting
July 31, 2022, 7:00PM
Baker Wetlands Discovery Center

Public Observing
July 31, 2022, 8:00PM
Baker Wetlands Discovery Center

Club Officers
President
Rick Heschmeyer email

AICOR
William Winkler email

NSN Coordinator
Howard Edin email

Faculty Advisor
Dr. Jennifer Delgado email.

Newsletter Editor
Chuck Wehner email

Inside This Issue

Report From the Officers

By Rick Heschmeyer

June was an interesting month weather-wise. Our first scheduled Post-City Band Concert Observing Session on June 1 was cancelled due to weather (in fact the entire concert was cancelled as no indoor facility was found to host the concert that night). Our second scheduled session on June 15 was cancelled as well when the concert was moved to the Lied Center due to weather.

June's Telescope Night at KU on the 9th began with a presentation by KU astronomer Elisabeth Mills entitled "Space Donuts" where she spoke about the black hole at the center of the Milky Way galaxy. Unfortunately, the clouds prohibited any useful telescopic observing following the talk.

On June 11, AAL president Rick Heschmeyer joined 14 other amateur astronomers from the Salina Astronomy Club and Wichita's Kansas Astronomical Observers to operate the Stargazing Tent at the Symphony in the Flint Hills. Several activities were scheduled during the day, including presentations in the tent and solar observing. But the heat of the day brought severe thunderstorms in the evening, and ultimately the cancellation of the entire event at intermission of the KC Philharmonic concert. Rick will be providing the club with more information about the event and the day at our August club meeting on Sunday, August 28 at Baker Wetlands Discovery Center for those who may be interested in volunteering at future Symphony in the Flint Hills events.

On June 25th, AAL participated in the Lawrence Public Library's How-To Festival. As in past years, the club ran the "How to Safely Observe the Sun" station at the outdoor event. We had a white-light filtered telescope, a Hα telescope, and a SunSpotter for participants' safe solar viewing. Thanks to AAL members Bill Wachspress, Bill Winkler, Rick Heschmeyer, and Barb Twarog for helping with the event on a very hot and humid day. The library estimated that 150 attended the event that day.

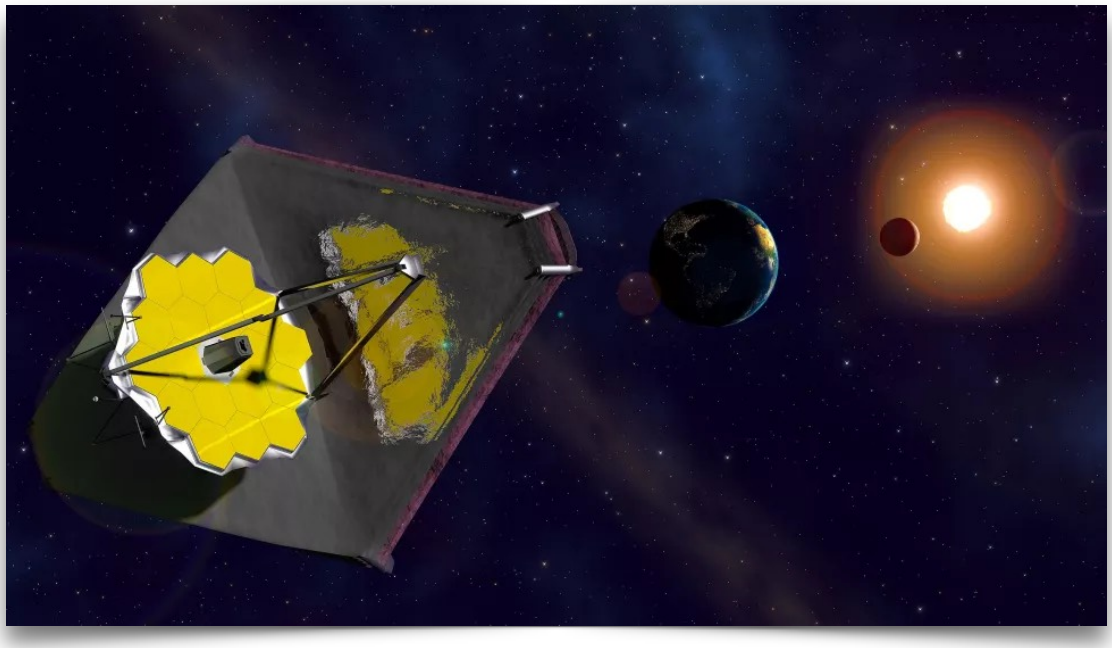
Our final two Post-City Band Observing Sessions at South Park are scheduled for June 29 and July 13. Observing will begin as soon as the concerts finish, usually around 9 PM, weather permitting of course. Watch your email or check the club's Facebook page for updates on the day of the event for weather-related information.

Have a great rest of your summer and clear skies to all!

James Webb Space Telescope will release its 1st science-quality images July 12

By Elizabeth Howell

SPACE.COM, JUNE 1, 2022



We now have a date for our first real images from NASA's next-generation observatory.

Following half a year of commissioning in space, NASA will release the first operational images taken by the $10 billion James Webb Space Telescope on July 12, according to an agency statement posted Wednesday (June 1). While Webb officials are still keeping those first imaging targets secret, the agency emphasized that it took five years of work among the several participating space agencies to decide what those first images will show.

"Our goals for Webb's first images and data are both to showcase the telescope's powerful instruments and to preview the science mission to come," astronomer Klaus Pontoppidan, Webb project scientist at the Space Telescope Science Institute, said in the. "They are sure to deliver a long-awaited 'wow' for astronomers and the public."

Although the Webb team has shared several images already, these were all interim alignment images taken to evaluate the observatory's capabilities. The July 12 images will come after each instrument is "calibrated, tested, and given the green light by its science and engineering team," according to NASA.

