

Space News Update

– March 16, 2018 –

Contents

In the News

Story 1:

CSU Professor Clarifies Report Astronaut's DNA Changed In Space

Story 2:

Dawn Reveals Recent Changes in Ceres' Surface

Story 3:

New Horizons Spacecraft's Next Distant Destination Gets a Nickname

Departments

The Night Sky

ISS Sighting Opportunities

Space Calendar

NASA-TV Highlights

Food for Thought

Space Image of the Week

1. CSU Professor Clarifies Report Astronaut's DNA Changed In Space



Scott (right) and Mark Kelly (left)

While Professor Susan Bailey was on Spring Break from Colorado State University she was shocked to find out headlines were circulating the globe that astronaut Scott Kelly's DNA had actually changed in space. "It was news to all of us too," laughed Bailey. "I think it was a very innocent comment. an innocent tweet that just exploded. it really caught people's attention and imagination."

On March 10th Kelly tweeted out an article saying his DNA had changed. He was even surprised.

Bailey is the lead researcher on Kelly's year in space with regards to DNA. She says things got blown out of proportion.

"It wasn't so much changes in the DNA, it was changes in gene expressions so the actual proteins that get expressed from those changes. There's always a lot of variation in gene expression. Endurance exercise, for example, can change gene expression and that can change every day for all of us," Bailey said.

Seven percent of those gene expressions didn't return to normal after Kelly returned to earth, but that research was put out by Bailey and her team more than a year ago.

"The things that did change, a lot of it went back to normal. That's really good news," the associate professor at the Department of Environmental and Radiological Sciences at CSU said. Bailey says her research, and nine other studies, aren't finalized yet and should be released from NASA later this year.

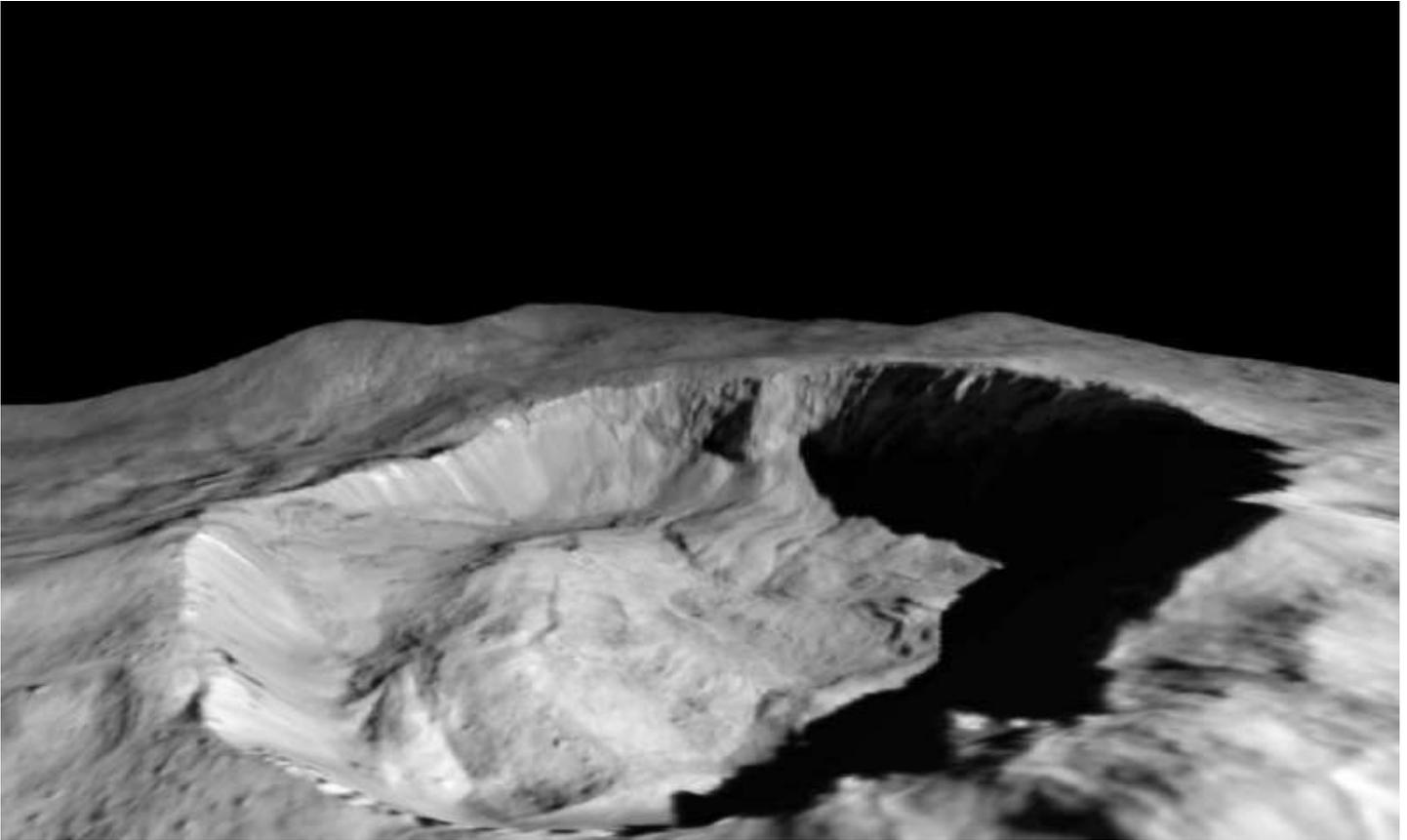
"It's really just the beginning of finding out what space flight does to people," she said. "We're still trying to figure out what that means and what caused it and if there's any kind of long-term health risk associated with that."

