Skywatchers

Newsletter of the China Lake Astronomical Society

Volume 57 No. 11 October 30 , 2020

NEXT MEETING 7:30 p.m., Monday, November 02, 2020
~~Maturango Museum, 100 East Las Flores Avenue, Ridgecrest, California.~~

PROGRAM FOR THE Nov 02, 2020 7:30 PM MEETING

Keith Weisz our Vice President will present an introduction to the remote observatory called Slooh. He will provide a quick run down of how he uses it and share some of the pictures he has taken. Keith will use the Slooh website for the presentation. If you would like to preview Slooh, please go to the website https://slooh.com/

China Lake Astronomical Society is inviting you to a scheduled Zoom meeting.

Topic: AS Meeting
Time: Nov 2, 2020 07:30 PM Pacific Time (US and Canada)

Join Zoom Meeting
https://us02web.zoom.us/j/6727499334?pwd=VWhuVGZ3aFphL283THRKNUNoZ0RSZz09

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Next CLAS Meeting: December 07th, 2020 at 7:30 PM.

Meeting Agenda Election of Officers for 2021

Saturday Night Star Party at Maturango

We had a good turnout of all ages at the October 24 Star Party at Maturango Museum. In a first for the club, we set up three telescopes with cameras displaying on computer monitors. This digital viewing made it easier for the public and members to see the targets.

Because of the greater sensitivity of digital cameras compared to our eyes, as well as the ability of software to integrate all the faint photons over several minutes, we could see details in some deep sky objects like the dark lanes in M31, the Andromeda Galaxy, and the spiral arms of M31, the Triangulum Galaxy.

We also had great views of the Quarter Moon (once the early clouds cleared) and Jupiter and Saturn. Bright and large Mars, unusually close to Earth now near opposition, was still a challenge when it came to seeing details.

Keith Weisz manned the 8-inch Meade SCT in the dome, using his camera and laptop. Brian Wolfe and Ralph Paonessa each brought refractors on equatorial mounts with cameras and PCs.

Everyone agreed we need to do this again!

Ralph Paonessa

New observations confirm Water exists on sunny parts of the moon, scientists confirm previous hints of H_2O on the lunar surface

Past observations of the moon have suggested that there is water on the surface. New observations from the SOFIA telescope support those findings.
ABRIENDOMUNDO/ISTOCK/GETTY IMAGES PLUS

By Maria Temming

OCTOBER 26, 2020 AT 12:00 PM

Past observations have suggested that there's water on the moon. New telescope observations conclude that those findings hold water.

Spacecraft have seen evidence of water ice in permanently shadowed craters at the lunar poles (*SN: 5/9/16*), as well as hints of water molecules on the sunlit surface (*SN: 9/23/09*). But water sightings in sunlit regions have relied on detection of infrared light at a wavelength that could also be emitted by other hydroxyl compounds, which contain hydrogen and oxygen.

Now, the Stratospheric Observatory for Infrared Astronomy, or SOFIA, has detected an infrared signal unique to water near the lunar south pole, researchers report online October 26 in *Nature Astronomy*. "This is the first unambiguous detection of molecular water on the sunlit moon," says study coauthor Casey Honniball, a lunar scientist at NASA's Goddard Space Flight Center in Greenbelt, Md. "This shows that water is not just in the permanently shadowed regions — that there are other places on the moon that we could potentially find it."

These observations could inform future missions to the moon that will scout out lunar water as a potential resource for human visitors SOFIA, operated by NASA and the German Aerospace Center, is a 2.5-meter telescope that rides aboard a jumbo jet to get clear views of the sky (*SN: 2/17/16*). During a flight in August 2018, the telescope detected 6-micrometer infrared light emanating from a region near the moon's southern Clavius crater. This wavelength of light is generated by the vibrations of sunlight-heated water molecules, but not other compounds containing hydroxyl, which consists of an oxygen atom bound to a hydrogen atom.

"I thought it was really brilliant" to confirm the presence of water on the moon with observations at this wavelength, says Jessica Sunshine, a planetary scientist at the University of Maryland in College Park. Sunshine was involved in past observations that spotted hints of water on the moon, but was not involved in the new study.