NASA emphasized that despite all the months of careful alignment since the Dec. 25, 2021, launch of Webb, it is difficult to predict exactly how the new images will look. The high-resolution infrared view of the universe will be unique, as Webb operates in deep space and has an 18-segment hexagonal mirror that collects sharp images expected to show the first galaxies, early in the history of the universe.

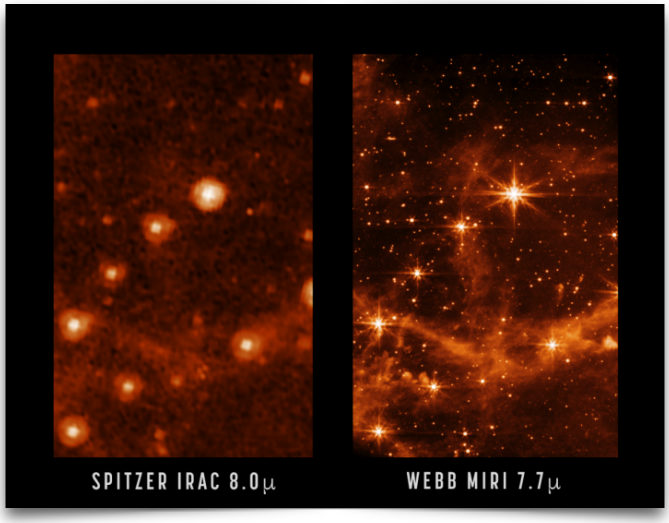
The new images will be available in full color and will be meant to show the breadth of Webb's science capabilities, NASA said. This means the images will not only be included, but also spectroscopic data to show elemental composition and other information that astronomers can infer from the spectrum of light.

"The first images package of materials will highlight the science themes that inspired the mission and will be the focus of its work: the early universe, the evolution of galaxies through time, the lifecycle of stars, and other worlds," NASA said. "All of Webb's commissioning data — the data taken while aligning the telescope and preparing the instruments — will also be made publicly available."

While we wait for the big reveal, we do know what Webb will focus on in its first year of operations, called Cycle 1. The agency has the list of planned investigations following a competition within the science community to determine the highest-priority work, a process that will repeat each year of the observatory's lifetime.

“As we near the end of preparing the observatory for science, we are on the precipice of an incredibly exciting period of discovery about our universe," Eric Smith, Webb program scientist at NASA, said in the

statement. "These images will be the culmination of decades of dedication, talent, and dreams — but they will also be just the beginning." ☀

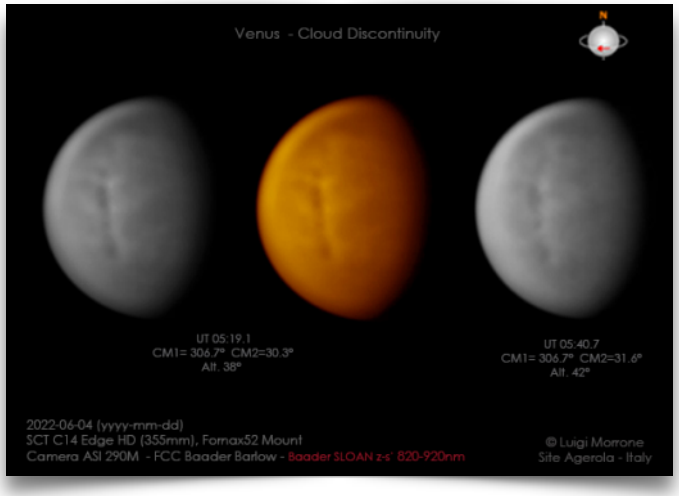


A comparison of views of the same part of the sky as seen by NASA's retired Spitzer Space Telescope and the newly launched James Webb Space Telescope. Click here for larger image.

The Venus Cloud Discontinuity

Space weather.com, June 7, 2022

A towering wall of acid clouds is racing through the atmosphere of Venus. Luigi Morrone photographed it from Agerola, Italy, on June 4th:

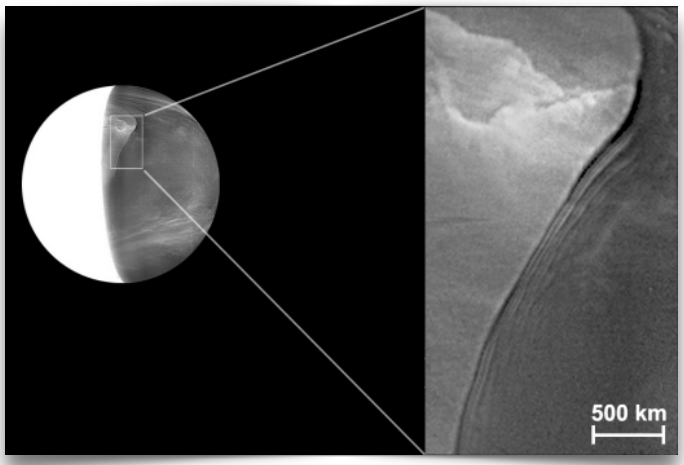


"It's called the Venus Cloud Discontinuity," says Morrone, who is part of an international network of amateur astronomers who have been tracking the massive structure. "I used a 14-inch Celestron telescope to record the discontinuity twice in 20 minutes."

The Venus Cloud Discontinuity is a relatively new discovery, photographed by Japan's Venus orbiter Akatsuki in 2016 and first spotted by JAXA scientist Javier Peralta. The massive structure cuts vertically across Venus's equator, stretching almost 5000 miles from end to end, and circles the planet faster than 200 mph, making one lap every ~5 Earth days.

Researchers following up on the discovery soon stumbled onto another surprise. Older photographs of Venus showed it, too. "[The Cloud Discontinuity] is a recurrent phenomenon that has gone unnoticed since at least the year 1983," they wrote in a May 2020 Geophysical Research Letter.

How do you overlook something so big? Visually, the Cloud Discontinuity is hidden underneath Venus's opaque cloudtops. To see it, you have to use an infrared filter, which reveals heat trickling up from below. Indeed, this is how amateurs are tracking the disturbance: "I used a Baader SLOAN 820-920nm near-infrared filter," notes Morrone.



