Celestial Observer

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CCAS member Michael Perez took this photo of the Hercules Globular Cluster (M13 or NGC 6205). This cluster is located within the keystone asterism of the constellation Hercules. It is above the horizon all night long in May, June, and July and can be seen with binoculars and small telescopes. This photo was taken using a Canon EOS Ra camera through a Celestron Nexstar EdgeHD 8" telescope.

CCAS on YouTube!

Want to see what's in the night sky this month, or how to best use binoculars for stargazing? Did you miss our last presentation? Visit our YouTube for all of this, plus our upcoming events and more!

Connect here:
YouTube.com/c/CentralCoastAstronomy

Total Lunar Eclipse!

Sunday, May 15th

Starting just after Moonrise, the West Coast will be treated to a Total Lunar Eclipse. Find out more and see what time the eclipse will begin and end in your area at the link below!

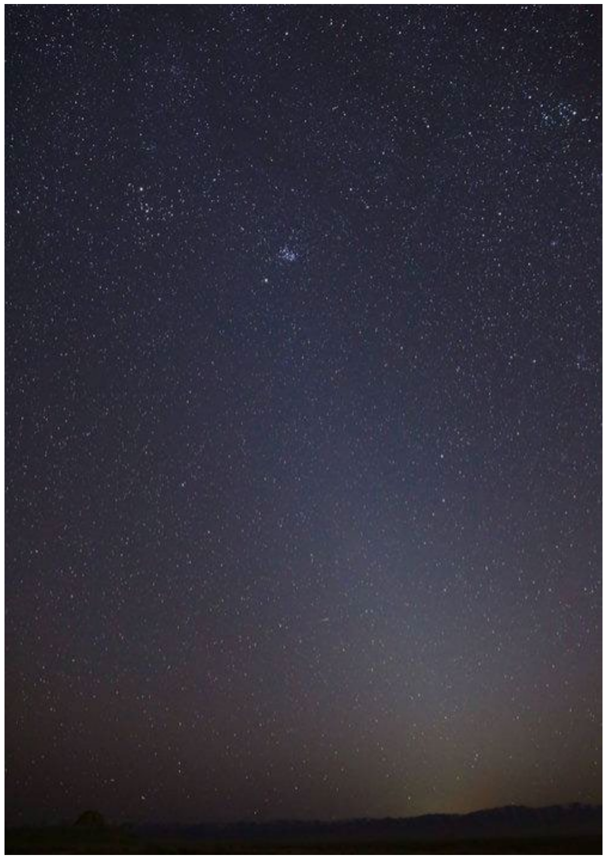
Find out more here:
TimeAndDate.com/eclipse/map/2022-may-16

Stanford is hosting an in-person* eclipse viewing party. Here are the details:

*Note: This event is in-person only. It will not be streamed.

Night Lights: Aurora, Noctilucent Clouds, and the Zodiacal Light

by David Prosper for NASA Night Sky Network



The zodiacal light extends into the Pleiades, as seen in the evening of March 1, 2021 above Skull Valley, Utah. The Pleiades star cluster (M45) is visible near the top. Credit and source: NASA/Bill Dunford. https://www.flickr.com/photos/gsfc/51030289967

Have you spotted any “night lights”? These phenomena brighten dark skies with celestial light ranging from mild to dazzling: the subtle light pyramid of the zodiacal light, the eerie twilight glow of noctilucent clouds, and most famous of all, the wildly unpredictable and mesmerizing aurora.

Aurora, often referred to as the northern lights (aurora borealis) or southern lights (aurora australis), can indeed be a wonderful sight, but the beautiful photos and videos shared online are often misleading. For most observers not near polar latitudes, auroral displays are relatively rare and faint, and without much structure, more gray than colorful, and show up much better in photos. However, geomagnetic storms can create auroras that dance and shift rapidly across the skies with several distinct colors and appear to observers much further away from the poles - on very rare occasions even down to the midlatitudes of North America! Geomagnetic storms are caused when a magnetic storm on our Sun creates a massive explosion that flings a mass of particles away from its surface, known as a Coronal Mass Ejection (CME). If Earth is in the path of this CME, its particles interact with our planet's magnetic field and result in auroral displays high up in our ionosphere. As we enter our Sun's active period of its 11-year solar cycle, CMEs become more common and increase the chance for dazzling displays! If you have seen any aurora, you can report your sighting to the Aurorasaurus citizen science program at aurorasaurus.org.

Have you ever seen wispy clouds glowing an eclectic blue after sunset, possibly towards your west or northwest? That wasn't your imagination; those luminescent clouds are noctilucent clouds (also called Polar Mesospheric Clouds (PMC)). They are thought to form when water vapor condenses around 'seeds' of dust from vaporized meteorites - along with other sources that include rocket launches and volcanic eruptions - around 50 miles high in the mesosphere. Their glow is caused by the Sun, whose light still shines at that altitude after sunset from the perspective of ground-based observers. Noctilucent clouds are increasing both in frequency and in how far south they are observed, a development that may be related to climate change. Keeping in mind that observers closer in latitude to the poles have a better chance of spotting them, your best opportunity to spot noctilucent clouds occurs from about half an hour to two hours after sunset during the summer months. NASA's AIM mission studies these clouds from its orbit high above the North Pole: go.nasa.gov/3uV3Yj1.

