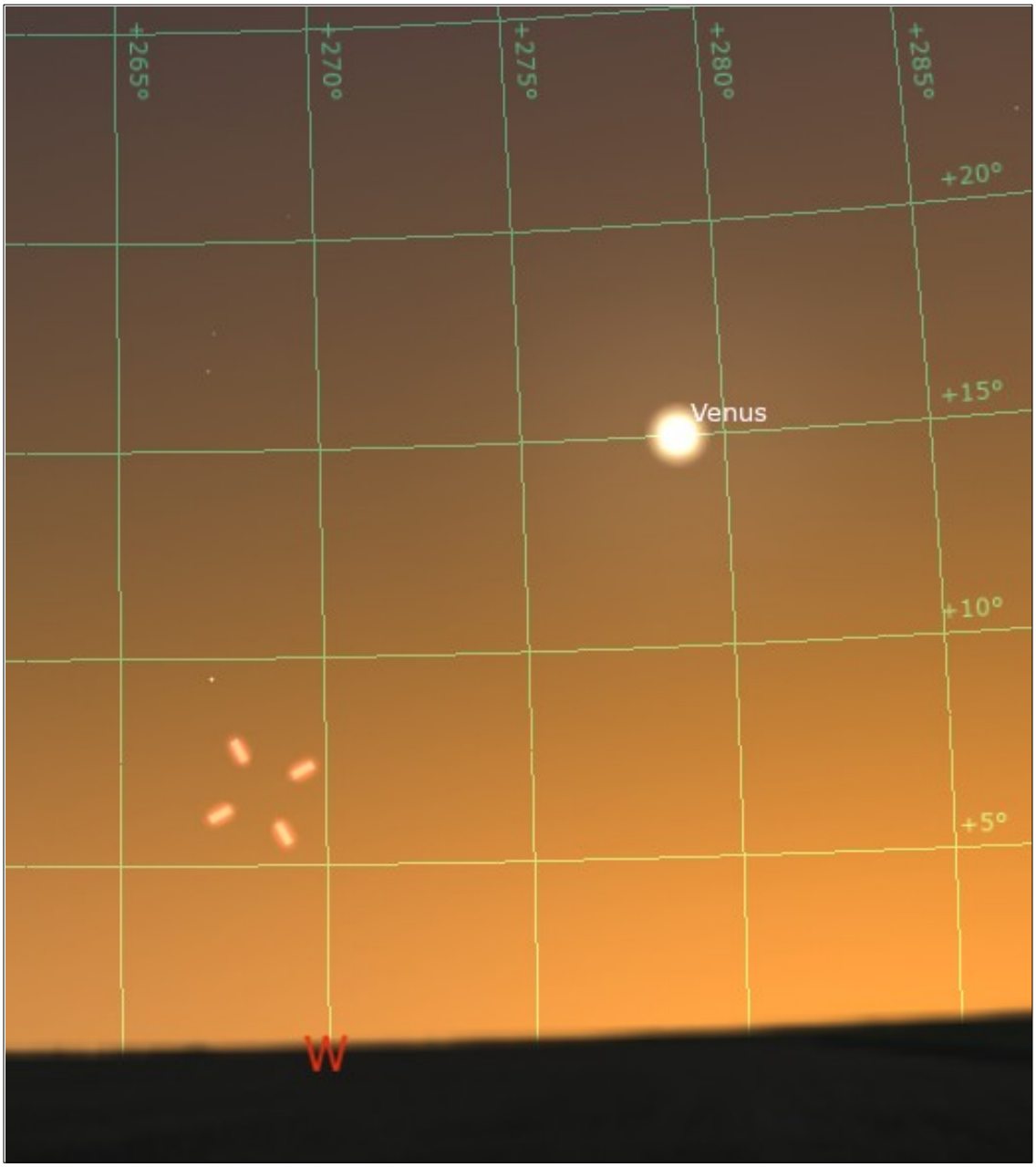
John J. McCarthy Observatory

April 2026 Newsburst

Twenty-five years after the McCarthy Observatory received the International Astronomical Union's (IAU) Observatory Code "932," once the staff demonstrated the required precision for reporting the position and movement of Near-Earth Asteroids, the Minor Planet Center has granted the newly constructed and second observatory on the site, the *R. Center for NEO Studies*, its own unique IAU Observatory Code.