Undulations behind the Cloud Discontinuity on April 15, 2016

Researchers still aren't sure what the Cloud Discontinuity is. "This atmospheric disruption is a new meteorological phenomenon, unseen on other planets. Because of this it is difficult to provide a confident physical interpretation," says Peralta. Numerical simulations suggest that it might be some kind of exotic nonlinear Kelvin wave; the jury's still out.

Whatever it is, the structure might help solve a longstanding mystery: Why does Venus's atmosphere rotate so much faster than the planet itself? The hot, deadly air on Venus spins nearly 60 times faster than its surface, an effect known as "super-rotation." Venus's Cloud Discontinuity could be assisting the spin-up by transporting angular momentum from the deep atmosphere to the cloudtops. ☀

Solstice Shadows

By David Prosper

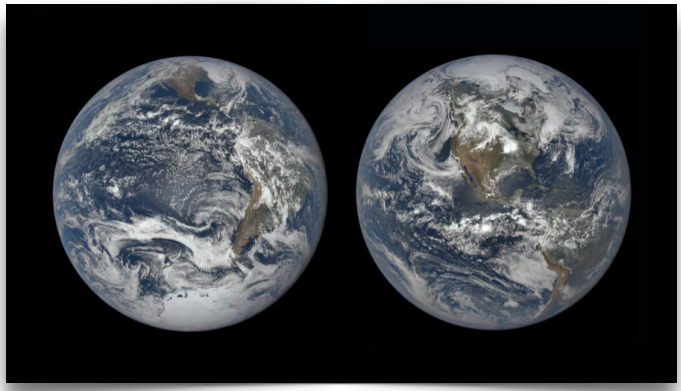
Nasanightsky, June 2022

Solstices mark the changing of seasons, occur twice a year, and feature the year's shortest and longest daylight hours - depending on your hemisphere. These extremes in the length of day and night make solstice days more noticeable to many observers than the subtle equality of day and night experienced during equinoxes. Solstices were some of our earliest astronomical observations, celebrated throughout history via many summer and winter celebrations.

Solstices occur twice yearly, and in 2022 they arrive on June 21 at 5:13 am EDT (9:13 UTC), and December 21 at 4:48pm EST (21:48 UTC). The June solstice marks the moment when the Sun is at its northernmost position in relation to Earth's equator, and the December solstice marks its southernmost position. The summer solstice occurs on the day when the Sun reaches its highest point at solar noon for regions outside of the tropics, and those observers experience the longest amount of daylight for the year. Conversely, during the winter solstice, the Sun is at its lowest point at solar noon for the year and observers outside of the tropics experience the least amount of daylight- and the longest night – of the year. The June solstice marks the beginning of summer for folks in the Northern Hemisphere and winter for Southern Hemisphere folks, and in December the opposite is true, as a result of the tilt of Earth's axis of rotation. For example, this means that the Northern Hemisphere receives more direct light from the Sun than the Southern Hemisphere during the June solstice. Earth's tilt is enough that northern polar regions experience 24-hour sunlight during the June solstice, while southern polar regions experience 24-hour night, deep in Earth's shadow. That same tilt means that the Earth's polar regions also experience a reversal of light and shadow half a year later in December, with 24 hours of night in the north and 24 hours of daylight in the south. Depending on how close you are to the poles, these extreme lighting conditions can last for many months, their duration deepening the closer you are to the poles.

While solstice days are very noticeable to observers in mid to high latitudes, that's not the case for observers in the tropics - areas of Earth found between the Tropic of Cancer and the Tropic of Capricorn. Instead, individuals experience two "zero shadow" days per year. On these days, with the sun directly overhead at solar noon, objects cast a minimal shadow compared to the rest of the year. If you want to see your own shadow at that moment, you have to jump! The exact date for zero shadow days depends on latitude; observers on the Tropic of Cancer (23.5° north of the equator) experience a zero shadow day on the June solstice, and observers on the Tropic of Capricorn (23.5° south of the equator) get their zero shadow day on December's solstice. Observers on the equator experience two zero shadow days, being exactly in between these two lines of latitude; equatorial zero shadow days fall on the March and September equinoxes.

There is some serious science that can be done by carefully observing solstice shadows. In approximately 200 BC, Eratosthenes is said to have observed sunlight shining straight down the shaft of a well during high noon on the solstice, near the modern-day Egyptian city of Aswan. Inspired, he compared measurements of solstice shadows between that location and measurements taken north, in the city of Alexandria. By calculating the difference in the lengths of these shadows, along with the distance between the two cities, Eratosthenes calculated a rough early estimate for the circumference of Earth – and also provided further evidence that the Earth is a sphere!



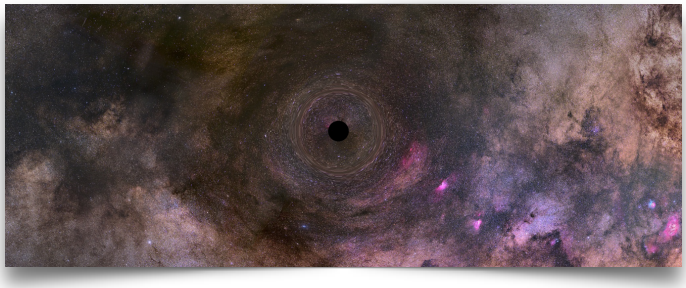
These images from NASA's DSCOVR mission shows the Sun-facing side of Earth during the December 2018 solstice (left) and June 2019 solstice (right). Notice how much of each hemisphere is visible in each photo; December's solstice heavily favors the Southern Hemisphere and shows all of South America and much of Antarctica and the South Pole, but only some of North America. June's solstice, in contrast, heavily favors the Northern Hemisphere and shows the North Pole and the entirety of North America, but only some of South America.

