Celestial Observer

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CCAS member Catherine Hyde took this photo of M45 (The Pleiades), an Open Cluster located 45 light-years from Earth. Nearest the constellation Taurus, this cluster is easily recognizable as a cluster of five to ten stars visible to the naked eye, depending on sky conditions.

Stargazing: Virtual and In person!

CCAS has both live online and in person stargazing events that are scheduled throughout the year. In person events are dependent on weather, but virtual events happen rain or shine.

In Person club meetings are back!

CCAS hosts quarterly in person meetings in San Luis Obispo which feature speakers on various astronomy topics. Join us and meet and greet your fellow club members!

Find dates and more information about all of our events on our calendar:
CentralCoastAstronomy.org/Calendar

Central Coast Astronomical Society Events

Virtual Stargazing Live Stream: CCAS President Aurora Lipper joins NASA Solar System Ambassador and CCAS member Brian P. Cox to take you on a tour of the night sky using live telescope views! (Live views are weather permitting) You'll learn about objects visible naked-eye, through binoculars, and through a telescope. Then, using the tools you learn during the presentation, you'll be able to stargaze from the comfort of your own home! Download a free sky chart and find out more details and dates on our website. This event will stream rain or shine!
www.CentralCoastAstronomy.org/calendar/category/virtual-stargazing/

Upcoming Events:

- Friday, February 9th - 7:00pm - 8:00pm

In Person Star Parties at Santa Margarita Lake Park: Join other astronomers and night sky enthusiasts monthly at Santa Margarita Lake Park to mingle and view the night sky. Bring your own telescope or enjoy looking through others'. These events are weather dependent, but are scheduled monthly on the weekend closest to the new moon (when possible), and in conjunction with certain holidays.
www.CentralCoastAstronomy.org/calendar/category/in-person-star-party/

Upcoming Events (Arrive before sunset):

- Saturday, February 10th
- Saturday, March 9th
- Saturday, April 6th

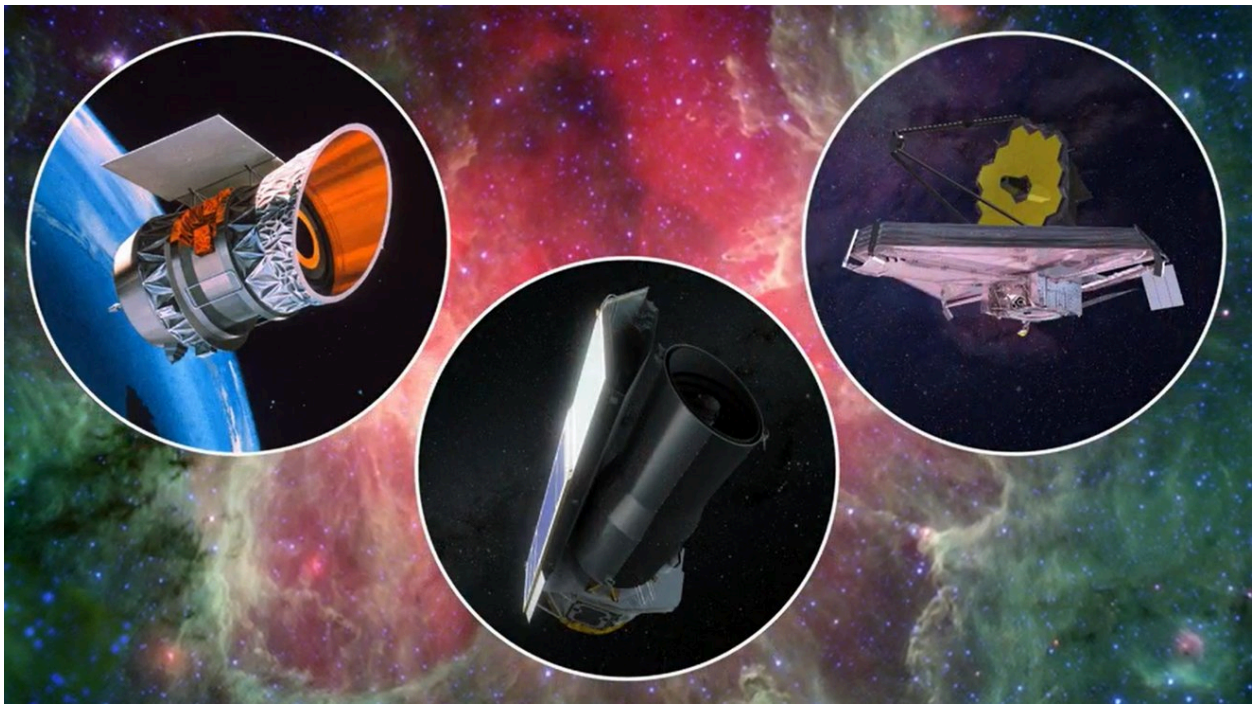
In Person Club Meetings: Held quarterly at the United Methodist Church in San Luis Obispo, meet other CCAS members and enjoy the guest speaker presentation on a wide range of topics surrounding astronomy and the cosmos. For dates and guest speaker details, visit our website.
www.CentralCoastAstronomy.org/calendar/category/in-person-club-meeting