Photo : Bill Cloutier

Sun Grazer



Predicted location of Comet C/2026 A1 MAPS 30 minutes after sunset on April 11th

Credit: Stellarium

Comet C/2026 A1 MAPS was discovered on January 13th by a team of astronomers based in Chile. The acronym "MAPS" comes from the names of the discoverers - Alain **M**aury, Georges **A**ttard, Daniel **P**arrott, and Florian **S**ignoret. At the time of discovery, the comet was more than twice the distance of the Earth from the Sun, suggesting a large nucleus or core.

C/2026 A1 MAPS is believed to be a member of the Kreutz group of sun-grazing comets, remnants of a much larger comet that fragmented around the year 362 BC. The comet will pass within 100,000 miles (160,000 km) of the Sun's surface on April 4th - less than half the distance between the Earth and the Moon. Should it survive the intense heat and not disintegrate, MAPS could put on an impressive show in the early April sky shortly after sunset.

As an example, on the night of April 11th (the night of the McCarthy Observatory's monthly open house), the comet, should it survive, will appear just above the western horizon at the end of civil twilight. Venus, the brightest "star" in the sky, will be nearby for orientation. A waxing crescent moon will join the scene on the 18th, should the comet remain visible.

Falling Back to Earth

Image credit: NASA

Launched thirty-five years ago, on April 24, 1990, aboard Space Shuttle Discovery, the Hubble Space Telescope has transformed our view of the cosmos. The orbiting observatory, upgraded and repaired over the course of five servicing missions when the shuttle program was active, is a much superior instrument than when first launched, providing unprecedented views of the universe in ultraviolet, visible, and near-infrared light. While operating in low-Earth orbit allowed astronauts to visit the telescope, it also subjects Hubble to a small measure of atmospheric drag, particularly when high solar activity causes Earth's upper atmosphere to expand.