[Note: More information on the NASA Twins Study can be found at <https://www.nasa.gov/feature/nasa-twins-study-confirms-preliminary-findings>]

Source: [CBS 4 News](#)

[Return to Contents](#)

2. Dawn Reveals Recent Changes in Ceres' Surface



Observations of Ceres have detected recent variations in its surface, revealing that the only dwarf planet in the inner solar system is a dynamic body that continues to evolve and change.

NASA's Dawn mission has found recently exposed deposits that give us new information on the materials in the crust and how they are changing, according to two papers published March 14 in *Science Advances* that document the new findings.

Observations obtained by the visible and [infrared mapping spectrometer](#) (VIR) on the Dawn spacecraft previously found [water ice](#) in a dozen sites on Ceres. The new study revealed the abundance of ice on the northern wall of Juling Crater, a [crater](#) 12 miles (20 kilometers) in diameter. The new observations, conducted from April through October 2016, show an increase in the amount of ice on the crater wall.

"This is the first direct detection of change on the surface of Ceres," said Andrea Raponi of the Institute of Astrophysics and Planetary Science in Rome.

Raponi led the new study, which found changes in the amount of ice exposed on the dwarf planet. "The combination of Ceres moving closer to the sun in its orbit, along with seasonal change, triggers the release of water vapor from the subsurface, which then condenses on the cold crater wall. This causes an increase in the amount of exposed ice. The warming might also cause landslides on the crater walls that expose fresh ice patches."

By combining chemical, geological and geophysical observations, the Dawn mission is producing a comprehensive view of Ceres. Previous data had shown Ceres has a crust about 25 miles (40 kilometers) thick and rich in water, salts and, possibly, organics.

In a second study, VIR observations also reveal new information about the variability of Ceres' crust, and suggest recent surface changes, in the form of newly exposed material.

Dawn previously found carbonates, common on the planet's surface, that formed within an ocean. Sodium carbonates, for example, dominate the bright regions in Occator Crater, and material of similar composition has been found at Oxo Crater and Ahuna Mons.

This study, led by Giacomo Carrozzo of the Institute of Astrophysics and Planetary Science, identified 12 sites rich in sodium carbonates and examined in detail several areas of a few square miles that show where water is present as part of the carbonate structure. The study marks the first time hydrated carbonate has been found on the surface of Ceres, or any other planetary body besides Earth, giving us new information about the [dwarf planet's](#) chemical evolution.

Water ice is not stable on the surface of Ceres over long time periods unless it is hidden in shadows, as in the case of Juling. Similarly, hydrated carbonate would dehydrate, although over a longer timescale of a few million years.

"This implies that the sites rich in hydrated carbonates have been exposed due to recent activity on the [surface](#)," Carrozzo said.

The great diversity of material, ice and carbonates, exposed via impacts, landslides and cryovolcanism suggests Ceres' crust is not uniform in composition. These heterogeneities were either produced during the freezing of Ceres' original ocean—which formed the crust—or later on as a consequence of large impacts or cryovolcanic intrusions.