Upcoming Events (Arrive before sunset):

- Thursday, January 18th - 7:00pm - 9:00pm
- Thursday, April 18th - 7:00pm - 9:00pm

Meet the Infrared Telescopes That Paved the Way for NASA's Webb

by NASA JPL



Scientists have been studying the universe with infrared space telescopes for 40 years, including these NASA missions, from left: the Infrared Astronomical Satellite (IRAS), launched in 1983; the Spitzer Space Telescope, launched in 2003; and the James Webb Space Telescope, launched in 2021. Credit: NASA/JPL-Caltech

The Webb telescope has opened a new window onto the universe, but it builds on missions going back 40 years, including Spitzer and the Infrared Astronomical Satellite.

On Dec. 25, NASA celebrated the two-year launch anniversary of the James Webb Space Telescope – the largest and most powerful space observatory in history. The clarity of its images has inspired the world, and scientists are just beginning to explore the scientific bounty it is returning.

Webb's success builds on four decades of space telescopes that also detect infrared light (which is invisible to the naked eye) – in particular the work of two retired NASA telescopes with big anniversaries this past year: January 2023 marked the 40th year since the launch of the Infrared Astronomical Satellite (IRAS), while August marked the 20th launch anniversary of the Spitzer Space Telescope.

This heritage shines through in NASA's images of Rho Ophiuchi, one of the closest star-forming regions to

Earth. IRAS was the first infrared telescope ever launched into Earth orbit, above the atmosphere that blocks most infrared wavelengths. Rho Ophiuchi's thick clouds of gas and dust block visible light, but IRAS' infrared vision made it the first observatory to be able to pierce those layers to reveal newborn stars nestled deep inside.

Twenty years later, Spitzer's multiple infrared detectors helped astronomers assign more specific ages to many of the stars in the region, providing insights about how young stars throughout the universe evolve. Webb's even more detailed infrared view shows jets bursting from young stars, as well as disks of material around them – the makings of future planetary systems.

Another example is Fomalhaut, a star surrounded by a disk of debris similar to our asteroid belt. Forty years ago, the disk was one of IRAS' major discoveries because it also strongly suggested the presence of at least one planet, at a time when no planets had yet been found outside the solar system. Subsequent observations by Spitzer showed the disk had two sections – a cold, outer region and a warm, inner region – and revealed more evidence of the presence of planets.

Many other telescopes, including NASA's Hubble Space Telescope, have since studied Fomalhaut, and earlier this year, images from Webb gave scientists their clearest view of the disk structure yet. It revealed two previously unseen rings of rock and gas in the inner disk. Combining the work of generations of telescopes is bringing the story of Fomalhaut into sharp relief.