Based on the brightness of the observed infrared light, Honniball's team calculated a water concentration of about 100 to 400 parts per million around the Clavius crater. That's less than half a liter of water per metric ton of lunar soil. This concentration was about what the researchers expected, based on past spacecraft observations.

These water molecules are not frozen in ice, like the water in permanently shadowed regions of the moon. Nor is it liquid, Sunshine says. "There's no moon puddles." Instead, the water molecules are thought to be bound inside some other material on the lunar surface.

"The only way for us to be seeing water on the [sunlit] moon is if it is sheltered from this harsh environment," Honniball says. These water molecules could be encased in glass forged by micrometeorite impacts, or wedged between soil grains that shield the water from blistering solar radiation.

Water could have formed on the moon itself, from hydrogen ions in the continual outward flow of charged particles from the sun reacting with oxygen on the surface (*SN: 10/6/14*). Or, if the water is stored in impact glass, it could have been delivered to the moon by micrometeorites.
Source: https://www.sciencenews.org/article/water-moon-sun-sofia-telescope

ESO telescopes record last moments of star devoured by a black hole

Using telescopes from the European Southern Observatory (ESO) and other organisations around the world, astronomers have spotted a rare blast of light from a star being ripped apart by a supermassive black hole. The phenomenon, known as a tidal disruption event, is the closest such flare recorded to date at just over 215 million light-years from Earth, and has been studied in unprecedented detail. The research is published today in *Monthly Notices of the Royal Astronomical Society*.

"The idea of a black hole 'sucking in' a nearby star sounds like science fiction. But this is exactly what happens in a tidal disruption event," says Matt Nicholl, a lecturer and Royal Astronomical Society research fellow at the University of Birmingham, UK, and the lead author of the new study. But these tidal disruption events, where a star experiences what's known as spaghettification as it's sucked in by a black hole, are rare and not always easy to study. The team of researchers pointed ESO's Very Large Telescope (VLT) and ESO's New Technology Telescope (NTT) at a new flash of light that occurred last year close to a supermassive black hole, to investigate in detail what happens when a star is devoured by such a monster.

ESO's Very Large Telescope complex in Paranal

Astronomers know what should happen in theory. "When an unlucky star wanders too close to a supermassive black hole in the centre of a galaxy, the extreme gravitational pull of the black hole shreds the star into thin streams of material," explains study author Thomas Wevers, an ESO Fellow in Santiago, Chile, who was at the Institute of Astronomy, University of Cambridge, UK, when he conducted the work. As some of the thin strands of stellar material fall into the black hole during this spaghettification process, a bright flare of energy is released, which astronomers can detect.

Although powerful and bright, up to now astronomers have had trouble investigating this burst of light, which is often obscured by a curtain of dust and debris. Only now have astronomers been able to shed light on the origin of this curtain.

"We found that, when a black hole devours a star, it can launch a powerful blast of material outwards that obstructs our view," explains Samantha Oates, also at the University of Birmingham. This happens because the energy released as the black hole eats up stellar material propels the star's debris outwards.

The discovery was possible because the tidal disruption event the team studied, AT2019qiz, was found just a short time after the star was ripped apart. "Because we caught it early, we could actually see the curtain of dust and debris being drawn up as the black hole launched a powerful outflow of material with velocities up to 10,000 km/s," says Kate Alexander, NASA Einstein Fellow at Northwestern University in the US. "This unique 'peek behind the curtain' provided the first opportunity to pinpoint the origin of the obscuring material and follow in real time how it engulfs the black hole."

