

# Space News Update

– May 16, 2017 –

## Contents

### In the News

#### Story 1:

Mars Rover Opportunity Begins Study of Valley's Origin

#### Story 2:

Bright Supernova Discovered in 'Fireworks Galaxy' NGC 6946

#### Story 3:

SpaceX Blast Biggest High Speed Communication Satellite into Orbit

### Departments

#### The Night Sky

#### ISS Sighting Opportunities

#### Space Calendar

#### NASA-TV Highlights

#### Food for Thought

#### Space Image of the Week

## 1. Mars Rover Opportunity Begins Study of Valley's Origin



NASA's Mars Exploration Rover Opportunity has reached the main destination of its current two-year extended mission -- an ancient fluid-carved valley incised on the inner slope of a vast crater's rim.

As the rover approached the upper end of "Perseverance Valley" in early May, images from its cameras began showing parts of the area in greater resolution than what can be seen in images taken from orbit above Mars.

"The science team is really jazzed at starting to see this area up close and looking for clues to help us distinguish among multiple hypotheses about how the valley formed," said Opportunity Project Scientist Matt Golombek of NASA's Jet Propulsion Laboratory, Pasadena, California.

The process that carved Perseverance Valley into the rim of Endeavour Crater billions of years ago has not yet been identified. Among the possibilities: It might have been flowing water, or might have been a debris flow in which a small amount of water lubricated a turbulent mix of mud and boulders, or might have been an even drier process, such as wind erosion. The mission's main objective with Opportunity at this site is to assess which possibility is best supported by the evidence still in place.

The upper end of the valley is at a broad notch in the crest of the crater rim. The rover team's plan for investigating the area begins with taking sets of images of the valley from two widely separated points at that dip in the rim. This long-baseline stereo imaging will provide information for extraordinarily detailed three-dimensional analysis of the terrain. The valley extends down from the rim's crest line into the crater, at a slope of about 15 to 17 degrees for a distance of about two football fields.

"The long-baseline stereo imaging will be used to generate a digital elevation map that will help the team carefully evaluate possible driving routes down the valley before starting the descent," said Opportunity Project Manager John Callas of JPL.

Reversing course back uphill when partway down could be difficult, so finding a path with minimum obstacles will be important for driving Opportunity through the whole valley. Researchers intend to use the rover to examine textures and compositions at the top, throughout the length and at the bottom, as part of investigating the valley's history.

While the stereo imaging is being analyzed for drive-planning, the team plans to use the rover to examine the area immediately west of the crater rim at the top of the valley. "We expect to do a little walkabout just outside the crater before driving down Perseverance Valley," Golombek said.

The mission has begun its 150th month since the early 2004 landing of Opportunity in the Meridiani Planum region of Mars. In the first three months, which were originally planned as the full length of the mission, it found evidence in rocks that acidic water flowed across parts of Mars and soaked the subsurface early in the planet's history.