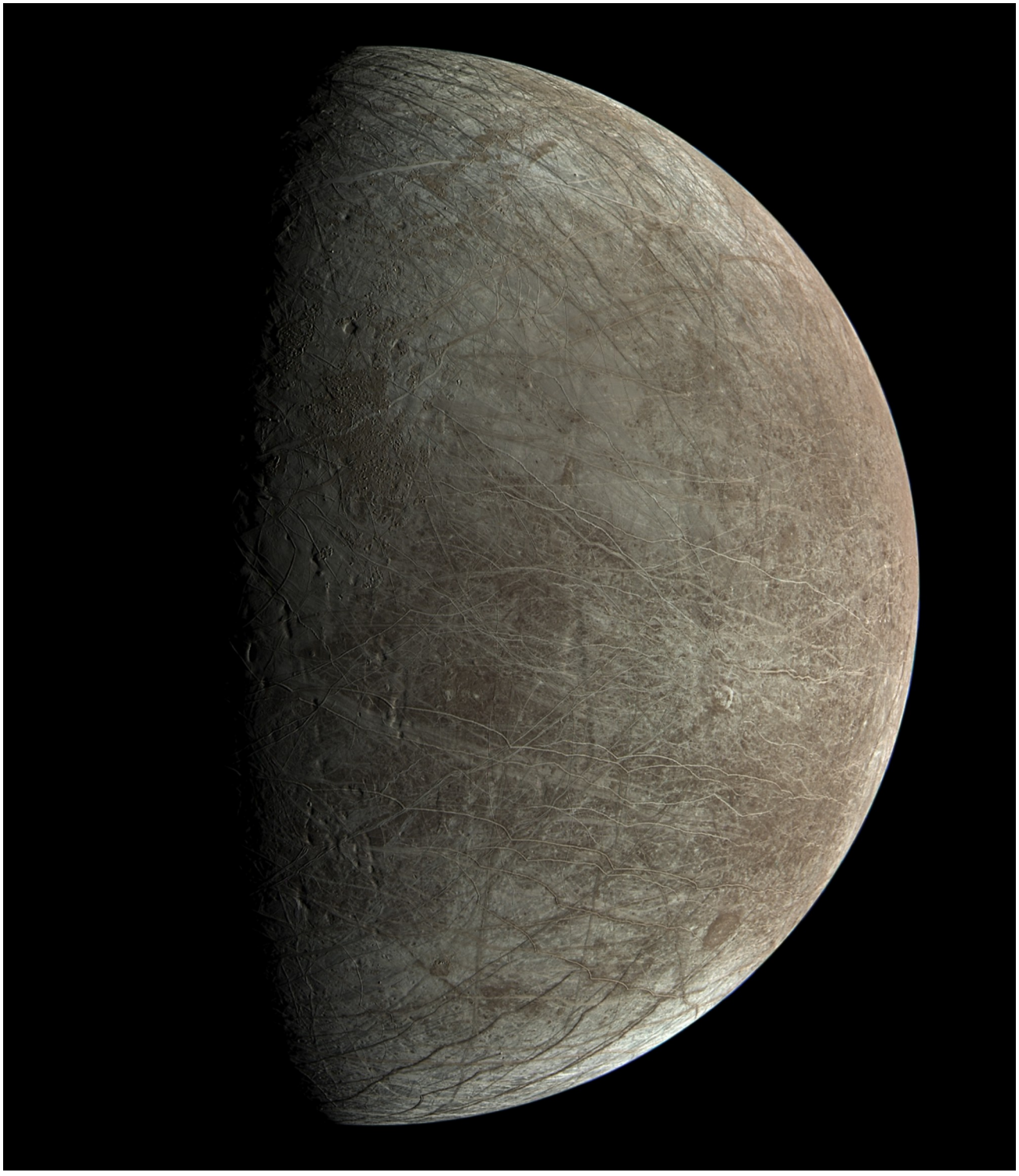
Hubble was originally deployed at an altitude of about 380 miles (611 km). Over time, its orbit has decayed. Three space shuttle missions included a boost to raise the observatory's altitude, the last one in 2002 (Service Mission 3B). Since then the telescope's altitude has been slowly decreasing. It is currently orbiting between 296 and 297 miles (476 and 478 km) above the Earth.

A recent independent assessment by NASA's Engineering and Safety Center concluded that, without intervention, orbital decay will soon affect pointing control and science operations. While a complete statistical analysis was not performed, the study shows how expectations on drag can produce a wide range of results. For example, solar activity assumptions that greatly increase drag result in a demise of the observatory as early as 2027, while low value assumptions could delay reentry until 2043.

The telescope will still be productive as its orbit decays although aging components present another risk to continued science operations (the observatory has experienced failure of multiple gyroscopes used for pointing). While NASA installed a capture device on the last service mission (in 2009) for use in guiding Hubble to a controlled reentry, such a mission has not been funded. Likewise, no substantial progress has been made on a possible reboost.

Hubble remains a valuable asset to the astronomical community and its collaboration with other telescopes like the James Webb, would make its loss even greater. However, time is running out for this venerable eye on the universe.

Spotlight on Europa



A natural color image of Europa captured by the Juno spacecraft during a close flyby
NASA/JPL-Caltech/SwRI/MSSS. Image processing by Björn Jónsson CC BY-NC-SA 2.0

NASA's Europa Clipper, launched on October 14, 2024 and scheduled to arrive in the Jovian system in April 2030, is designed to gather data on Europa's icy shell as a means to ascertain whether its subsurface ocean is able to support life. The presence of a saltwater ocean beneath the ice was first detected by the Voyager spacecrafts and later confirmed by the Galileo mission. Estimated to contain more water than all of Earth's oceans combined, Europa's interior is kept warm by tidal heating from Jupiter's intense gravitation field. The thickness of the overlying icy shell, however, is key to determining whether a pathway exists for oxygen and nutrients produced on the surface by radiation to reach the ocean and provide an energy source for any life forms.