"Changes in the abundance of water ice on a short timescale, as well as the presence of hydrated sodium carbonates, are further evidence that Ceres is a geologically and chemically active body," said Cristina De Sanctis, VIR team leader at the Institute of Astrophysics and Planetary Science.

Explore further: [Dawn discovers evidence for organic material on Ceres \(Update\)](#)

More information: Filippo Giacomo Carrozzo et al. Nature, formation, and distribution of carbonates on Ceres, *Science Advances* (2018). [DOI: 10.1126/sciadv.1701645](#)

Andrea Raponi et al. Variations in the amount of water ice on Ceres' surface suggest a seasonal water cycle, *Science Advances* (2018). [DOI: 10.1126/sciadv.aao3757](#)

Source: [Phys.org](#)

[Return to Contents](#)

3. New Horizons Spacecraft's Next Distant Destination Gets a Nickname



The frozen faraway miniature world targeted for a high-speed flyby by NASA's New Horizons spacecraft on Jan. 1, 2019, now has a nickname: Ultima Thule.

Formally known as 2014 MU69, the robotic space probe's next target will become the most distant object ever explored up-close, making Ultima Thule a fitting nickname.

"The name comes from medieval mapmakers, where Thule (pronounced "thoo-lee") was a distant and unknown island thought to be the northernmost place on Earth," wrote Mark Showalter, a member of the New Horizons science team who led the naming campaign. "'Ultima Thule' (which translates as 'farthest Thule' or 'beyond Thule) has come to be used as a metaphor for any mysterious place 'beyond the borders of the known world.'

"This is an apt metaphor for the tiny object, four billion miles away, that will be the next destination for the New Horizons spacecraft," Showalter wrote in a blog post revealing the nickname.

The New Horizons team selected the monicker after seeking nominations from the public, who then ranked 37 of the potential names in an online poll. Mission managers said they would pick a nickname from among the top vote-getters, and Ultima Thule was one of the most popular nominees, officials said in a press release Tuesday.

"MU69 is humanity's next Ultima Thule," said Alan Stern, New Horizons principal investigator from Southwest Research Institute in Boulder, Colorado. "Our spacecraft is heading beyond the limits of the known worlds, to what will be this mission's next achievement. Since this will be the farthest exploration of any object in space in history, I like to call our flyby target Ultima, for short, symbolizing this ultimate exploration by NASA and our team."

Three-and-a-half years after its historic first encounter with Pluto, New Horizons is in an extended mission. NASA approved a plan to aim the spacecraft for 2014 MU69, or Ultima Thule, a target that scientists believe

could consist of two or three icy worlds orbiting in close proximity to one another in the Kuiper Belt, a zone of frozen objects orbiting the sun beyond Neptune.

Scientists know little about Ultima Thule, which appears as a speck of light through even the highest-power telescopes, such as Hubble, the famous observatory astronomers used to find the object in 2014.

Ultima Thule is about the diameter of a large city and appears reddish in telescopic views, and a field campaign last year used occultations — when the object passed in front of stars as seen from Earth — to discern more about the shape and environment of New Horizons' next target.

It turns out the object is probably a dual-lobe world, with its two segments either orbiting one another or a contact binary stuck together "like two globs of ice cream," said Marc Buie, a co-investigator on the New Horizons mission from SWRI.

Buie said in December that scientists found evidence that Ultima Thule has a small moonlet lurking nearby.

Researchers believe Ultima Thule has remained in its primordial state since the solar system's early history 4.5 billion years ago. Comets that come from the far outer solar system originated in the same frozen, faint environment, but repeated passes near the sun have erased their ancient characteristics.

Scientists hope the plutonium-powered New Horizons spacecraft's discoveries at Ultima Thule will help their understanding of how the solar system formed and evolved over billions of years.

Ultima Thule will be just a placeholder name for 2014 MU69, which will receive an official designation from the International Astronomical Union in 2019. The New Horizons team plans to submit a formal name to the global body after the Jan. 1 flyby.

The final name will depend in part on whether MU69 is found to be a single body, a binary pair, or a cluster of multiple objects, the New Horizons team wrote in a statement.