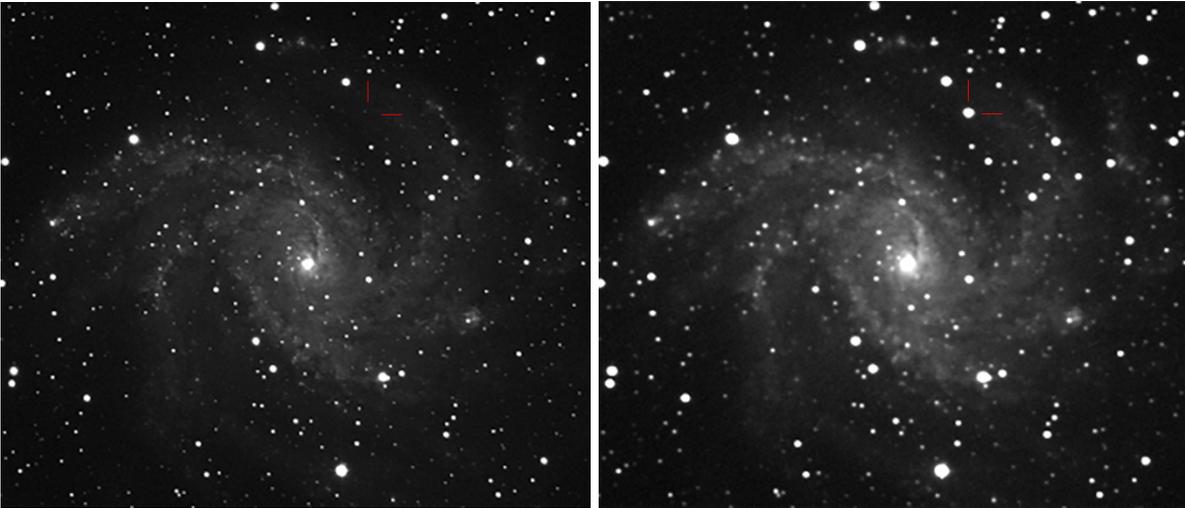
For nearly half of the mission -- 69 months -- Opportunity has been exploring sites on and near the western rim of Endeavour Crater, where even older rocks are exposed. The crater spans about 14 miles (22 kilometers) in diameter. Opportunity arrived from the northwest at a point corresponding to about the 10 o'clock position on the circle if north is noon; Perseverance Valley slices west to east at approximately the 8 o'clock position.

Opportunity hustled southward to reach the crown of the valley in recent weeks. In mid-April it finished about two-and-a-half years on a rim segment called "Cape Tribulation." In seven drives between then and arriving at the destination on May 4, it covered 377 yards (345 meters), bringing the mission's total odometry to about 27.8 miles (44.7 kilometers).

Source: [JPL](#)

[Return to Contents](#)

## 2. Bright Supernova Discovered in 'Fireworks Galaxy' NGC 6946



Last night, Utah amateur [Patrick Wiggins](#) discovered a possible bright supernova in the spiral galaxy [NGC 6946](#) in Cygnus. If confirmed, [2017 eaw](#) will become the 10th supernova found in this explosion-rich galaxy in the past century, reaffirming its reputation for fireworks of the grandest kind.

It was Wiggins's third supernova, and he found it by comparing a CCD image made on May 14.24 UT through his 0.35-m f/5.5 reflector near Erda, Utah, with one taken several years ago and another from May 12th. Nothing showed on either image, leading him to suspect a supernova.

To be sure, he watched the new object for over an hour to see if it moved. Faint asteroids have masqueraded as supernovae before, but this one didn't budge. Italian astronomer Gianluca Masi did a check for known asteroids in the vicinity and none were listed. For the moment then, it appears we have a brand new stellar blowup in our night sky.

Through a combination of good fortune and hard work, Wiggins happened to catch the star during the early stage of the blast. He estimated its magnitude at +12.8. Others have since confirmed the discovery and pinned the star's brightness at +12.6, bright enough to spot in telescopes as small as 6 inches!

The new possible supernova (PSN) is located 61" west and 143" north of the galaxy's nucleus at R.A. 20<sup>h</sup> 34<sup>m</sup> 44.24<sup>s</sup>, Dec. +60° 11' 35.9", not far from two stars of similar brightness indicated on the map. Although spectra have yet to confirm whether it's a Type Ia (white dwarf detonation) or Type II (a massive star collapsing and exploding), Wiggins's early catch likely means that AT 2017 eaw will almost certainly continue to brighten.

*(\*\* Update 9 p.m. CDT, May 14: Good news! According to [ATel #10376](#), a spectrum taken of the object "is consistent with that of a young type IIP supernova at one week before the maximum light." This means that our "new star" was a massive supergiant ... that is more.)*

During the last supernova blast in 2008, [SN 2008S](#) hovered around magnitude +16 at best; the brightest explosion occurred in 1980 when SN 1980K peaked around magnitude around +11.4. Wouldn't that be nice if it happened again? Timing's perfect for viewing the star. By 10:30 p.m. local time from mid-northern latitudes, the galaxy is already 25° up in the northeastern sky, and the Moon doesn't rise till after midnight.