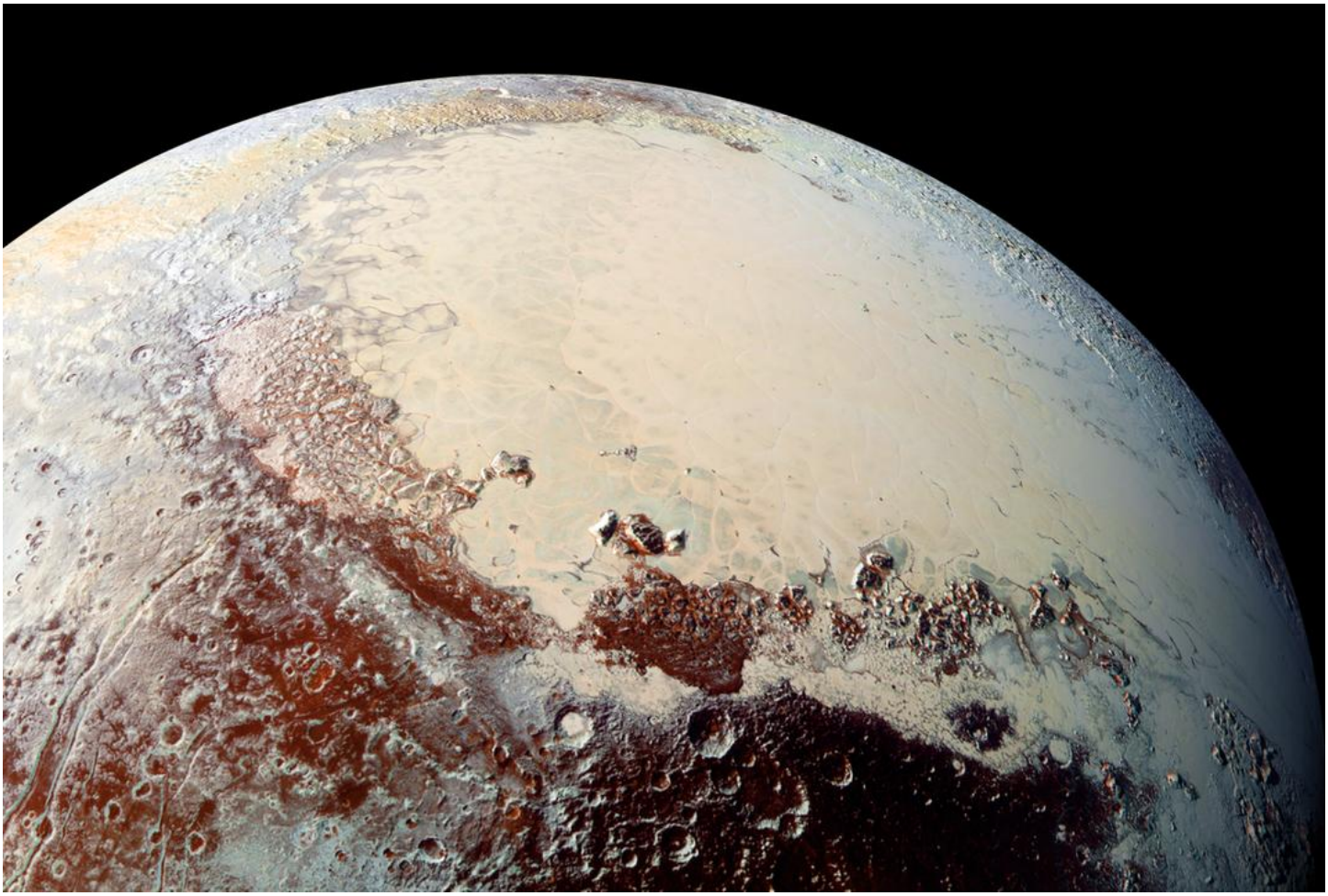
The team carried out observations of AT2019qiz, located in a spiral galaxy in the constellation of Eridanus, over a 6-month period as the flare grew in luminosity and then faded away. "Several sky surveys discovered emission from the new tidal disruption event very quickly after the star was ripped apart," says Wevers. "We immediately pointed a suite of ground-based and space telescopes in that direction to see how the light was produced."

Multiple observations of the event were taken over the following months with facilities that included X-shooter and EFOSC2, powerful instruments on ESO's VLT and ESO's NTT, which are situated in Chile. The prompt and extensive observations in ultraviolet, optical, X-ray and radio light revealed, for the first time, a direct connection between the material flowing out from the star and the bright flare emitted as it is devoured by the black hole. "The observations showed that the star had roughly the same mass as our own Sun, and that it lost about half of that to the monster black hole, which is over a million times more massive," says Nicholl, who is also a visiting researcher at the University of Edinburgh.