Europa – Is it an open or closed ocean world?

An image of the fractured ice surface captured by Juno's star camera, normally used to orient the spacecraft.

Taken from a distance of 256 miles (412 km), the image covers an area 93 miles (150 km) by 125 miles (200 km).

NASA's Clipper spacecraft will get up close - as close as 16 miles (25 km) during its 49 flybys of Europa.

Credits: NASA/JPL-Caltech/ SwRI

Until Clipper arrives in 2030, scientists are using data collected by NASA's Juno spacecraft, which is currently in orbit around Jupiter, to model the moon's surface. During the spacecraft's extended mission, the spacecraft made several flybys of the Galilean moons, coming as close as 225 miles (360 km) to Europa. The spacecraft's Microwave Radiometer instrument (MWR), designed to perform observations of Jupiter's atmosphere below the planet's upper cloud deck, was repurposed to collect data on the moon's surface composition and characteristics, as well as thickness.

Analysis of a 2022 flyby suggests an icy shell thickness of 18 miles or 29 kilometers, on average. This assumes that the shell is a cold, rigid layer of pure water ice. If other layers exist beneath the outer shell, the total thickness would increase and, conversely, if the shell contains dissolved salts, the depth could be less. MWR data also revealed surface irregularities such as cracks in the ice. While these fissures could provide a pathway between the surface and ocean, they don't appear to fully penetrate the shell.

Juno's data doesn't preclude Europa as a habitable world, but makes it a more challenging environment. While icy eruptions have been recorded with Earth-based telescopes, no activity was evident during Juno's brief flybys. Although scientists had hoped that the geysers might prove to be another pathway to the depths (much like on Saturn's moon Enceladus), models suggests that the eruptions are likely from the expansion of shallow pockets of water.

While Juno has provided scientists a preview of what Clipper will see, they may have to wait another four years to get a more definitive answer on the likelihood that Europa's ocean could support life. In the interim, Juno's observations will be used to improve the planning for Clipper's visit, as well as for the European Space Agency's JUICE spacecraft (which will arrive in 2031).

Lessons from Apollo

NASA's Space Launch System rocket and Orion spacecraft return to the launch pad at the Kennedy Space Center in Florida.

NASA/Joel Kowsky

NASA's Space Launch System (SLS) rocket returned to launch Complex 39B on March 20th after having been returned to the Vehicle Assembly Building for repairs to a helium system that is used to pressurize the rocket's cryogenic propellant tanks in the upper stage. The return to the pad sets the stage for an Artemis II April flight.

While technicians were processing the rocket for flight, NASA announced a change in the cadence and mission objectives for future flights. Rather than going to the Moon and landing, Artemis III will remain in Earth orbit with the crew linking up with either or both of NASA's contracted human landing systems (HLS) - SpaceX's Starship or Blue Origin's Blue Moon, depending on their availability. This will provide NASA an opportunity to fully test and evaluate the HLSs in a controlled environment without putting the crews at risk in lunar orbit. This is the tactic NASA adopted during the Apollo program with Apollo 9 testing the Lunar Module (LM) in Earth orbit following Apollo 8's lunar flyby and in preparation for Apollo 10's LM dress rehearsal for the first Moon landing.

Artemis III, scheduled to fly in 2027, will now pave the way for an Artemis IV landing in 2028. NASA has also announced changes in the SLS configuration to reduce costs and increase future flight cadence. Development of the Exploration Upper Stage will be scrapped in favor of using an existing, flight-proven, Centaur V. According to NASA Administrator Jared Isaacman, the changes will enable NASA to fly at least one surface landing every year.

The launch window for Artemis II opens on April 1st.