I'll have additional news as it arrives in my e-mail. You can also check David Bishop's excellent [Latest Supernovae site](#) for fresh updates. Congratulations to Patrick! He joins a long line of Fireworks Galaxy supernovae discoverers, which includes American astronomer [George Ritchey](#), inventor of the [Ritchey-](#)

[Chrétien](#) telescope design, who uncovered the first stellar blast in the galaxy, SN 1917A, on July 19, 1917, and got the ball rolling.



*NGC 6946 is well-known to amateur astronomers. The magnificent pinwheel (type Sc spiral) is located 22 million light-years from Earth and was discovered by William Herschel in 1798. Clear skies and happy supernova hunting!*

*Jim Misti*

Source: [Sky & Telescope](#)

[Return to Contents](#)

### 3. SpaceX Blast Biggest High Speed Communication Satellite into Orbit



[SpaceX blasted](#) the “largest and most complicated communications satellite ever built to orbit” for London based Inmarsat at twilight this evening, May 15, from NASA's Kennedy Space Center.

In fact [the Inmarsat-5 F4 satellite](#) is so powerful that it has the potential to reach “hundreds of millions of customers” the Inmarsat CEO Rupert Pierce told Universe Today in a post launch interview at the Kennedy Space Center.

“This is the largest and most complicated [communications] satellite ever built,” Pierce explained beside NASA's countdown clock at the KSC press site.

Blastoff of the Inmarsat-5 Flight 4 communications satellite for commercial High-Speed broadband provider Inmarsat took place right on time early Monday evening, May 15 at 7:21 p.m. EDT (or 23:21 UTC) from [SpaceX's seaside Launch Complex 39A](#) on NASA's Kennedy Space Center in Florida.

The newly built 229-foot-tall (70-meter) SpaceX Falcon 9 successfully delivered the huge 6100 kg Inmarsat-5 F4 satellite to a Geostationary Transfer Orbit (GTO) under brilliant blue twilight skies from the Florida Space Coast.

“Satellite deployment success!” Inmarsat announced.

“#I5F4 has been released & is flying high on its way to geostationary orbit! Safe journey! Thanks for a great launch SpaceX!”

Why launch such the largest and most complicated satellite ever? I asked Inmarsat CEO Pierce.

"We set a very high bar for the service offerings we want to offer for that satellite that just went up and is now on its way to in orbit testing," Inmarsat CEO Pierce told me.

"That satellite will deliver mobile broadband for a third of the Earth at 50 megabits per second."

"And by the end of next year those data rates will go up to over 300 megabits per second."

"To get that kind of data speed you need very high processing powers, you need to deploy the new Ka band – which although it is still relatively unproven is looking like a very exciting new capability for space assets."

The integrated Falcon 9/Inmarsat-5 F4 were rolled out to the KSC launch pad on Sunday to begin final preparations and were erected at the pad this morning for Monday's liftoff.

The first stage is powered by nine Merlin 1 D engines fueled by RP-1 and liquid oxygen propellants and generating 1.7 million pounds.

The 7 meter long satellite was deployed approximately 32 minutes after launch when it will come under the command of the Boeing and Inmarsat satellite operations teams based at the Boeing facility in El Segundo.

It will now be "manoeuvred to its geostationary orbit, 35,786km (22,236 miles) above Earth, where it will deploy its solar arrays and reflectors and undergo intensive payload testing before beginning commercial service."

The Inmarsat-5 F4 (I-5 F4) will become part of the firms Global Xpress network "which has been delivering seamless, high-speed broadband connectivity across the world since December 2015," says Inmarsat.

"Once in geostationary orbit, the satellite will provide additional capacity for Global Xpress users on land, at sea and in the air."

I-5 F4 was built by Boeing at their satellite operations facility in El Segundo, CA for Inmarsat.

The new satellite will join 3 others already in orbit.

Inmarsat has invested approximately US\$1.6 billion in the Global Xpress constellation "to establish the first ever global Ka-band service from a single network operator."