Are you having difficulty visualizing solstice lighting and geometry? You can build a "Suntrack" model that helps demonstrate the path the Sun takes through the

sky during the seasons; find instructions at stanford.io/3FY4mBm. You can find more fun activities and resources like this model on NASA Wavelength: science.nasa.gov/learners/wavelength. And of course, discover the latest NASA science at nasa.gov. ☀

A presenter from the San Antonio Astronomy Club in Puerto Rico demonstrating some Earth-Sun geometry to a group during a “Zero Shadow Day” event. As Puerto Rico lies a few degrees south of the Tropic of Cancer, their two zero shadow days arrive just a few weeks before and after the June solstice. Globes are a handy and practical way to help visualize solstices and equinoxes for large outdoor groups, especially outdoors during sunny days!

Hubble Determines Mass of Isolated Black Hole Roaming Our Milky Way Galaxy



HUBBLESITE, JUNE 10, 2022

Astronomers estimate that 100 million black holes roam among the stars in our Milky Way galaxy, but they have never conclusively identified an isolated black hole. Following six years of meticulous observations, NASA's Hubble Space Telescope has, for the first time ever, provided direct evidence for a lone black hole drifting through interstellar space by a precise mass measurement of the phantom object. Until now, all black hole masses have been inferred statistically, or through interactions in binary systems or in the cores of galaxies. Stellar-mass black holes are usually found with companion stars, making this one unusual.

The newly detected wandering black hole lies about 5,000 light-years away, in the Carina-Sagittarius spiral arm of our galaxy. However, its discovery allows astronomers to estimate that the nearest isolated stellar-mass black hole to Earth might be as close as 80 light-years away. The nearest star to our solar system, Proxima Centauri, is a little over 4 light-years away.

Black holes roaming our galaxy are born from rare, monstrous stars (less than one-thousandth of the galaxy's stellar population) that are at least 20 times more massive than our Sun. These stars explode as supernovae, and the remnant core is crushed by gravity into a black hole. Because the self-detonation is not perfectly symmetrical, the black hole may get a kick, and go careening through our galaxy like a blasted cannonball.

Telescopes can't photograph a wayward black hole because it doesn't emit any light. However a black hole warps space, which then deflects and amplifies starlight from anything that momentarily lines up exactly behind it.

Ground-based telescopes, which monitor the brightness of millions of stars in the rich star fields toward the central bulge of our Milky Way, look for a tell-tale sudden brightening of one of them when a massive object passes between us and the star. Then Hubble follows up on the most interesting such events.

Two teams used Hubble data in their investigations — led by Kailash Sahu of the Space Telescope Science Institute in Baltimore, Maryland; and by Casey Lam of the University of California, Berkeley. The teams' results differ slightly, but both suggest the presence of a compact object.

The warping of space due to the gravity of a foreground object passing in front of a star located far behind it will momentarily bend and amplify the light of the background star as it passes in front of it. Astronomers use the phenomenon, called gravitational microlensing, to study stars and exoplanets in the approximately 30,000 events seen so far inside our galaxy.

The signature of a foreground black hole stands out as unique among other microlensing events. The very

intense gravity of the black hole will stretch out the duration of the lensing event for over 200 days. Also, if the intervening object was instead a foreground star, it would cause a transient color change in the starlight as measured because the light from the foreground and background stars would momentarily be blended together. But no color change was seen in the black hole event.

Next, Hubble was used to measure the amount of deflection of the background star's image by the black hole. Hubble is capable of the extraordinary precision needed for such measurements. The star's image was offset from where it normally would be by about a milliarcsecond. That's equivalent to measuring the diameter of a 25-cent coin in Los Angeles as seen from New York City.

This astrometric microlensing technique provided information on the mass, distance, and velocity of the black hole. The amount of deflection by the black hole's intense warping of space allowed Sahu's team to estimate that it weighs seven solar masses.

Lam's team reports a slightly lower mass range, meaning that the object may be either a neutron star or a black hole. They estimate that the mass of the invisible compact object is between 1.6 and 4.4 times that of the Sun. At the high end of this range the object would be a black hole; at the low end, it would be a neutron star.

"As much as we would like to say it is definitely a black hole, we must report all allowed solutions. This includes both lower-mass black holes and possibly even a neutron star," said Jessica Lu of the Berkeley team.

"Whatever it is, the object is the first dark stellar remnant discovered wandering through the galaxy unaccompanied by another star," Lam added.

This was a particularly difficult measurement because there is a bright, unrelated star that is extremely close in angular separation to the source star. "So it's like trying to measure the tiny motion of a firefly next to a bright light bulb," said Sahu. "We had to meticulously subtract the light from the nearby bright star to precisely measure the deflection of the faint source."

Sahu's team estimates the isolated black hole is traveling across the galaxy at 100,000 miles per hour, or 160,000 kilometers (fast enough to travel from Earth to the Moon in less than three hours). That's faster than most of the other neighboring stars in that region of our galaxy.

"Astrometric microlensing is conceptually simple but observationally very tough," said Sahu. "Microlensing is the only technique available for identifying isolated black holes." When the black hole passed in front of a background star located 19,000 light-years away in the galactic bulge, the starlight coming toward Earth was amplified for a duration of 270 days as the black hole passed by. However, it took several years of Hubble observations to follow how the background star's position appeared to be deflected by the bending of light by the foreground black hole.

The existence of stellar-mass black holes has been known since the early 1970s, but all of their mass measurements—until now—have been in binary star systems. Gas from the companion star falls into the black hole and is heated to such high temperatures that it emits X-rays. About two dozen black holes have had their masses measured in X-ray binaries through their gravitational effect on their companions. Mass estimates range from 5 to 20 solar masses. Black holes detected in other galaxies by gravitational waves from mergers between black holes and companion objects have been as high as 90 solar masses.

"Detections of isolated black holes will provide new insights into the population of these objects in our Milky Way," said Sahu. But it is a needle-in-a-haystack search. The prediction is that only one in a few hundred microlensing events are caused by isolated black holes.

