

Space News Update

– February 10, 2017 –

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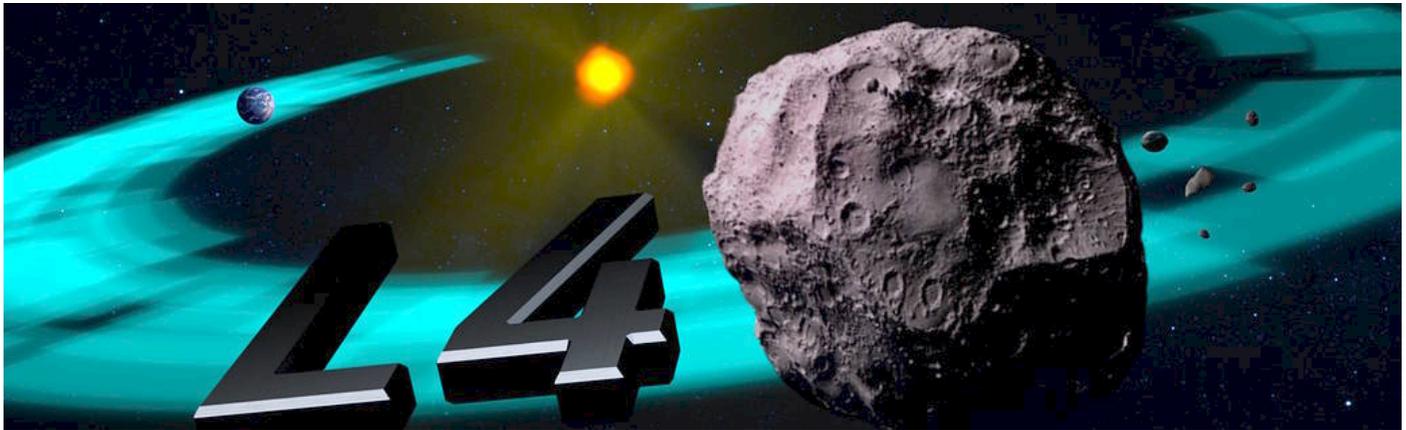
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1. NASA's OSIRIS-REx Begins Earth-Trojan Asteroid Search



A NASA spacecraft begins its search Thursday for an enigmatic class of near-Earth objects known as Earth-Trojan asteroids. OSIRIS-REx, currently on a two-year outbound journey to the asteroid Bennu, will spend almost two weeks searching for evidence of these small bodies.

Trojan asteroids are trapped in stable gravity wells, called Lagrange points, which precede or follow a planet. OSIRIS-REx is currently traveling through Earth's fourth Lagrange point, which is located 60 degrees ahead in Earth's orbit around the sun, about 90 million miles (150 million kilometers) from our planet. The mission team will use this opportunity to take multiple images of the area with the spacecraft's MapCam camera in the hope of identifying Earth-Trojan asteroids in the region.

Although scientists have discovered thousands of Trojan asteroids accompanying other planets, only one Earth-Trojan has been identified to date, asteroid 2010 TK₇. Scientists predict that there should be more Trojans sharing Earth's orbit, but they are difficult to detect from Earth as they appear near the sun on the Earth's horizon.

"Because the Earth's fourth Lagrange point is relatively stable, it is possible that remnants of the material that built Earth are trapped within it," said Dante Lauretta. "So this search gives us a unique opportunity to explore the primordial building blocks of Earth."

The search commences today (Thursday, February 9 2017) and continues through Feb. 20. On each observation day, the spacecraft's MapCam camera will take 135 survey images that will be processed and examined by the mission's imaging scientists at the University of Arizona, Tucson. The study plan also includes opportunities for MapCam to image Jupiter, several galaxies, and the main belt asteroids 55 Pandora, 47 Aglaja and 12 Victoria.