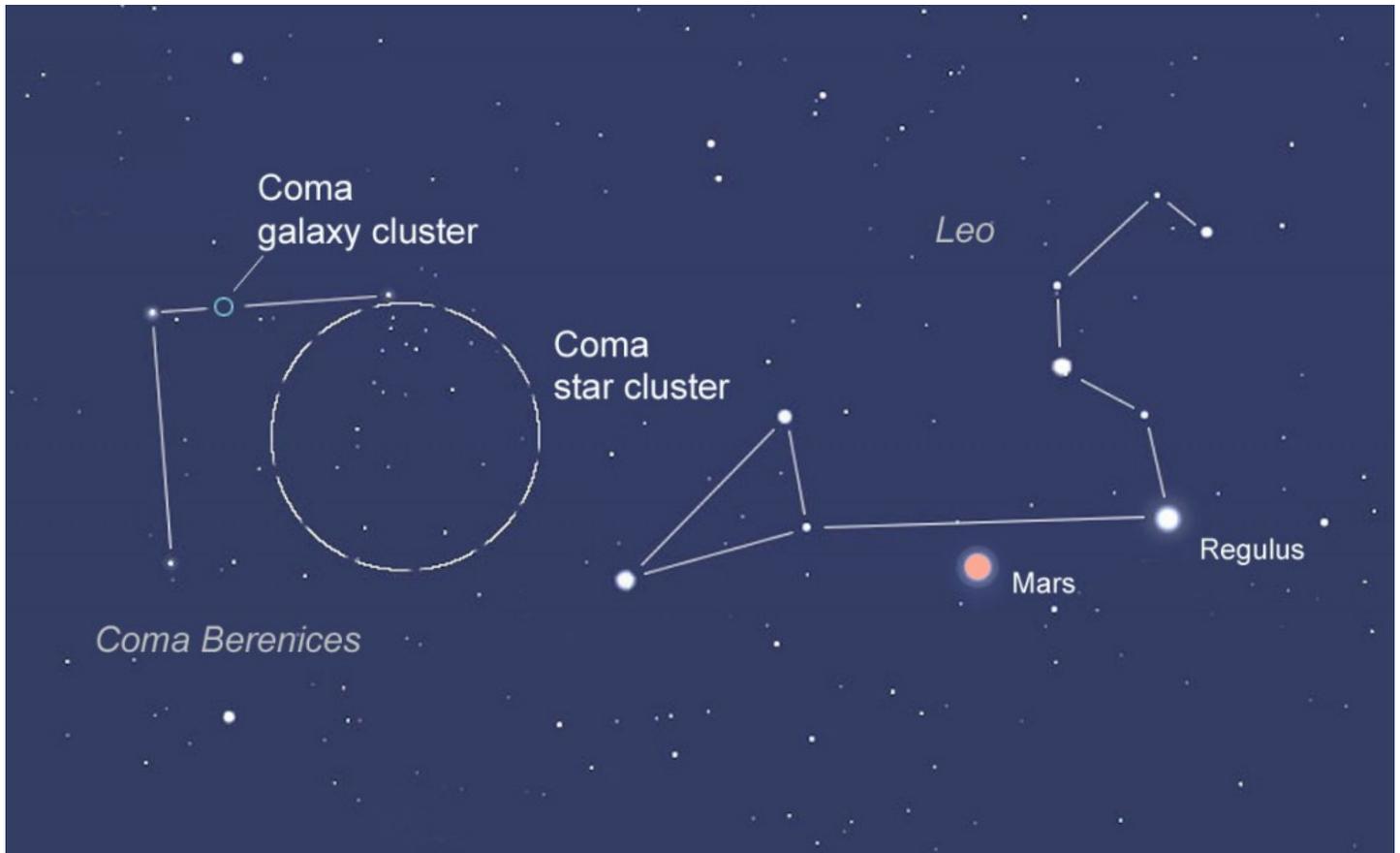
Inmarsat 5 F4 counts as the sixth SpaceX launch of 2017.