The research helps us better understand supermassive black holes and how matter behaves in the extreme gravity environments around them. The team say AT2019qiz could even act as a 'Rosetta stone' for interpreting future observations of tidal disruption events. ESO's Extremely Large Telescope (ELT), planned to start operating this decade, will enable researchers to detect increasingly fainter and faster evolving tidal disruption events, to solve further mysteries of black hole physics.

Source: https://www.sciencedaily.com/releases/2020/10/201012115956.htm

The mountains of Pluto are snowcapped, but not for the same reasons as on Earth



In 2015, the New Horizons space probe discovered spectacular snowcapped mountains on Pluto, which are strikingly similar to mountains on Earth. Such a landscape had never before been observed elsewhere in the Solar System. However, as atmospheric temperatures on our planet decrease at altitude, on Pluto they heat up at altitude as a result of solar radiation.

So where does this ice come from? An international team led by CNRS scientists* conducted this exploration. They first determined that the "snow" on Pluto's mountains actually consists of frozen methane, with traces of this gas being present in Pluto's atmosphere, just like water vapour on Earth.

Then, to understand how the same landscape could be produced in such different conditions, they used a climate model for the dwarf planet, which revealed that due to its particular dynamics, Pluto's atmosphere is rich in gaseous methane at altitudes. As a result, it is only at the peaks of mountains high enough to reach this enriched zone that the air contains enough methane for it to condense.

At lower altitudes the air is too low in methane for ice to form.

This research, published in *Nature Communications*, could also explain why the thick glaciers consisting of methane observed elsewhere on Pluto bristle with spectacular craggy ridges, unlike Earth's flat glaciers, which consist of water.

*- Scientists from the IPSL Dynamic Meteorology Laboratory (CNRS / Sorbonne Université / École polytechnique / ENS Paris), the Institute for Planetary Sciences and Astrophysics of Grenoble (CNRS / Université Grenoble Alpes), the NASA Ames Research Center, and the Lowell Observatory (Unite States) took part in this research.

Source: https://www.sciencedaily.com/releases/2020/10/201013134310.htm

Earth's biggest telescopes reopen after months of COVID closures

Observational astronomy, largely shutdown since March, is getting back to work thanks to slowly declining COVID-19 cases in Chile and new workplace practices.

By Eric Betz | Published: Monday, October 26, 2020

The Magellan Clay telescope

After more than six months of COVID-related closures, observational astronomy is largely getting back to work.

Many of the world's biggest telescopes have reopened their domes in recent weeks, returning their gazes to the heavens for the first time since the pandemic forced a global shutdown of observational astronomy in March. Other major telescopes expect to reopen soon. This wave of reopenings was buoyed by declining COVID-19 cases in Chile, especially in the Atacama Desert, a region home to many world-class observatories. U.S. officials who manage telescopes in Hawaii and Arizona say they're also beginning to resume operations, largely thanks to significant changes in their workflows. If major observatories continue to come back online — and remain open — it will end an unprecedented dark era in astronomy. After all, even during World War II, America's observatories kept a close eye on the skies.

Astronomy in quarantine

Earlier this year, an *Astronomy* magazine analysis showed that over 100 of Earth's largest telescopes temporarily shuttered their doors closed due to the COVID-19 pandemic. And by late March, observational astronomy had almost completely shutdown. The closures reveal a little-realized truth about modern astronomy. Even in 2020, most observatories are not fully automated. Telescopes have grown dramatically larger and more complex in recent decades. They've also been pushed to more remote locations, farther and farther from civilization's expanding light pollution. Basic tasks like swapping the instruments and cleaning the mirrors on these behemoths can require a small village of engineers, technicians, observers, medics, cooks, groundskeepers, and more. In Chile, where many of the world's biggest observatories are now located, the telescopes are so far away from cities that employees can't just commute to the mountain each night.

They have to live on campus part-time. Even the astronomers using the instruments typically travel to the observatories during their awarded observing nights. This reality forced observatories to shut down in the early days of the pandemic. There was no way to abide by social distancing rules and effectively run the telescopes.