Whether or not the team discovers any new asteroids, the search is a beneficial exercise. The operations involved in searching for Earth-Trojan asteroids closely resemble those required to search for natural satellites and other potential hazards around Bennu when the spacecraft approaches its target in 2018. Being able to practice these mission-critical operations in advance will help the OSIRIS-REx team reduce mission risk once the spacecraft arrives at Bennu.

NASA's Goddard Space Flight Center provides overall mission management, systems engineering and the safety and mission assurance for OSIRIS-REx. Dante Lauretta of the University of Arizona, Tucson, is the principal investigator, and the University of Arizona also leads the science team and the mission's observation planning and processing. Lockheed Martin Space Systems in Denver built the spacecraft and is providing flight operations. Goddard and KinetX Aerospace are responsible for navigating the OSIRIS-REx spacecraft. OSIRIS-

REx is the third mission in NASA's New Frontiers Program. NASA's Marshall Space Flight Center in Huntsville, Alabama, manages the agency's New Frontiers Program for its Science Mission Directorate in Washington.

For more information on OSIRIS-Rex, visit:

www.nasa.gov/osirisrex and www.asteroidmission.org

Source: [NASA](#)

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2. Hubble Witnesses Massive Comet-Like Object Pollute Atmosphere of a White Dwarf



For the first time, scientists using NASA's Hubble Space Telescope have witnessed a massive object with the makeup of a comet being ripped apart and scattered in the atmosphere of a white dwarf, the burned-out remains of a compact star. The object has a chemical composition similar to Halley's Comet, but it is 100,000 times more massive and has a much higher amount of water. It is also rich in the elements essential for life, including nitrogen, carbon, oxygen, and sulfur.

These findings are evidence for a belt of comet-like bodies orbiting the white dwarf, similar to our solar system's Kuiper Belt. These icy bodies apparently survived the star's evolution as it became a bloated red giant and then collapsed to a small, dense white dwarf.

As many as 25 to 50 percent of white dwarfs are known to be polluted with infalling debris from rocky, asteroid-like objects, but this is the first time a body made of icy, comet-like material has been seen polluting a white dwarf's atmosphere.

The results also suggest the presence of unseen, surviving planets which may have perturbed the belt and worked as a "bucket brigade" to draw the icy objects into the white dwarf. The burned-out star also has a companion star, which may disturb the belt, causing objects from the belt to travel toward the burned-out star.

Siyi Xu of the European Southern Observatory in Garching, Germany, led the team that made the discovery. According to Xu, this was the first time that nitrogen was detected in the planetary debris that falls onto a white dwarf. "Nitrogen is a very important element for life as we know it," Xu explained. "This particular object is quite rich in nitrogen, more so than any object observed in our solar system."

Our own Kuiper Belt, which extends outward from Neptune's orbit, is home to many dwarf planets, comets, and other small bodies left over from the formation of the solar system. Comets from the Kuiper Belt may have been responsible for delivering water and the basic building blocks of life to Earth billions of years ago.

The new findings are observational evidence supporting the idea that icy bodies are also present in other planetary systems, and have survived throughout the history of the star's evolution.

To study the white dwarf's atmosphere, the team used both Hubble and the W. M. Keck Observatory. The measurements of nitrogen, carbon, oxygen, silicon, sulfur, iron, nickel, and hydrogen all come from Hubble, while Keck provides the calcium, magnesium, and hydrogen. The ultraviolet vision of Hubble's Cosmic Origins Spectrograph (COS) allowed the team to make measurements that are very difficult to do from the ground.

This is the first object found outside our solar system that is akin to Halley's Comet in composition. The team used the famous comet for comparison because it has been so well studied.

The white dwarf is roughly 170 light-years from Earth in the constellation Bootes, the Herdsman. It was first recorded in 1974 and is part of a wide binary system, with a companion star separated by 2,000 times the distance that the Earth is from the sun.