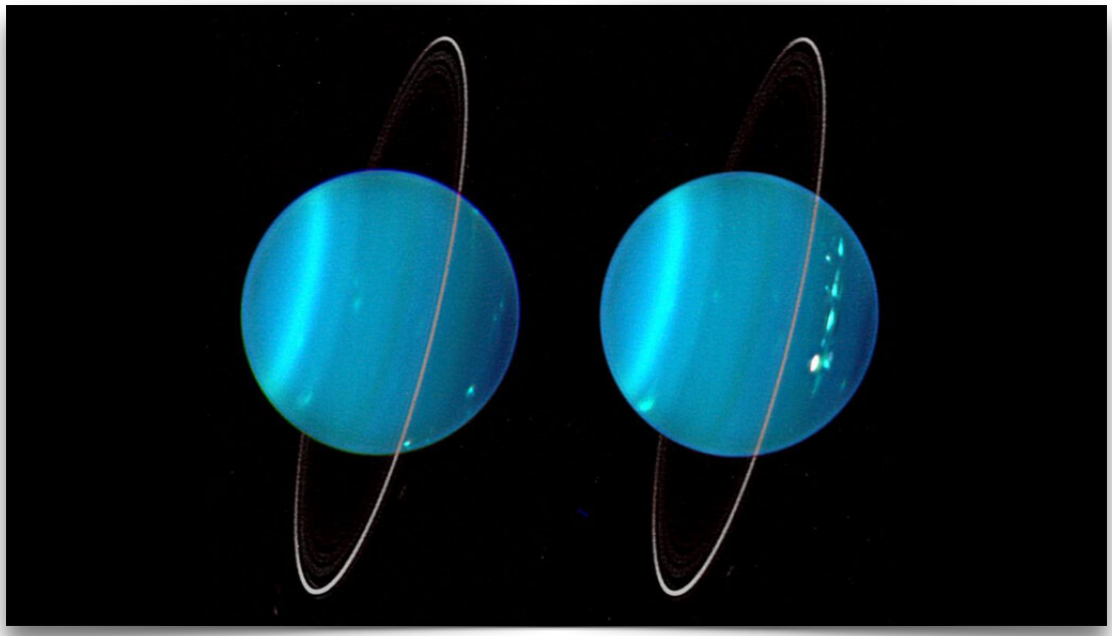
NASA's upcoming Nancy Grace Roman Space Telescope will discover several thousand microlensing events out of which many are expected to be black holes, and the deflections will be measured with very high accuracy.

In a 1916 paper on general relativity, Albert Einstein predicted that his theory could be tested by observing the Sun’s gravity offsetting the apparent position of a background star. This was tested by a collaboration led by astronomers Arthur Eddington and Frank Dyson during a solar eclipse on May 29, 1919. Eddington and his colleagues measured a background star being offset by 2 arcseconds, validating Einstein's theories. These scientists could hardly have imagined that over a century later this same technique would be used – with unimaginable precision of a thousandfold better — to look for black holes across the galaxy. ☀

U.S. planetary scientists want to explore Uranus and Enceladus next

By Liz Kruesi

Sciencenews, April 20, 2022



In the new decadal survey setting priorities for U.S. planetary exploration, researchers recommend sending an orbiter and probe to Uranus. This infrared composite image of the two hemispheres of the ice giant was taken with the Keck Telescope in Hawaii.

The continuing search for life beyond Earth is driving many of the priorities for what's next when it comes to U.S. planetary exploration. In a new report that could shape the next 10 years of planetary missions, Mars, Uranus and Saturn's moon Enceladus have come out on top.

This report is the latest decadal survey for planetary science and astrobiology. Every 10 years, experts convened by the National Academies of Sciences, Engineering and Medicine compile a look at the state of the field and pull together a list of recommended priorities for the next decade of exploration. The new survey, which covers 2023 to 2032, will be used by NASA, the National Science Foundation and others to help guide which projects are pursued and funded.

The survey is meant in part "to identify the key scientific questions that are the most important" to pursue in the next decade and assess how best to answer them, astrophysicist Robin Canup said April 19 during a news conference after the report was released. Canup, of the Southwest Research Institute in Boulder, Colo., is a cochair of the steering committee for the decadal survey.

At the top of the list, the report recommends continuing the Mars sample-return effort by developing a mission that will retrieve, as soon as possible, the rock and soil samples that NASA's Perseverance rover is collecting and storing (*SN: 9/10/21*). This multipart sample-return mission was also the top priority of the previous decadal survey, released in 2011 (*SN: 3/7/11*). Those samples could hold hints of past signs of life on the Red Planet.

The report also suggests that the *next* Mars mission, after the sample-return one, should look for signs of life in the ice as well as gaseous biosignatures in the atmosphere. That one is farther down the priority list, though.

Next in the line after the Mars sample-return mission is a large, several-billion-dollar mission to send an orbiter and probe to Uranus to explore the planet, its ring system and its moons. Uranus and the solar system's other ice giant, Neptune, were visited once, in the late 1980s, when Voyager 2 flew by each.