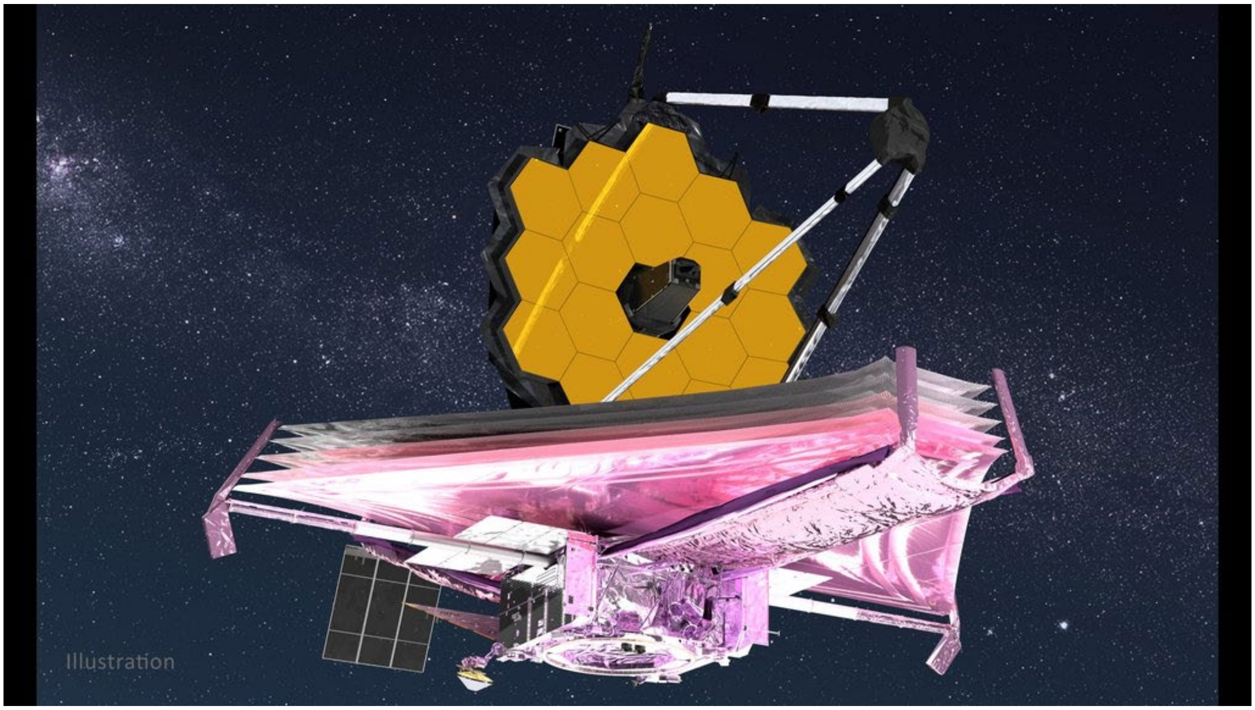
You may have seen the zodiacal light without even realizing it; there is a reason it's nicknamed the "false dawn"! Viewers under dark skies have their best chance of spotting this pyramid of ghostly light a couple of hours after sunset around the spring equinox, or a couple of hours before dawn around the autumnal equinox. Unlike our previous two examples of night lights, observers closer to the equator are best positioned to view the zodiacal light! Long known to be reflected sunlight from interplanetary dust orbiting in the plane of our solar system, these fine particles were thought to originate from comets and asteroids. However, scientists from NASA's Juno mission recently published a fascinating study indicating a possible alternative origin: dust from Mars! Read more about their serendipitous discovery at: go.nasa.gov/3Onf3kN.

Curious about the latest research into these night lights? Find news of NASA's latest discoveries at nasa.gov

This article is distributed by NASA Night Sky Network

The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

Webb Telescope's Coldest Instrument Reaches Operating Temperature
by NASA/JPL



In this illustration, the multilayered sunshield on NASA's James Webb Space Telescope stretches out beneath the observatory's honeycomb mirror. The sunshield is the first step in cooling down Webb's infrared instruments, but the Mid-Infrared Instrument (MIRI) requires additional help to reach its operating temperature. Credit: NASA GSFC/CIL/Adriana Manrique Gutierrez

With help from a cryocooler, the Mid-Infrared Instrument has dropped down to just a few degrees above the lowest temperature matter can reach and is ready for calibration.

NASA's James Webb Space Telescope will see the first galaxies to form after the big bang, but to do that its instruments first need to get cold – really cold. On April 7, Webb's Mid-Infrared Instrument (MIRI) – a joint development by NASA and ESA (European Space Agency) – reached its final operating temperature below 7 kelvins (minus 447 degrees Fahrenheit, or minus 266 degrees Celsius).