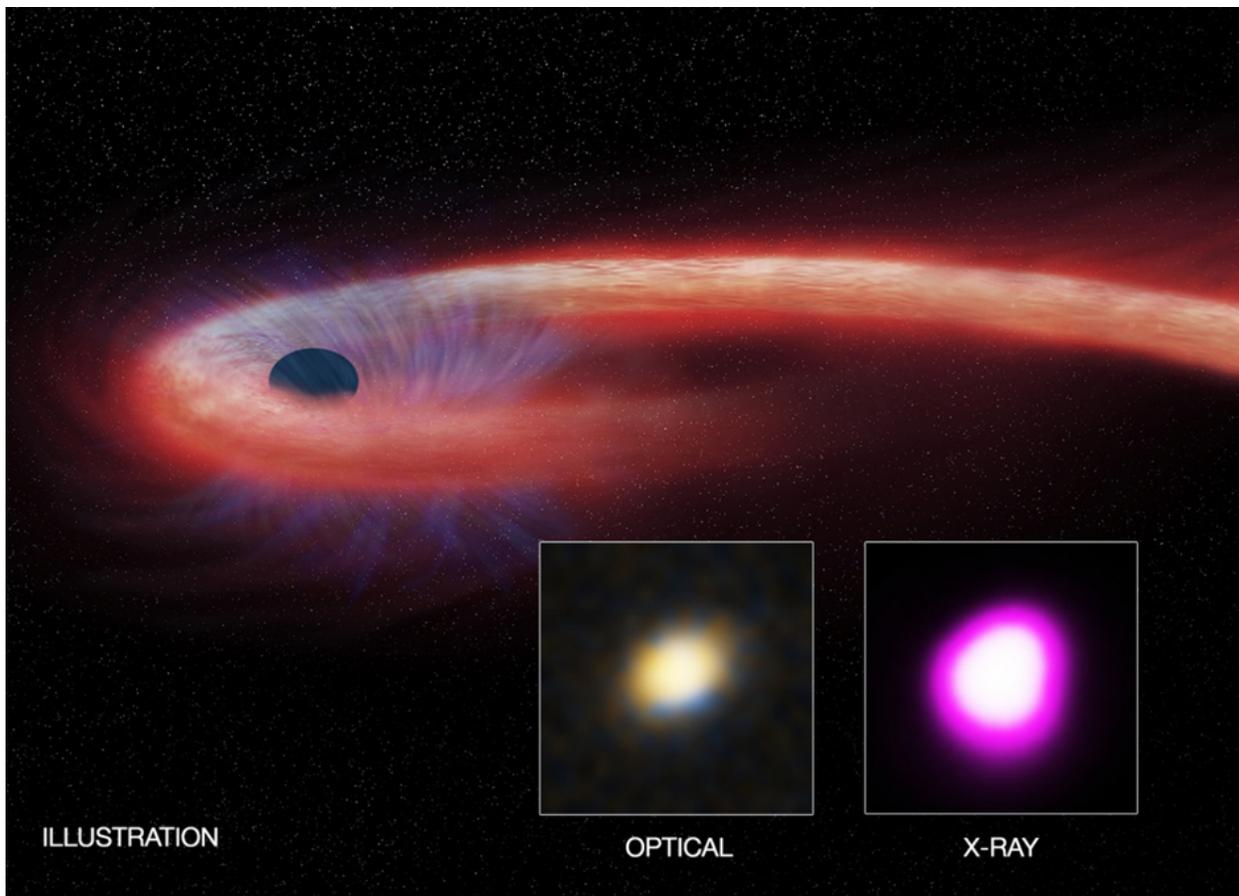
The Hubble Space Telescope is a project of international cooperation between NASA and the European Space Agency. NASA Goddard manages the telescope. The Space Telescope Science Institute (STScI) in Baltimore, Maryland, conducts Hubble science operations. STScI is operated for NASA by the Association of Universities for Research in Astronomy in Washington, D.C.

For images and more information about the exocomets and Hubble, visit http://hubblesite.org/news_release/news/2017-09 and www.nasa.gov/hubble

Source: [NASA](http://www.nasa.gov)

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3. A Black Hole Feeding Frenzy That Breaks Records



A giant black hole ripped apart a nearby star and then continued to feed off its remains for close to a decade, according to research led by the University of New Hampshire.