In interviews back in March, observatory directors said they expected telescopes to be offline for at least three to six months. And that's largely how the pandemic played out for them.A number of observatories did manage to change their workflows enough to feel safe reopening during the summer. And in recent weeks, many of the remaining observatories have likewise reopened. The only telescopes little impacted were the small, survey telescopes that run robotically, or with minimal support. These scan the skies for transient objects — the field's term for unexpected and brief astronomical objects and events. For example, the Catalina Sky Survey in Arizona never stopped searching for asteroids. And astronomers kept the Las Cumbres Observatory network of robotic telescopes hunting for both supernovae and space rocks. Hopefully, that was enough to avoid any *major* gaps in the observational record. What was missedLuckily for the field, those survey telescopes didn't pick up any once-in-a-lifetime objects that would leave astronomers agonizing over what might have been."I'm sure we've missed a few things," says John S. Mulchaey, director of the Carnegie Observatories, which runs some of the world's largest and most historically important telescopes. "But for most of astronomy, you don't miss that much. For those of us studying galaxies in the distant universe, they're gonna be there next year. They're gonna look the same." Mulchaey says he did ponder how tragic it would have been if Betelgeuse went supernova. Early in the year, astronomers were mystified by the behavior of the dying red supergiant star in the constellation Orion. "That doesn't seem likely, but we haven't had a visible supernova in our galaxy in 400 years or something," he says.Early on, astronomers were also worried about their ability to detect potentially dangerous near-Earth asteroids. And new asteroid detections did decline initially, according to Kelly Fast, NASA's program manager for Near-Earth Object Observations. However, as smaller observatories found ways to reopen, those detections eventually started going back up. "Most stuff that would have been done this year can be done next year," Mulchaey says. "It means it takes an extra year to get to the answer, but that's not that bad in the scheme of things. In Chile, the past month has seen telescopes restart at observatories across the country, including Las Campanas, Paranal, Cerro Pachon, and Cerro Tololo Inter-American Observatory. Other major instruments like the Atacama Pathfinder Experiment, the Gemini South telescope, and Southern Astrophysical Research Telescope have also resumed their operations. Below is a brief summary of the statuses of other notable observatories.

- Construction has restarted at the Vera C. Rubin Observatory, formerly known as the Large Synoptic Survey Telescope, a massive, next-generation instrument that will image the entire visible sky every night.
- The Atacama Large Millimeter Array in Chile, or ALMA, has begun working toward reopening. Before the shutdown, astronomers used ALMA's 66 radio telescopes to help discover phosphine gas in the atmosphere in Venus, which could be evidence of alien life. The finding is controversial though, and researchers could be eager for a second look. However, the array is so complex that it could be months before ALMA is fully back online.
- Meanwhile, Kitt Peak National Observatory in Arizona, has started working to get its telescopes observing again. A major new project there called the Dark Energy Spectroscopic Instrument saw first light last fall and researchers are eager to get it operational again. Other major telescopes in the United States opened in May and June. The relatively low number of COVID-19 cases in Hawaii also helped instruments like the Gemini North telescope get back to work.
- In Antarctica, Earth's only coronavirus-free continent, upgrades to the South Pole Telescope (SPT) have been postponed as fewer people are deploying to the continent. But SPT's observing schedule has continued uninterrupted. "There has been a very strict protocol, limiting deployments to only essential personnel and with very strict quarantine rules," says the University of Chicago's John Kovac.
- La Silla Observatory in Chile, home to a number of European Southern Observatory instruments, still hasn't restarted science operations. *[Update: Shortly after the publication of this article, La Silla Observatory began limited science operations.]*

Although not a light-gathering observatory, LIGO, the Laser Interferometer Gravitational-Wave Observatory, was forced to shut down its observing run a month early due to COVID-19. LIGO was planned to be offline for upgrades until 2022, but the pandemic is causing delays that could extend the process even longer. Processing the data from the last observing run is also taking longer than expected.

“There are delays due to supply chain issues, changes in how vendors work, and teams learning to work in a COVID-safe way,” says LIGO spokesperson Patrick Brady. They likely won’t know until next year whether the pandemic has postponed LIGO’s ability to tune back into gravitational waves again.