Source: [Spaceflight Now](#)

[Return to Contents](#)

The Night Sky

Friday, March 16

- The biggest asterism in the sky is the Winter Hexagon. Right after dark in March, it fills the sky toward the south and west. Start with brilliant Sirius in its bottom, nearly south. Going clockwise from there, march upper left through Procyon, then up to Pollux and Castor near the zenith. Then head far to the right through Menkalinan to bright Capella, then lower left to Aldebaran, farther lower left to Rigel in Orion's foot, and back to Sirius.

Betelgeuse shines inside the Hexagon, below center.

In a few weeks, as the constellations wheel westward and the Hexagon's lower half sets, its top half becomes the twilight Arch of Spring.

Saturday, March 17

- Spring begins in three days — so watch the low east-northeast for the rise of the "Spring Star," Arcturus. Find the Big Dipper high in the northeast and follow the curve of its handle down around, by a little more than a Dipper-length, to see where Arcturus is — or soon will be.

- New Moon (exact at 9:12 a.m. EDT).

Sunday, March 18

- As twilight fades, look low due west for Venus with the super-thin Moon 3° or 4° to its left, as shown above. A similar distance upper right of the Moon, look for Mercury, much fainter at magnitude +0.4.

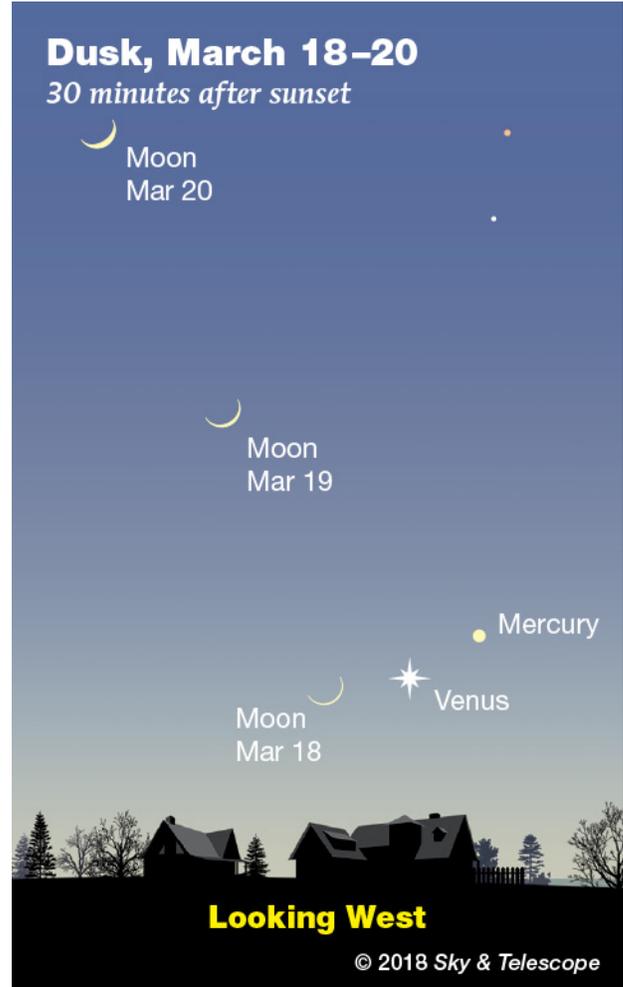
- By nightfall, the Big Dipper is high in the northeast and beginning to tip left. Look well to its left for Polaris and the dim Little Dipper. Other than Polaris, all you may see of the Little Dipper through light pollution is the two stars forming the outer edge of its bowl: Kochab (similar to Polaris in brightness) and below it, fainter Pherkad. Find these two "Guardians of the Pole" to Polaris's lower right by about a fist and a half at arm's length.

Now is the time of year when the Guardians line up exactly vertically at the end of twilight.

Monday, March 19

- If the crescent Moon were a bow, it would shoot an arrow to the lower right just past Venus in this evening's twilight, as shown above.

- Sirius shines brilliantly in the south-southwest after dark. Lower left of Sirius, by about one fist, is the triangle of Adhara, Wezen, and Aludra, from right to left. They form Canis Major's hind foot, rear end, and tail, respectively.



Just left of them, forming a 3rd- and 4th-magnitude arc, are the three uppermost stars of the constellation Puppis. No it's not a pup, despite its nearness to the Big Dog. It's the Poop Deck (stern) of the giant ancient constellation Argo Navis, the ship of Jason and the Argonauts. These three stars the only ones of Argo that are readily visible naked-eye from mid-northern latitudes.