This black hole meal is more than 10 times longer than any other previous episode of a star's death.

"We have witnessed a star's spectacular and prolonged demise," said Dacheng Lin, a research scientist at the University of New Hampshire's Space Science Center and the study's lead author. "Dozens of these so-called tidal disruption events have been detected since the 1990s, but none that remained bright for nearly as long as this one."

Using data from a trio of orbiting X-ray telescopes, NASA's Chandra X-ray Observatory and Swift Satellite as well as ESA's XMM-Newton, researchers found evidence of a massive "tidal disruption event" (TDE). Tidal forces, due to the intense gravity from the black hole, can destroy an object - such as a star - that wanders too close. During a TDE, some of the stellar debris is flung outward at high speeds, while the rest falls toward the black hole. As it travels inward, and is ingested by the black hole, the material heats up to millions of degrees and generates a distinct X-ray flare.

These multiwavelength flares, which can be viewed by the satellites, help to study otherwise dormant massive black holes. Previous flares were short-lived, typically becoming very faint in a year, but this super-long X-ray flare has been persistently bright for close to a decade. The extraordinary long bright phase of this TDE means that either this was the most massive star ever to be torn apart during one of these events, or the first where a smaller star was completely torn apart.

The X-ray source containing this force-fed black hole, known by its abbreviated name of XJ1500+0154, is located in a small galaxy about 1.8 billion light years from Earth.

The X-ray data also indicates that radiation from material surrounding this black hole has consistently surpassed the so-called Eddington limit, defined by a balance between the outward pressure of radiation from the hot gas and the inward pull of the gravity of the black hole.

The conclusion that supermassive black holes can grow, from TDEs and perhaps other means, at rates above those corresponding to the Eddington limit has important implications. Such rapid growth may help explain how supermassive black holes were able to reach masses about a billion times higher than the sun when the universe was only about a billion years old.

Based on the modeling by the researchers the black hole's feeding supply should be significantly reduced in the next decade and begin to fade in the next several years.

A paper describing these results appears in the February 6th issue of the journal Nature Astronomy.
<http://www.nature.com/articles/s41550-016-0033>

Source: [Spaceref.com](http://www.spaceref.com)

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The Night Sky

Friday, February 10

- Full Moon (exactly so at 7:33 p.m. EST). A very deep penumbral eclipse of the Moon happens around sunset or in early evening for most of the Americas. See our article with timetable, [February's Deep Penumbral Lunar Eclipse](#), and the [February Sky & Telescope](#), page 48.

Look for Regulus 6° or 7° to the Moon's lower left as darkness comes on for North America, as shown here. By midnight, Regulus is directly to the Moon's left.

Saturday, February 11

- Now the Moon shines below Regulus and the Sickle of Leo after dark, as shown here.

Sunday, February 12

- Zenith star: sometime around 7 or 8 p.m. (depending on how far east or west you live in your time zone), zero-magnitude Capella passes closest to your zenith. At almost the same minute, zero-magnitude Rigel, the leading foot of Orion, crosses the meridian due south.