Visionary Infrared Astronomy Survey

When IRAS launched in 1983, scientists weren't sure what the mission would reveal. They couldn't predict that infrared would eventually be used in almost every area of astronomy, including studies of the evolution of galaxies, the life cycle of stars, the source of pervasive cosmic dust, the atmospheres of exoplanets, the movements of asteroids and other near-Earth objects, and even the nature of one of the biggest cosmological mysteries in history, dark energy.

IRAS set the stage for the European-led Infrared Space Observatory (ISO) and the Herschel Space Observatory; the Japanese-led AKARI satellite; NASA's Wide-Field Infrared Survey Explorer (WISE), and the agency's airborne SOFIA (Stratospheric Observatory for Infrared Astronomy), as well as many balloon-lofted observatories.

"Infrared light is essential for understanding where we came from and how we got here, on both the biggest and smallest astrophysical scales," said Michael Werner, an astrophysicist at NASA's Jet Propulsion Laboratory in Southern

California. Werner, who specializes in infrared observations, served as project scientist for Spitzer. “We use infrared to look back in space and time, to help us understand how the modern universe came to be. And infrared enables us to study the formation and evolution of stars and planets, which tells us about the history of our own solar system.”

On to Spitzer

If IRAS was a pathfinding mission, Spitzer was designed to dive deep into the infrared universe. Many of Webb’s planetary targets in its first year had already been studied with Spitzer, which pursued a broad range of science goals, thanks to its wide field of view and relatively high resolution. During its 16-year mission, Spitzer uncovered new wonders from the edge of the universe (including some of the most distant galaxies ever observed at the time) to our own solar system (such as a new ring around Saturn). Researchers were also surprised to find that the telescope was a perfect tool for studying exoplanets (planets beyond our solar system), something they hadn’t expected when building it.

“With any telescope, you’re not just taking data for the sake of it; you’re asking a particular question or a series of questions,” said Sean Carey, a former manager for the Spitzer Science Center at IPAC, a data and science processing center at Caltech. “The questions we’re able to ask with Webb are much more complex and varied because of the knowledge we acquired with telescopes like Spitzer and IRAS.”

For example, Carey said, “We studied exoplanets with Spitzer and Hubble, and we figured out what you can do with an infrared telescope in that field, what types of planets are most interesting, and what you can learn about them. So when Webb launched, we jumped into exoplanet studies right from the get-go.”

Webb, too, is paving the way for future infrared missions. NASA’s upcoming SPHEREx (Spectro-Photometer for the History of the Universe, Epoch of Reionization and Ices Explorer) mission as well as the agency’s next flagship observatory, the Nancy Grace Roman Space Telescope, will continue to explore the universe in infrared.

More About the Missions

IRAS was a joint project of NASA, the Netherlands Agency for Aerospace Programmes, and the United Kingdom's Science and Engineering Research Council. The mission was managed for NASA by JPL. Caltech in Pasadena manages JPL for NASA.

For more information about IRAS, visit:

www.jpl.nasa.gov/missions/infrared-astronomical-satellite-iras

JPL managed the Spitzer Space Telescope mission for NASA's Science Mission Directorate in Washington until the mission was retired in January 2020. Science operations were conducted at the Spitzer Science Center at Caltech. Spacecraft operations were based at Lockheed Martin Space in Littleton, Colorado. Data are archived at the Infrared Science Archive operated by IPAC at Caltech.

For more information about Spitzer, visit:

www.nasa.gov/spitzer

The James Webb Space Telescope is the world's premier space science observatory. Webb is solving mysteries in our solar system, looking beyond to distant worlds around other stars, and probing the mysterious structures and origins of our universe and our place in it. Webb is an international program led by NASA with its partners, ESA (European Space Agency) and CSA (Canadian Space Agency).

For more information about Webb, visit:

www.nasa.gov/webb

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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.

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Photo by Peter Bresler of the center of the Rosette Nebula (NGC 2238)