Along with Webb's three other instruments, MIRI initially cooled off in the shade of Webb's tennis-court-size sunshield, dropping to about 90 kelvins (minus 298 F, or minus 183 C). But dropping to less than 7 kelvins required an electrically powered cryocooler. Last week, the team passed a particularly challenging milestone called the "pinch point," when the instrument goes from 15 kelvins (minus 433 F, or minus 258 C) to 6.4 kelvins (minus 448 F, or minus 267 C).

“The MIRI cooler team has poured a lot of hard work into developing the procedure for the pinch point,” said Analyn Schneider, project manager for MIRI at NASA’s Jet Propulsion Laboratory in Southern California. “The team was both excited and nervous going into the critical activity. In the end it was a textbook execution of the procedure, and the cooler performance is even better than expected.”

The low temperature is necessary because all four of Webb’s instruments detect infrared light – wavelengths slightly longer than those that human eyes can see. Distant galaxies, stars hidden in cocoons of dust, and planets outside our solar system all emit infrared light. But so do other warm objects, including Webb’s own electronics and optics hardware. Cooling down the four instruments’ detectors and the surrounding hardware suppresses those infrared emissions. MIRI detects longer infrared wavelengths than the other three instruments, which means it needs to be even colder.

Another reason Webb’s detectors need to be cold is to suppress something called dark current, or electric current created by the vibration of atoms in the detectors themselves. Dark current mimics a true signal in the detectors, giving the false impression that they have been hit by light from an external source. Those false signals can drown out the real signals astronomers want to find. Since temperature is a measurement of how fast the atoms in the detector are vibrating, reducing the temperature means less vibration, which in turn means less dark current.

MIRI’s ability to detect longer infrared wavelengths also makes it more sensitive to dark current, so it needs to be colder than the other instruments to fully remove that effect. For every degree the instrument temperature goes up, the dark current goes up by a factor of about 10.

Once MIRI reached a frigid 6.4 kelvins, scientists began a series of checks to make sure the detectors were operating as expected. Like a doctor searching for any sign of illness, the MIRI team looks at data describing the instrument’s health, then gives the instrument a series of commands to see if it can execute tasks correctly. This milestone is the culmination of work by scientists and engineers at multiple institutions in addition to JPL, including Northrop Grumman, which built the cryocooler, and NASA’s Goddard Space Flight Center, which oversaw the integration of MIRI and the cooler to the rest of the observatory.

“We spent years practicing for that moment, running through the commands and the checks that we did on MIRI,” said Mike Ressler, project scientist for MIRI at JPL. “It was kind of like a movie script: Everything we were supposed to do was written down and rehearsed. When the test data rolled in, I was ecstatic to see it looked exactly as expected and that we have a healthy instrument.”
There are still more challenges that the team will have to face before MIRI

can start its scientific mission. Now that the instrument is at operating temperature, team members will take test images of stars and other known objects that can be used for calibration and to check the instrument's operations and functionality. The team will conduct these preparations alongside calibration of the other three instruments, delivering Webb's first science images this summer.

"I am immensely proud to be part of this group of highly motivated, enthusiastic scientists and engineers drawn from across Europe and the U.S.," said Alistair Glasse, MIRI instrument scientist at the UK Astronomy Technology Centre (ATC) in Edinburgh, Scotland. "This period is our 'trial by fire' but it is already clear to me that the personal bonds and mutual respect that we have built up over the past years is what will get us through the next few months to deliver a fantastic instrument to the worldwide astronomy community."

More About the Mission

The James Webb Space Telescope is an international program led by NASA with its partners, ESA and the Canadian Space Agency.

MIRI was developed through a 50-50 partnership between NASA and ESA. JPL leads the U.S. efforts for MIRI, and a multinational consortium of European astronomical institutes contributes for ESA. George Rieke with the University of Arizona is the MIRI science team lead. Gillian Wright is the MIRI European principal investigator.

Laszlo Tamas with UK ATC manages the European Consortium. The MIRI cryocooler development was led and managed by JPL, in collaboration with Northrop Grumman in Redondo Beach, California, and NASA's Goddard Space Flight Center in Greenbelt, Maryland.

For more information about the Webb mission, visit:

https://www.nasa.gov/webb

CCAS Contacts

President	Aurora Lipper
Vice President	Tom Frey
Treasurer	Lee Coombs
Secretary	Linnea Fritch
Outreach	Scott McMillian
Communication	Brian P. Cox

CCAS Information

Founded in 1979, the Central Coast Astronomical Society (CCAS) is an association of people who share a common interest in astronomy and related sciences.

Central Coast Astronomical Society
PO Box 1415
San Luis Obispo, CA 93406
Website: CentralCoastAstronomy.org
Facebook: facebook.com/CentralCoastAstronomicalSociety

CCAS Officer Lee Coombs took this photo of the Whirlpool Galaxy (M51 or NGC 5194), and NGC 5195 (the smaller galaxy appearing at the end of one of M51's arms, and is passing behind the larger Galaxy). Located 31 million light-years from Earth, the Whirlpool Galaxy is located in the constellation Canes Venatici and is spotted most easily during May with a small telescope.