Monday, February 13

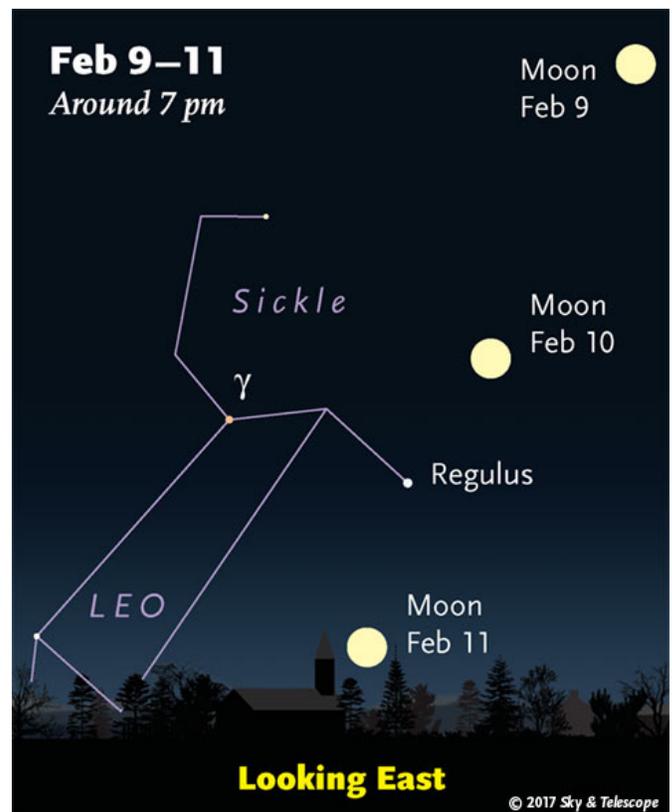
- The sky's biggest asterism (informal star pattern) is the Winter Hexagon, filling the southern sky after dinnertime. Start with brilliant Sirius at the Hexagon's bottom. Going clockwise from there, march through Procyon, Pollux and Castor, Menkalinan and Capella nearly overhead, then down to Aldebaran, Rigel in Orion's foot, and back to Sirius. Betelgeuse sparkles inside the Hexagon, off center.

Tuesday, February 14

- The Moon rises around 9 p.m., with Jupiter following up below it 30 or 40 minutes later. Then only 10 or 15 minutes later, fainter Spica follows Jupiter (look to Jupiter's lower right). By dawn on the 15th the trio has moved over to the high southwest, as shown here.

Source: [Sky & Telescope](#)

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ISS Sighting Opportunities

[For Denver:](#)

Date	Visible	Max Height	Appears	Disappears
Fri Feb 10, 7:04 PM	2 min	21°	11° above NNW	21° above N
Sat Feb 11, 6:11 PM	4 min	16°	10° above NNW	11° above ENE
Sat Feb 11, 7:47 PM	< 1 min	16°	10° above NW	16° above NW
Sun Feb 12, 6:55 PM	3 min	43°	10° above NW	42° above NE
Mon Feb 13, 6:03 PM	5 min	26°	10° above NNW	11° above E
Mon Feb 13, 7:40 PM	< 1 min	28°	20° above W	28° above W
Tue Feb 14, 6:46 PM	5 min	77°	10° above NW	23° above SE

Sighting information for other cities can be found at NASA's [Satellite Sighting Information](#)

NASA-TV Highlights

(all times Eastern Daylight Time)

Saturday, February 11

1:30 p.m., The Smithsonian's National Air and Space Museum Presents – "Heritage Family Days" - African American Pioneers in Aviation and Space with NASA Astronaut Victor Glover (NTV-1 (Public))

6 p.m., Replay of The Smithsonian's National Air and Space Museum Presents – "Heritage Family Days" - African American Pioneers in Aviation and Space with NASA Astronaut Victor Glover (NTV-1 (Public))

Sunday, February 12

4 p.m., Replay of The Smithsonian's National Air and Space Museum Presents – "Heritage Family Days" - African American Pioneers in Aviation and Space with NASA Astronaut Victor Glover (NTV-1 (Public))

8 p.m., Replay of The Smithsonian's National Air and Space Museum Presents – "Heritage Family Days" - African American Pioneers in Aviation and Space with NASA Astronaut Victor Glover (NTV-1 (Public))

Watch NASA TV on the Net by going to the [NASA website](#).