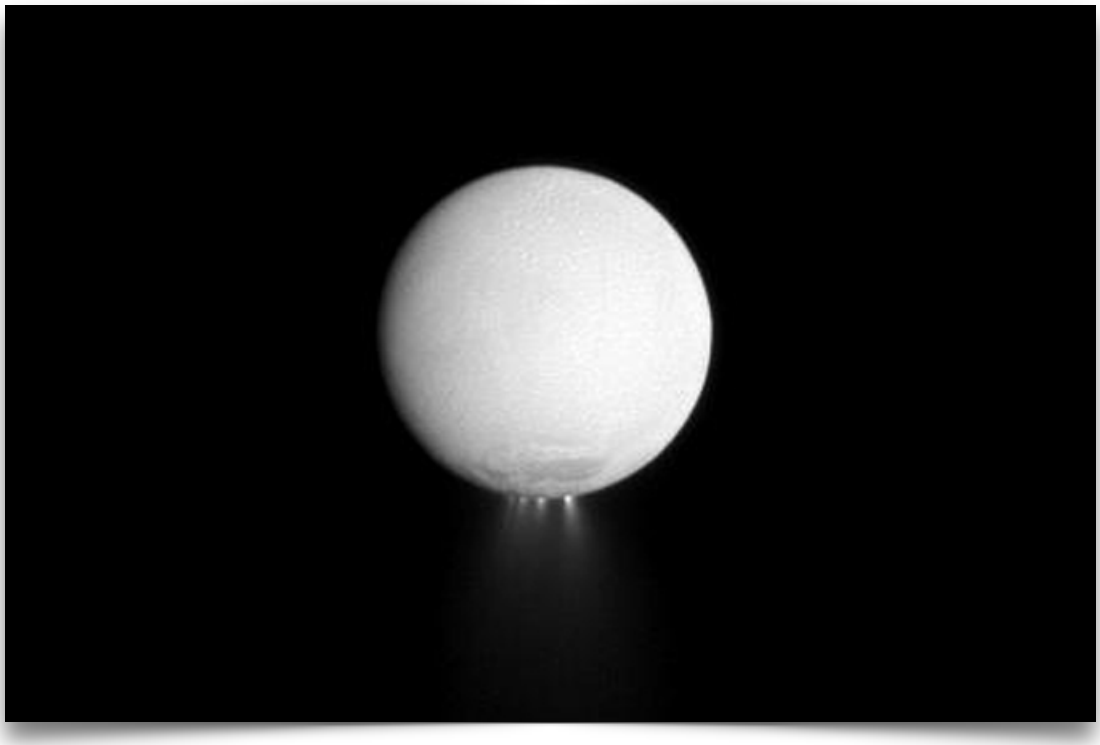
The time has come to go back, scientists say (*SN: 2/10/16*). "I'm really thrilled to see that they picked a mission to go back and follow up on those incredible discoveries and those wonderful images that Voyager took," says planetary scientist Linda Spilker of NASA's Jet Propulsion Laboratory in Pasadena, Calif., who was not involved in the decadal survey. Spilker began her career with Voyager.

What's more, better understanding the ice giants in our solar system could help scientists decipher the mysteries of faraway worlds. In the hunt for planets outside our solar system, the most common type of known exoplanets are those like Neptune and Uranus.

A mission to Uranus "will be transformative," says planetary scientist Amy Simon of NASA Goddard Space Flight Center in Greenbelt, Md., and a member of the decadal steering committee. "We're sure there's going to be fantastic discoveries."

This mission could launch in June 2031 or April 2032, the report suggests. After swinging by Jupiter to use the giant planet's gravity to fling it faster, the spacecraft would arrive at Uranus 13 years after its launch. Once there, the orbiter would drop a probe in the atmosphere, sampling its composition as never before.

The next highest priority is sending an "orbilander" to Saturn's moon Enceladus, a world known to have easily accessible liquid water (*SN: 5/2/06*). NASA's now-defunct Cassini mission discovered in 2005 that this small moon spews geysers of water into space, and more recent research suggests that water coming from subsurface locales has salts, possibly indicating warm pockets of water interacting with rock — and brewing an environment that may host life (*SN: 8/4/14*).



Does Enceladus (shown) harbor life? A new planetary science report recommends planning a mission to the Saturnian moon to try to answer that question.

This proposed spacecraft would arrive at the moon in the early 2050s, where it would first spend 1.5 years orbiting Enceladus, flying through its watery plumes to sample the liquid. Then the spacecraft would land on the surface for a two-year mission.

"If you want to go and look for life, Enceladus is a very good place to do it," says planetary scientist Francis Nimmo of the University of California, Santa Cruz, and a member of the decadal steering committee.

Life on other planets isn't the only thing on planetary scientists' minds. The report also recommends continuing work on a mission to find and characterize near-Earth objects, like asteroids and comets, in an effort to protect life on the only planet where it's known to exist.

Two medium-sized missions should be funded in the next decade too, the report recommends. While the survey doesn't specify targets for these missions, nine higher-priority locales are singled out, including Venus, Saturn's moon Titan and Neptune's moon Triton.