More than a Nudge

Pre-impact image of Dimorphos captured by DART's DRACO imager from a distance of 42 miles (68 km)
NASA/Johns Hopkins APL

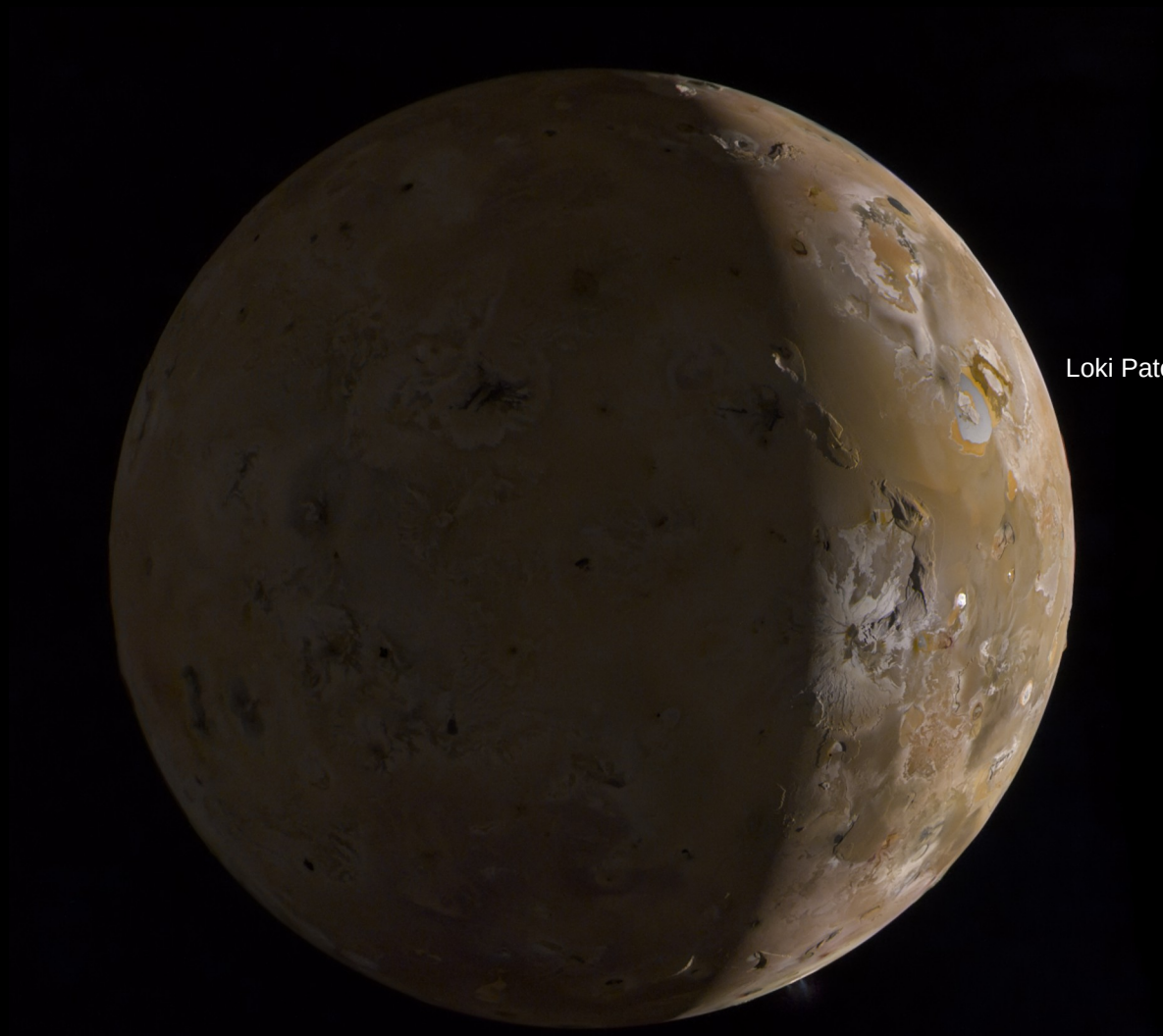
In September 2022, NASA's DART spacecraft was intentionally crashed into the asteroid moonlet Dimorphos at nearly 15,000 miles per hour (24,000 kph). The high-speed collision was a test of kinetic deflection – an evaluation of the effectiveness of changing the trajectory of a near-Earth asteroid with an impact.