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Space Calendar

- Feb 10 - [Comet 41P/Tuttle-Giacobini-Kresak At Opposition](#) (0.339 AU)
- Feb 10 - [Comet C/2016 J2 \(Denneau\) At Opposition](#) (3.343 AU)
- Feb 10 - [Asteroid 21 Lutetia Occults TYC 1900-01125-1](#) (12.3 Magnitude Star)
- Feb 10 - [Aten Asteroid 2014 DV110 Near-Earth Flyby](#) (0.025 AU)
- Feb 10 - [Asteroid 6471 Collins](#) Closest Approach To Earth (1.146 AU)
- Feb 10 - [Asteroid 5891 Gehrig](#) Closest Approach To Earth (1.430 AU)
- Feb 11 -  [Feb 04] [Penumbral Lunar Eclipse](#)
- Feb 11 - [Moon Occults Regulus](#)
- Feb 11 - [Comet 45P/Honda-Mrkos-Pajdusakova Near-Earth Flyby](#) (0.083 AU)
- Feb 11 - [Comet 73P-N/Schwassmann-Wachmann Closest Approach To Earth](#) (1.595 AU)
- Feb 11 - [Amor Asteroid 2017 BX6](#) Near-Earth Flyby (0.057 AU)
- Feb 11 - [Atira Asteroid 2007 EB26 Closest Approach To Earth](#) (0.811 AU)
- Feb 11 - [Asteroid 15495 Bogie](#) Closest Approach To Earth (1.689 AU)
- Feb 11 - [Educator's Workshop: Marsbound and the Search for Life](#), Pasadena, California
- Feb 11 -  [Feb 07] [Event: African-American Pioneers in Aviation and Space](#), Washington DC
- Feb 11 - 20th Anniversary (1997), [STS-82 Launch](#) (Space Shuttle Discovery, Hubble Space Telescope Servicing)
- Feb 12 - [Moon Occults Asteroid 16 Psyche](#)
- Feb 12 - [Comet 73P-J/Schwassmann-Wachmann Perihelion](#) (0.976 AU)
- Feb 12 - [Comet C/2015 D3 \(PANSTARRS\) At Opposition](#) (7.383 AU)
- Feb 12 - [Comet C/2014 B1 \(Schwartz\) Closest Approach To Earth](#) (8.664 AU)
- Feb 12 - [Apollo Asteroid 2017 BK32](#) Near-Earth Flyby (0.027 AU)
- Feb 12 - [Apollo Asteroid 2015 QR3](#) Near-Earth Flyby (0.034 AU)
- Feb 12 - [Aten Asteroid 2017 BO6](#) Near-Earth Flyby (0.047 AU)
- Feb 12 - [Apollo Asteroid 2014 QC3](#) Near-Earth Flyby (0.050 AU)
- Feb 12 - [Asteroid 3061 Cook](#) Closest Approach To Earth (2.665 AU)
- Feb 12 - 70th Anniversary (1947), [Sikhote Alin Meteorite](#) Fall in Russia
- Feb 13 - [Comet 73P-BO/Schwassmann-Wachmann Closest Approach To Earth](#) (1.574 AU)
- Feb 13 - [Comet 33P/Daniel At Opposition](#) (1.669 AU)
- Feb 13 - [Comet 224P/LINEAR-NEAT At Opposition](#) (1.808 AU)
- Feb 13 - [Comet 61P/Shajn-Schaldach At Opposition](#) (2.806 AU)
- Feb 13 - [Comet 316P/LONEOS-Christensen Closest Approach To Earth](#) (2.986 AU)
- Feb 13 - [Comet C/2017 A3 \(Elenin\) Perihelion](#) (3.878 AU)
- Feb 13 -  [Feb 04] [Apollo Asteroid 2017 BT93](#) Near-Earth Flyby (0.076 AU)
- Feb 13 - [Asteroid 5870 Baltimore](#) Closest Approach To Earth (1.371 AU)
- Feb 13 - [Aten Asteroid 99942 Apophis Closest Approach To Earth](#) (1.732 AU)
- Feb 13 - [Asteroid 4749 Ledzepplin](#) Closest Approach To Earth (2.212 AU)
- Feb 13 - [Asteroid 3325 TARDIS](#) Closest Approach To Earth (2.256 AU)
- Feb 13 - [John Dreyer's 165th Birthday](#) (1852)

Source: [JPL Space Calendar](#)

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Food for Thought

A Valentine: From Cassini with Love



Saturn mission invites public to share artistic creations with [#CassiniInspires](#).