Source: [Sky & Telescope](#)

[Return to Contents](#)

ISS Sighting Opportunities

[For Denver:](#)

Date	Visible	Max Height	Appears	Disappears
Sat Mar 17, 5:06 AM	1 min	22°	22° above NNE	20° above NE
Sat Mar 17, 6:39 AM	6 min	49°	10° above WNW	12° above SSE
Sun Mar 18, 5:49 AM	5 min	80°	23° above NW	10° above SE
Mon Mar 19, 4:59 AM	2 min	32°	32° above ENE	11° above ESE
Mon Mar 19, 6:32 AM	5 min	19°	10° above W	10° above S

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

NASA-TV Highlights

(all times Eastern Daylight Time)

Friday, March 16

2 p.m., 6 p.m., 10 p.m., Replay of SpaceCast Weekly (all channels)

Saturday, March 17

8 a.m., 2 p.m., 6 p.m., Replay of Pre-Launch Activities by the ISS Expedition 55-56 Crew (Artemyev, Feustel, Arnold) in Baikonur, Kazakhstan (Recorded March 4-15) (all channels)

10 a.m., 4 p.m., 8 p.m., Replay of SpaceCast Weekly (all channels)

Sunday, March 18

8 a.m., 6 p.m., 9 p.m., Replay of SpaceCast Weekly (all channels)

9 a.m., 8p.m., 10 p.m., Replay of Pre-Launch Activities by the ISS Expedition 55-56 Crew (Artemyev, Feustel, Arnold) in Baikonur, Kazakhstan (Recorded March 4-15) (all channels)

Monday, March 19

4 p.m., Video File of Pre-Launch Activities by the ISS Expedition 55-56 Crew (Artemyev, Feustel, Arnold) in Baikonur, Kazakhstan and the Rollout of the Soyuz MS-08 Vehicle to the Launch Pad at the Baikonur Cosmodrome (Recorded March 16-18) (NTV-3 (Media))

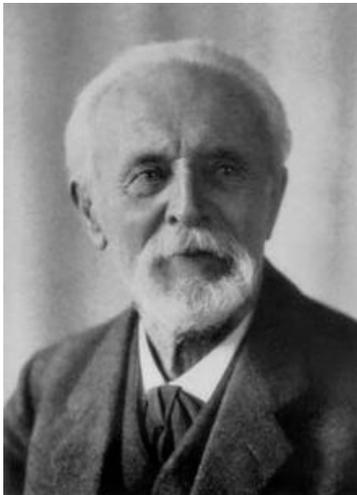
7 p.m., 9 p.m., Replay of Pre-Launch Activities by the ISS Expedition 55-56 Crew (Artemyev, Feustel, Arnold) in Baikonur, Kazakhstan and the Rollout of the Soyuz MS-08 Vehicle to the Launch Pad at the Baikonur Cosmodrome (Recorded March 16-18) (all channels)

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

[Return to Contents](#)