Not the same

Even as major observatories continue to come back online, many won’t be operating at 100 percent for the foreseeable future.

Large telescopes often have their instruments changed multiple times a night as they start new observing runs. But observatory directors say that changing instruments just won’t be possible in many cases now, as they’ve had to learn to work with dramatically reduced staff. Sometimes, they even have to find ways for one person to do tasks that would usually take an entire team.

Astronomers no longer physically travel to the telescopes from during their observing nights, either. And public tours have also been canceled, robbing observatories of vital revenue and access to potential donors.

Maintenance has also been delayed. Large telescope mirrors often stretch more than a dozen feet across and sit exposed to the outdoors all night long, gathering dust. That means observatories have to regularly clean and recoat their mirrors, or else they’ll gradually lose their light-gathering abilities.

“One aspect that has suffered at the [Hobby-Eberly Telescope] and other large telescopes is that our mirror cleaning and segment re-aluminization are way behind schedule,” says Steven Janowiecki, an astronomer at the McDonald Observatory who serves as the observatory's science operations manager. “Those processes require people to be in close proximity and have been significantly reduced since March. That will have long term impacts on our light-collecting ability — perhaps 5 to 15 percent — but we'll still be observing." So, although the observational abilities of major telescopes around the world might remain slightly dimmed in the short term, astronomers and engineers are working hard to get Earth's observatories fully back in the game.

Source: https://astronomy.com/news/2020/10/earths-biggest-telescopes-reopen-after-months-of-covid-closures

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November Celestial Calendar

1. Venus rises in the east about 3 hours before sunrise at the first of the month and 2½ hours before the sun the end of the month.

2. Mercury moves back to the morning sky this month where it can be seen in the east the first few days of the month.

3. Jupiter and Saturn are in the evening sky all month where they can be seen close together in the south after the sun sets.

4. Mars can be seen in the east at sunset and in the west before sunrise.

5. The Leonid meteor shower peaks on the 17th.

November 1	**Daylight Savings Time ends**
November 5	**Moon .2° North of M35**
	S Taurid Meteor Shower Peak
November 8	Last Quarter Moon
November 10	Mercury Greatest Elongation (West 19°**)**
November 12	N Taurid Meteor Shower Peak
	Venus 3° South of Moon
November 13	**Mercury 1.7° South of Moon.**
November 14	**Moon at Perigee (High Tides)**
November 15	**New Moon**
November 17	Leonid Meteor Shower Peak
November 19	**Jupiter 2° North of Moon**

	Saturn 3° North of Moon
November 22	First Quarter
November 25	Mars 5° **North of Moon**
November 27	**Uranus 3° North of Moon**
November 30	**Full Moon**
	Penumbral Lunar Eclipse

Roger Brower

2020 ROYAL ASTRONOMICAL SOCIETY HANDBOOKS AND CALENDARS

~~The group rate price for a single copy if you buy **in person** from CLAS is $27.00 for the handbook and $10.00 for the calendar. Calendar and Handbook are sold together for the combined price of $35.00.~~ ~~**Available NOW.**~~

November 02 Meeting we will discuss ordering the 2021 ROYAL ASTRONOMICAL SOCIETY HANDBOOKS AND CALENDARS .

MEMBERSHIP INFORMATION

Basic CLAS dues are $25.00 per year - due in January. Students and Skywatchers Newsletter are FREE. Members also receive discounted rates for Astronomy Magazine and /or Sky and Telescope Magazine.

The fee schedule is as follows: Verify current magazine prices with Roger!

Basic membership $25.00 per year.
Membership with Astronomy magazine is $59.00 per year.
Membership with Sky and Telescope magazine is $58.00 per year.
Membership with both S & T and Astronomy is $92.00 per year.

Send your Check or Money Order to:

Roger Brower, Treasurer, China Lake Astronomical Society, P.O. Box 1783, Ridgecrest, CA 93556.

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Meetings of the China Lake Astronomical Society are held at the Maturango Museum at 7:30 p.m. on the first Monday evening of each month, except when the first Monday is a holiday.

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