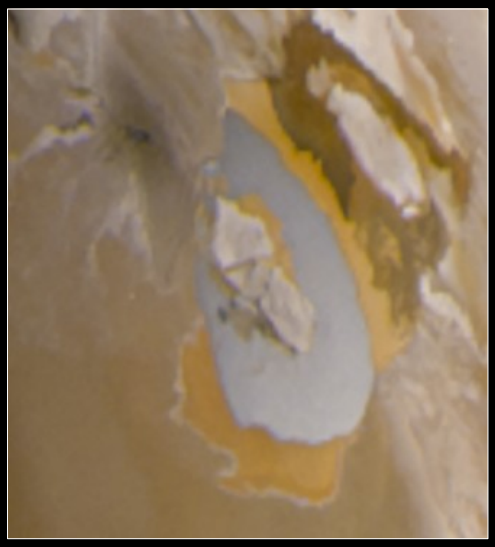
Dimorphos orbits the larger asteroid (Didymos) with a pre-impact orbital period of 11 hours and 55 minutes. NASA had defined the measurement of success as a minimum change in this period of 73 seconds or more. Following the impact, about 50 feet from the asteroid's center, the moon's orbital period was shortened to 11 hours and 23 minutes – a reduction of 32 minutes.

While the demonstration was considered a resounding success, and validation of a potential planetary defense technique, researchers found that there was more to the impact than what was initially observed. A new study based on both ground radar measurements and measurements of stellar occultation events, found that the collision also changed the asteroids' orbit around the Sun. While the change was very small, the implication that we can induce a change in a solar orbit is meaningful. After the collision, the asteroids' orbit around the Sun contracted by about 1,200 feet (360 meters) – shortening the time to complete a trip by a fraction of a second.

Astronomers will get a better view of the aftermath of the DART mission later this year when the European Space Agency's Hera spacecraft arrives at the binary system. Hera will conduct a detailed survey of Dimorphos, assessing changes in the asteroid's shape and rotation. Its survey and asteroid characterization will be aided by two CubeSats. The two drones will attempt to land on the moonlet at the end of their missions.