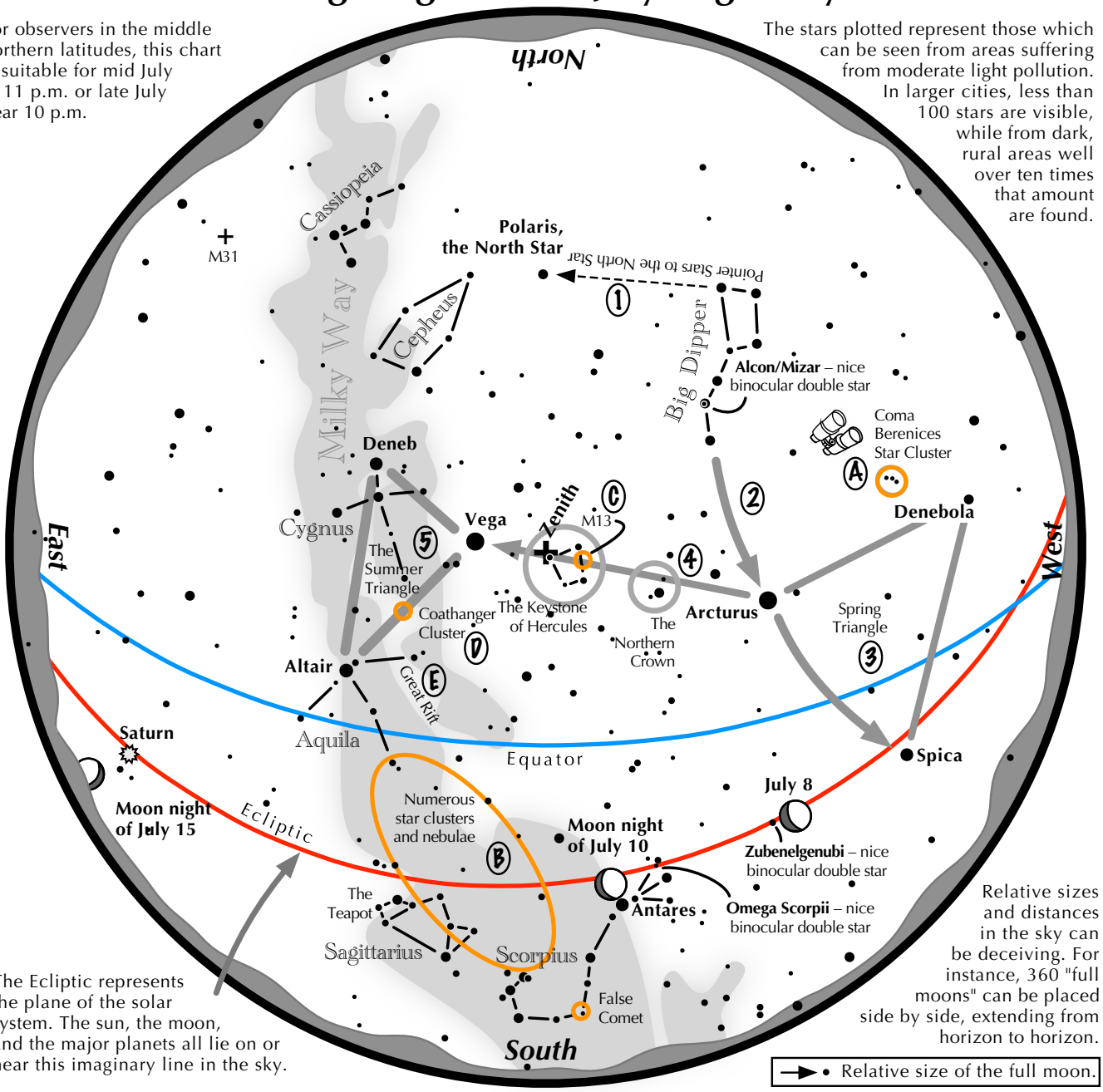
The decadal survey also considered the state of the fields of planetary science and astrobiology — namely decreasing funding opportunities and how to improve diversity, equity, inclusion and accessibility efforts. For the latter, the committee looked at whether the community has diverse representation through their members.

"The thing that became abundantly clear is that NASA has done a terrible job of collecting those kinds of statistics," Nimmo says of demographics in planetary science. For now, the recommendation is to better survey the scientific community, he says. "We're not going to be able to solve anything until we actually have better statistics." ☀

Navigating the mid July Night Sky

For observers in the middle northern latitudes, this chart is suitable for mid July at 11 p.m. or late July near 10 p.m.

The stars plotted represent those which can be seen from areas suffering from moderate light pollution. In larger cities, less than 100 stars are visible, while from dark, rural areas well over ten times that amount are found.



The Ecliptic represents the plane of the solar system. The sun, the moon, and the major planets all lie on or near this imaginary line in the sky.

Relative sizes and distances in the sky can be deceiving. For instance, 360 "full moons" can be placed side by side, extending from horizon to horizon.

→• Relative size of the full moon.

Navigating the mid July night sky: Simply start with what you know or with what you can easily find.

1. Extend a line north from the two stars at the tip of the Big Dipper's bowl. It passes by Polaris, the North Star.
2. Follow the arc of the Dipper's handle. It first intersects Arcturus, the brightest star in the July evening sky, then continues to Spica.
3. Arcturus, Spica, and Denebola form the Spring Triangle, a large equilateral triangle.
4. To the northeast of Arcturus shines another star of similar brightness, Vega. Draw a line from Arcturus to Vega. It first meets "The Northern Crown," then the "Keystone of Hercules." A dark sky is needed to see these two dim stellar configurations.
5. High in the East lies the Summer Triangle stars of Vega, Altair, and Deneb.

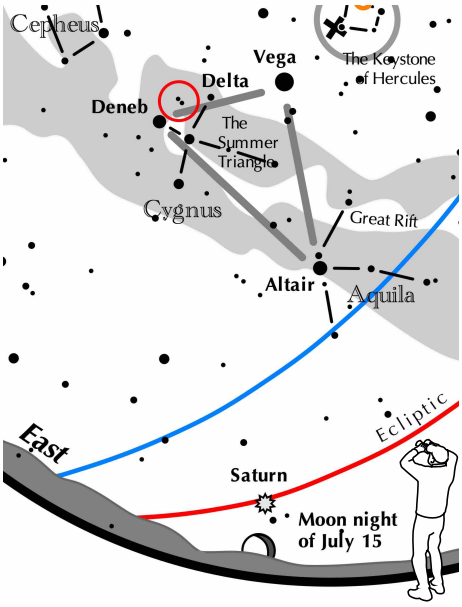
Binocular Highlights

A: Between Denebola and the tip of the Big Dipper's handle, lie the stars of the Coma Berenices Star Cluster.
B: Between the bright stars Antares and Altair, hides an area containing many star clusters and nebulae.
C: On the western side of the Keystone glows the Great Hercules Cluster, containing nearly 1 million stars.
D: 40% of the way between Altair and Vega, twinkles the "Coathanger," a group of stars outlining a coathanger.
E: Sweep along the Milky Way for an astounding number of faint glows and dark bays, including the Great Rift.