Space Calendar

- Mar 16 - [Comet 62P/Tsuchinshan Closest Approach To Earth](#) (1.025 AU)
- Mar 16 - [Comet P/2015 X1 \(PANSTARRS\) At Opposition](#) (3.828 AU)
- Mar 16 - **NEW** [Mar 14] [Apollo Asteroid 2018 EB4](#) Near-Earth Flyby (0.004 AU)
- Mar 16 - [Asteroid 3494 Purple Mountain](#) Closest Approach To Earth (1.564 AU)
- Mar 16 - [Asteroid 371 Bohemia](#) Closest Approach To Earth (1.746 AU)
- Mar 16 - [Asteroid 325 Heidelberga](#) Closest Approach To Earth (2.450 AU)
- Mar 16 - [Frederick Reines' 100th Birthday](#) (1918)
- Mar 16 - [Heinrich Kayser's 165th Birthday](#) (1853)
- Mar 17 - [Comet 103P/Hartley At Opposition](#) (2.500 AU)
- Mar 17 - [Asteroid 26858 Misterrogers](#) Closest Approach To Earth (1.139 AU)
- Mar 17 - [Asteroid 15000 CCD](#) Closest Approach To Earth (1.589 AU)
- Mar 17 - [Asteroid 1278 Kenya](#) Closest Approach To Earth (1.984 AU)
- Mar 17 - [Asteroid 6701 Warhol](#) Closest Approach To Earth (1.993 AU)
- Mar 17 - [Asteroid 316201 Malala](#) Closest Approach To Earth (2.123 AU)
- Mar 17 - 60th Anniversary (1958), [Vanguard 1](#) Launch
- Mar 18 - [Mercury](#) Passes 3.9 Degrees From [Venus](#)
- Mar 18 - [Comet 346P/Catalina At Opposition](#) (2.725 AU)
- Mar 18 - [Comet 235P/LINEAR Perihelion](#) (2.732 AU)
- Mar 18 - [Comet 314P/Montani Closest Approach To Earth](#) (4.053 AU)
- Mar 18 - [Comet C/2016 E1 \(PANSTARRS\) At Opposition](#) (7.651 AU)
- Mar 18 - **NEW** [Mar 12] [Apollo Asteroid 2018 ET1](#) Near-Earth Flyby (0.011 AU)
- Mar 18 - **NEW** [Mar 10] [Apollo Asteroid 2018 EC1](#) Near-Earth Flyby (0.032 AU)
- Mar 18 - [Asteroid 2187 La Silla](#) Closest Approach To Earth (1.855 AU)
- Mar 19 - [Comet 73P-Y/Schwassmann-Wachmann Closest Approach To Earth](#) (1.558 AU)
- Mar 19 - [Comet P/2012 O2 \(McNaught\) At Opposition](#) (2.706 AU)
- Mar 19 - [Asteroid 24663 Philae](#) Closest Approach To Earth (1.675 AU)
- Mar 19 - [Asteroid 6136 Gryphon](#) Closest Approach To Earth (2.008 AU)
- Mar 19 - **NEW** [Mar 16] [Colloquium: What Is the Dark Matter Made Of?](#), Tuscon, Arizona



Heinrich Gustav Johannes Kayser

Source: [JPL Space Calendar](#)

[Return to Contents](#)

Food for Thought

'He Inspired Us All to Wonder': Scientists and the Public Remember Stephen Hawking



In 1963, [Stephen Hawking](#), then a physics student at the University of Cambridge, was given a few years to live. Now, 55 years later, after multiple best-selling books and many groundbreaking cosmological theories, [the acclaimed physicist and science communicator has died](#). And his death has spawned an outpouring of respect and emotions from scientists the world over.

According to Lord Martin Rees — astronomer royal, emeritus professor of cosmology and astrophysics at the University of Cambridge, and fellow student of Hawking at Cambridge — Hawking viewed everything that happened after his devastating amyotrophic lateral sclerosis (ALS) diagnosis as a bonus. And he certainly didn't waste a minute of that time.

"He didn't just survive," Rees said in a statement. "He became one of the most famous scientists in the world — acclaimed as a world-leading researcher in mathematical physics; for his best-selling books about space, time and the cosmos; and for his astonishing triumph over adversity. Few, if any, of Einstein's successors have done more to deepen our insights into gravity, space and time." [[Stephen Hawking's Far-Out Ideas About Black Holes](#)]

"His passing has left an intellectual vacuum in his wake," said astrophysicist Neil deGrasse Tyson, who in 2017 became the first American to receive the [Stephen Hawking Medal for Science Communication](#). "But it's not empty. Think of it as a kind of vacuum energy permeating the fabric of space-time that defies measure."

At only 32, Hawking was elected a fellow of the U.K.'s Royal Society, the oldest national scientific institution in the world, for his work on radiation that escapes from black holes, later dubbed Hawking radiation. But his scientific interests were much broader.

"He had the ambition and the ability to tackle fundamental questions about gravity and quantum mechanics, their role in black holes and [the origin of the universe](#)," said David Wands, director of the Institute of Cosmology and Gravitation at the University of Portsmouth, in the U.K., and a former student of Hawking at Cambridge.

"He realized that [black holes can emit radiation](#), which eventually leads them to evaporate," Wands said. "He also discovered that the same quantum effect in the very early universe can lead to small fluctuations in the density of the hot thermal plasma, a fraction of a second after the Big Bang, and this could lead to all the structures that we observe in the cosmos around us, galaxies, stars and, ultimately, planets and people."