Lava Lakes



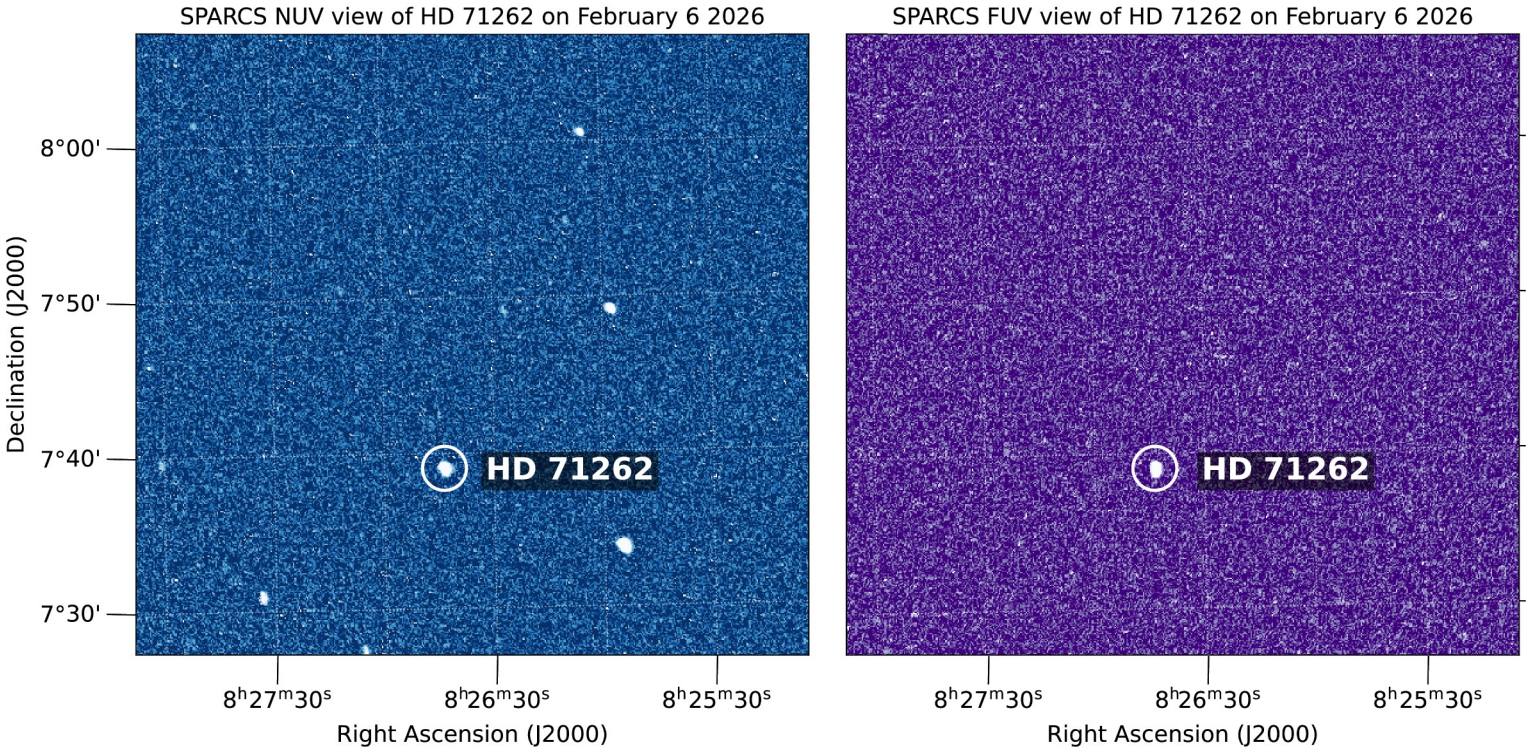


This true color image of Jupiter's volcanic moon Io was captured by the Juno spacecraft during its extended mission phase. The darker side of the moon is illuminated by sunlight reflected off Jupiter's clouds (Jupiter-shine).

On the illuminated side, sunlight glints off the large lava lake Loki Patera. The dynamic feature is fed by the largest and most active volcano on the Jovian moon. The caldera, at 126 miles (202 km) in diameter, confines the molten lava which surrounds a raised central island. As the surface cools, it sinks, and is replaced by warmer lava from below. A complete resurfacing of the lake occurs, on average, every one to three years.

Credit : NASA / JPL / SwRI / MSSS / Simeon Schmauß

SPARCS Fly

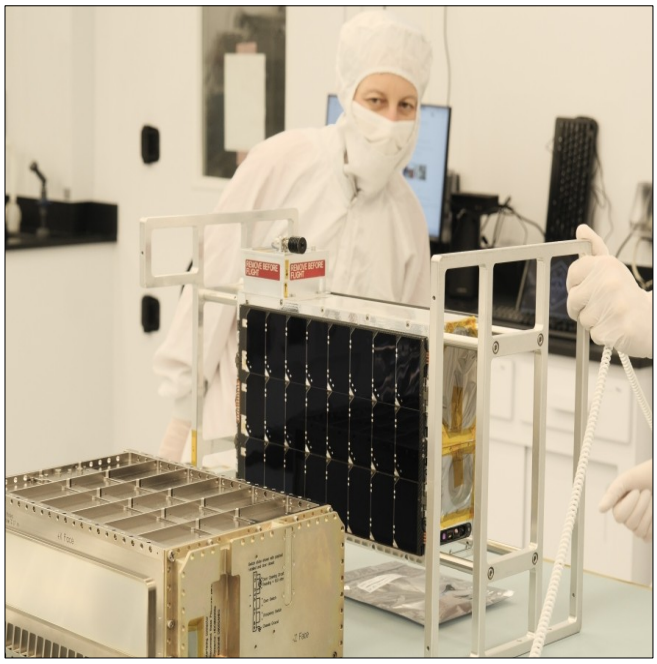


This pair of images shows stars observed Feb. 6, 2026, by the SPARCS space telescope simultaneously in the near-ultraviolet, left, and far-ultraviolet, right.