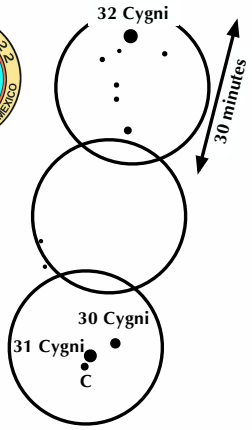
Astronomical League *www.astroleague.org/outreach; duplication is allowed and encouraged for all free distribution.*

Just in time for July 4th: The Patriotic Star

• Around this time of year, Cygnus rises high in the northeast.
• Draw an imaginary line from Deneb, its brightest star to Delta, the western star on the constellation's cross bar.
• About half way between Deneb and Delta lies an intriguing stellar smear.
• Binoculars reveal two groups of stars.



This Fourth of July, aim higher than the exploding fireworks to the "Patriotic Star." Can you see the red, white and blue?



Just in time for Independence Day is the sky's own "Patriotic Star." Actually, it is grouping of three stars, each being the brightest component of its own multiple system.

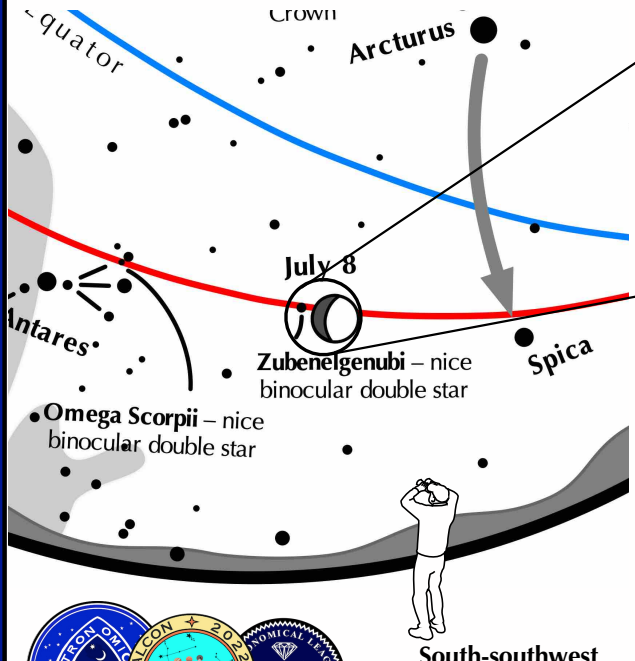
• The brightest partner, twinkling at mag. 3.8, is 31 Cygni (aka Omicron 1 Cygni).
• Six minutes to its northwest glows the 4.9 mag. 30 Cygni, while the dimmest member, "C," has a magnitude of 7.0.

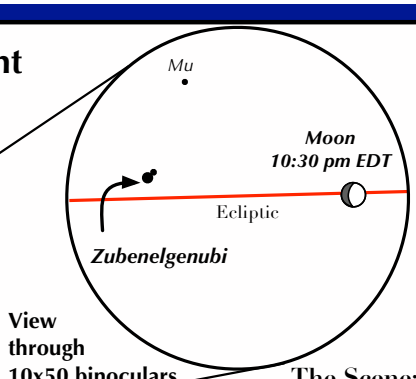
Aim your scope at these three stars to make your own color estimation. You may agree with some observers that their advertised red, white, and blue colors may be a bit of a stretch. Slightly de-focus the trio to give small, round blurs instead of crisp points. Now can you distinguis color differences among these three very different stars?

Orangish-red 31 Cygni is classified as a super giant with a surface temperature of approximately 4000ºF, about 2000ºF cooler than our own sun. Incredibly, if placed within our own solar system, its radius bloats the star's surface beyond Mars! 30 Cygni is hotter at 8700ºF, giving it a white appearance. Finally, "C" fires the hottest, possessing a temperature over 11000ºF. If you look closely, it appears bluish.

The northern portion consists of 3.9 magnitude 32 Cygni, also called Omicron-2, set against five 7th and 8th magnitufe field stars. Altogether they form a "micro-cygnus." The pretty flock of Cygnets points one degree south to the stellar family headed by the Patriotic Star, 31 Cygni.

If you can observe only one celestial event this month, consider this one:





View through 10x50 binoculars

South-southwest 75-90 minutes after sunset on July 8

The Scene:

Waxing gibbous Moon approaches a wide double star

Look to the south-southwest 75 90 minutes after sunset on July 8.

• The Moon will be found hanging in the darkening twilight.
• People with good eyesight should be able to spot Alpha Librae Zubenelgenubi to the Moon's immediate left. Or the bright moonlight might totally obscure the star.
• Aim binoculars at the Moon. Zuben will be seen as being a double star with its dimmer component immediately to the upper right of the brighter star.

Zubenelgenubi? Practice saying it:
Zube - en- el- gen- ubi

Why ALCon?

Astronomy is often seen as being a solitary pursuit - but not always …

Why, then, do many people make the effort to attend astronomy conferences and star parties, sometimes traveling great distances to do so? Why do many people devote several days of their limited vacation time attending these gatherings? Why do many of the same people do this year after year?

Could it be that the total experience gained at the eyepiece demands more than just what the eye sees during the moment? Could it be that it also needs an understanding of what is being seen? Could it be that it requires personally interacting with others who have had similar experiences?

At ALCon, discover and learn from
experts in various fields
+ authors + magazine editors + research scientists + university professors + NASA mission specialists + astronauts + observers +.sketchers + imagers

It all adds up to a larger sense of personal discovery.

Yes! ALCon! https://alcon2022.org

About Astronomy Associates

The club is open to all people interested in sharing their love for astronomy. Monthly meetings are typically on the last Sunday of each month and often feature guest speakers, presentations by club members, and a chance to exchange amateur astronomy tips. These meetings and the public observing sessions that follow are scheduled at the Baker Wetlands Discovery Center, south of Lawrence. All events and meetings are free and open to the public. Periodic star parties are scheduled as well.

Because of the flexibility of the schedule due to holidays and alternate events, it is always best to check the Web site for the exact Sundays when events are scheduled.

Copies of the Celestial Mechanic can also be found on the web at newsletter.
Annual Dues for the club are: $12 for regular members; $6 for students Membership forms can be accessed at the club website form.