A pop-culture physicist

In addition to pushing the boundaries of theoretical physics and stunning his doctors with his persistent survival against all prognoses, Hawking managed to accomplish something that many of his predecessors would deem impossible: He made a subject as complicated as astrophysics a matter of wide public fascination. His popularizing book "[A Brief History of Time](#)" (Bantam Books, 1988), in which he explains in layman's terms the evolution of the universe, occupied the British Sunday Times best-seller list for a record-breaking 237 weeks.

"He was a true genius who had a great admiration of and connection to the public," said Katherine Mathieson, chief executive of the British Science Association. "He simplified and explained, but without gimmicks. His assumption that people are curious about the universe and black holes was true. He inspired us all to wonder."

Hawking — who used a wheelchair due to ALS and spoke with a machine-synthesized voice due to a life-saving tracheotomy he had in 1985 after contracting pneumonia during a trip to CERN (European Organization for Nuclear Research) — became a true pop-culture icon. The [outpouring of condolences and expressions of respect on Twitter](#) following the announcement of his passing has extended far beyond the scientific community.

"In loving memory of Stephen Hawking. It was an honor to have him," [tweeted the team behind "The Big Bang Theory" TV series](#), where Hawking appeared on three separate occasions, the last of which was less than a year ago. "Thank you for inspiring us and the world."

Hawking, according to his long-term scientific collaborator Roger Penrose, always enjoyed his role of "the No. 1 celebrity scientist." He also appeared in an episode of "Star Trek: The Next Generation," and voiced himself on "The Simpsons" and "Futurama," to name just a few. In 2015, British actor Eddie Redmayne [won an Oscar for portraying Hawking](#) in the biographical drama "The Theory of Everything."

Despite his popular appeal, Hawking remained firmly rooted in the scientific world, having served as the Lucasian professor of mathematics at Cambridge, a highly prestigious position once held by Isaac Newton, for 30 years until he reached retiring age in 2009. He authored technical papers until his final decade, according to Rees.

"Huge audiences would attend his public lectures, perhaps not always just for scientific edification," Penrose said [in an obituary in The Guardian](#). "The scientific community might well form a more sober assessment. He was extremely highly regarded, in view of his many greatly impressive, sometimes revolutionary, contributions to the understanding of the physics and the geometry of the universe."

A vocal advocate of the rights of people with physical disabilities, Hawking showed the world that people can live full lives despite having severe physical ailments.

In 2007, the then-65-year-old took part in a zero-gravity parabolic flight that gave him a 4-minute taste of weightlessness. Hawking was also scheduled to fly on one of the first suborbital flights of Virgin Galactic. Unfortunately, this last dream of Hawking will not come true.

In a touching tribute, Virgin Galactic's billionaire founder, Sir Richard Branson, said he was honored to know Hawking, who [helped name the company's VSS Unity SpaceShipTwo vehicle](#) in 2016. The spacecraft carries Hawking's iris pattern, said Branson, who lamented never getting the chance to see the physicist fly in space.

"I am so sorry we didn't get him into space as he so dearly wished, but so thankful he was able to play such a meaningful role in the development of a new frontier he was so passionate about," [Branson said in a statement](#). "It was a huge privilege to have him name VSS Unity, and we are honoured to fly his iris on our spaceship."

Source: [Space.com](#)

[Return to Contents](#)

Space Image of the Week



The Aurora Named STEVE

Explanation What's in a name? If your name is Strong Thermal Emission Velocity Enhancement aka STEVE, then there's quite a bit behind the name.

Glowing in mostly purple and green colors, a new celestial phenomenon is sparking the interest of scientists, photographers and astronauts. The display was initially discovered by a group of citizen scientists who took pictures of the unusual lights and playfully named them "Steve." Scientists have since learned more about the purples and greens, and have given it a more accurate name: Strong Thermal Emission Velocity Enhancement, which can still be shortened to STEVE.

A citizen science project called Aurorasaurus, funded by NASA and the National Science Foundation, wants your help gathering photos so they can learn more about this mysterious phenomenon. Aurorasaurus tracks appearances of auroras — and now STEVE — around the world through users submitting reports and photographs directly on its mobile app and on aurorasaurus.org.

[Research about STEVE](#) is providing a new visual identifier to help track the chemical and physical processes going on in near Earth space. This information can ultimately help us better understand the space weather near Earth which can interfere with satellites and communications signals. [Learn more](#).

Image Credit: ©Megan Hoffman (Used by permission)

Source: [NASA Image of the Day](#)

[Return to Contents](#)