NASA/JPL-Caltech/ASU

NASA's Star-Planet Activity Research CubeSat, (SPARCS), has achieved "first light," demonstrating the functionally needed before the diminutive space telescope can commence full science operations. The mini observatory, measuring approximately 12 x 8 x 4 inches or 30 x 20 x 10 cm in its launch configuration (before deploying its solar panel) and weighing just 25 pounds or 11.4 kg, was launched on a SpaceX ride-share in January.

SPARCS will monitor activity (flares) on low-mass M-type red dwarf stars. Only 30% to 70% the mass of the Sun, these stars are the most common in our galaxy and are dimmer and cooler than our host star. They can also be more active – prone to flaring more frequently. Flares can be disruptive and bathe the atmospheres of nearby planets in radiation. As such, the stability of these long-lived stars is key to assessing the habitability of potentially billions of planets that occupy the region around these stars where liquid water can exist (the Goldilocks zone).



ASU Professor Evgenya Shkolnik, principal investigator for the SPARCS mission, inspects the space instrument as its being built in a clean room.

NASA/JPL-Caltech/ASU

The SPARCS spacecraft will monitor approximately 20 low-mass stars over 5 to 45 days in near- and far-ultraviolet light with its 3.5 inch (9 cm) telescope.

The project is funded by NASA and led by Arizona State University. The cutting-edge technologies that underpin this cubeSat-size orbiting observatory, should they be validated, can be exploited on a grander scale for upcoming missions like UVEX (UltraViolet Explorer) and the Habitable Worlds Observatory.

Second Saturday Stars

FREE EVENT

John J. McCarthy Observatory
Behind the New Milford High School
860.946.0312
www.mccarthyobservatory.org

April 11th

8:00 - 10:00 pm

Free Star Party

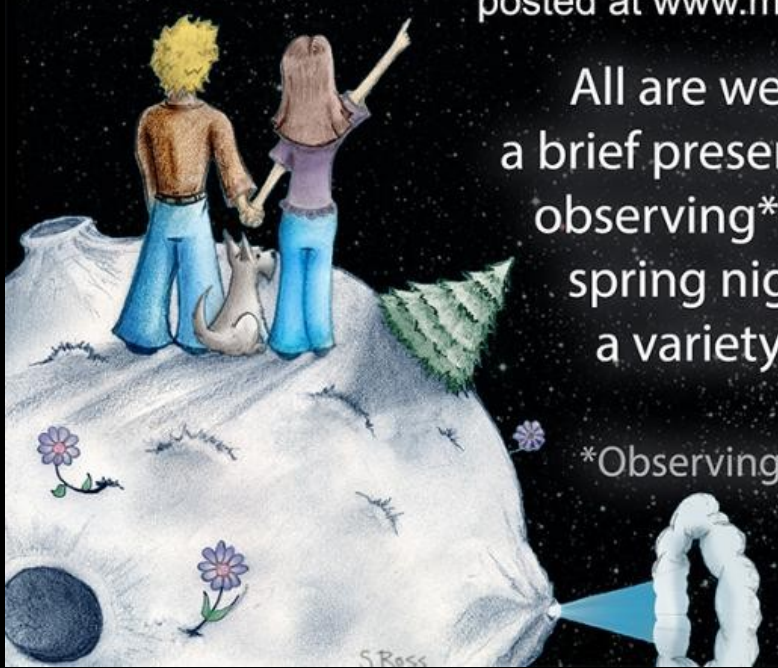
Featuring:

25th Anniversary & Dome Dedication

Presentation at the observatory with light refreshments.
In the event of inclement weather, updates will be posted at www.mccarthyobservatory.org

All are welcome to enjoy
a brief presentation along with
observing* the sights of the
spring night sky through
a variety of telescopes!

*Observing if weather permits



Map

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