Although the motivation behind NASA's Cassini mission to Saturn was scientific, part of the planet's allure has long been in its undeniable physical beauty.

Since Cassini arrived at Saturn in 2004, dramatic views from the spacecraft's imaging cameras -- and other sensors that observe in infrared, ultraviolet and radio frequencies -- have revealed the ringed planet and its moons in unprecedented detail for scientists to study.

Images taken by Cassini's cameras are [published directly to the web](#) shortly after they're received from the spacecraft, making them available for anyone to peruse and enjoy. And thus, throughout the journey, a dedicated community of space exploration enthusiasts has ridden along, sharing and discussing Cassini's images, often processing them to create their own spectacular scenes.

"We're so gratified that Cassini's images have inspired people to work with the pictures themselves to produce such beautiful creations," said Linda Spilker, Cassini project scientist at NASA's Jet Propulsion Laboratory, Pasadena, California. "It's been truly wonderful for us to feel the love for Cassini from the public. The feeling from those of us on the mission is mutual.

Cassini Inspires

To celebrate the many ways Cassini's exploration of Saturn has sparked curiosity and wonder, the mission is launching a campaign planned to continue through the mission's dramatic conclusion in September.

The activity, called "Cassini Inspires" invites members of the public to share their original Saturn-inspired artistic creations in a variety of different media (including painting, music, poetry, fiction, video or any format that can be shared online). To participate, artists post their creations on the social media platform of their choice, and tag them [#CassiniInspires](#). For more information, visit <https://saturn.jpl.nasa.gov/cassiniinspires>

Launched in 1997, Cassini has been touring the Saturn system since arriving in 2004 for an up-close study of the planet, its rings and moons, and its vast magnetosphere. Cassini has made numerous dramatic discoveries, including a global ocean with indications of hydrothermal activity within the moon Enceladus, and liquid methane seas on another moon, Titan.

The mission is in its penultimate phase, performing weekly ring-grazing dives just past the outer edge of Saturn's main rings. In April, the spacecraft will begin its Grand Finale, plunging through the gap between the rings and the planet itself, leading up to a fateful plunge into Saturn on September 15.

The Cassini-Huygens mission is a cooperative project of NASA, ESA (European Space Agency) and the Italian Space Agency. NASA's Jet Propulsion Laboratory, a division of Caltech in Pasadena, manages the mission for NASA's Science Mission Directorate, Washington. JPL designed, developed and assembled the Cassini orbiter.

More information about Cassini at <http://www.nasa.gov/cassini> and <http://saturn.jpl.nasa.gov>.

Source: [NASA](#)

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Space Image of the Week



The Butterfly Nebula from Hubble

Explanation: The bright clusters and nebulae of planet Earth's night sky are often named for [flowers](#) or [insects](#). Though its wingspan covers over 3 light-years, [NGC 6302](#) is no exception. With an estimated surface temperature of about 250,000 degrees [C](#), the dying central star of this particular [planetary nebula](#) has become exceptionally hot, shining brightly in ultraviolet light but hidden from direct view by a dense torus of dust. This sharp close-up of the dying star's nebula was recorded by the [Hubble Space Telescope](#) and is presented here in [reprocessed colors](#). Cutting across a bright cavity of ionized gas, the dust [torus](#) surrounding the central star is near the center of this view, almost edge-on to the line-of-sight. [Molecular hydrogen has been detected](#) in the hot star's dusty cosmic shroud. [NGC 6302](#) lies about 4,000 light-years away in the [arachnologically](#) correct constellation of the Scorpion ([Scorpius](#)).

Image Credit: [NASA](#), [ESA](#), [Hubble](#), [HLA](#); **Reprocessing & Copyright:** [Jesús M.Vargas & Maritxu Poyal](#)

Source: [Astronomy Picture of the Day](#)

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