And SpaceX is on an absolutely torrid launch pace. Monday's liftoff comes just 2 weeks after the last successful SpaceX Falcon 9 liftoff on May 1 of the super secret NROL-76 payload for the National Reconnaissance Office, or NRO – [as I reported here](#).

Source: [Universe Today](#)

[Return to Contents](#)

# The Night Sky



## **Tuesday, May 16**

- Vega is the brightest star in the east-northeast after dark. Look  $14^\circ$  (about a fist and a half at arm's length) to Vega's upper left for Eltanin, the nose of Draco the Dragon. Closer above and upper left of Eltanin are the three fainter stars of Draco's stick-figure head, also called the Lozenge. Draco always points his nose to Vega. He seems curious about it.

## **Wednesday, May 17**

- Summer Milky Way preview: For much of the spring at mid-northern latitudes, the Milky Way lies right down all around the horizon after dark, completely out of sight. But as night grows late, watch low in the east to northeast. There the rich Cygnus stretch of the Milky Way starts rising into view by around 11 p.m. It will rise earlier and higher every week.

## **Thursday, May 18**

- Jupiter double-shadow event for telescopes tonight: Io and smaller Europa are both casting their tiny black shadows onto Jupiter's face from 11:53 p.m. to 12:42 a.m. EDT.

- The last-quarter Moon rises around 2 a.m. tonight, shining in Aquarius. As Friday's dawn gets under way, look very high to the Moon's upper right for Altair, and look way off to the Moon's lower left for Venus making its appearance.

## **Friday, May 19**

- With the Moon out of the evening sky, can you see the big Coma Berenices star cluster? Does your light pollution *really* hide it, or do you just not know exactly where to look? It's 2/5 of the way from Denebola (Leo's tail) to the end of the Big Dipper's handle (Ursa Major's tail).

Its brightest members form an inverted Y. The entire cluster is about  $5^\circ$  wide — a big, dim glow when seen in at least a moderately dark sky. It nearly fills a binocular view.

# ISS Sighting Opportunities

[For Denver:](#)

Date	Visible	Max Height	Appears	Disappears
Tue May 16, 2:15 AM	< 1 min	17°	17° above NNE	17° above NNE
Tue May 16, 3:50 AM	2 min	11°	10° above NNW	10° above N
Wed May 17, 2:57 AM	2 min	13°	12° above NW	12° above N
Wed May 17, 4:35 AM	1 min	10°	10° above N	10° above NNE
Thu May 18, 2:07 AM	< 1 min	16°	16° above N	15° above N
Thu May 18, 3:43 AM	< 1 min	10°	10° above N	10° above N
Fri May 19, 1:16 AM	< 1 min	11°	11° above NNE	11° above NNE
Fri May 19, 2:50 AM	1 min	10°	10° above NNW	10° above N
Fri May 19, 4:27 AM	1 min	13°	10° above NNW	13° above N

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

## NASA-TV Highlights

(all times Eastern Daylight Time)

**4 p.m., Tuesday, May 16** - Coverage of the RS-25 Rocket Engine Test Firing (starts at 3:55 p.m.) (all channels)

**7 p.m., Tuesday, May 16** - Replay of the RS-25 Rocket Engine Test Firing (all channels)

**9 p.m., Tuesday, May 16** - Replay of the RS-25 Rocket Engine Test Firing (all channels)

**11 p.m., Tuesday, May 16** - Replay of the RS-25 Rocket Engine Test Firing (all channels)

**1 p.m., Wednesday, May 17** - Smithsonian National Air and Space Museum Presents STEM in 30: World War I: Legacy, Letters and Belgian War Lace (NTV-1 (Public))

**12:30 p.m., Friday, May 19** - ISS Expedition 51 In-Flight Educational Event with the Space Dynamics Laboratory in North Logan, Utah and ISS Commander Peggy Whitson and Flight Engineer Jack Fischer of NASA (starts at 12:40 p.m.) (all channels)

**1 p.m., Friday, May 19** - 2017 Astronaut Hall of Fame Induction Ceremony (all channels)

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

[Return to Contents](#)

# Space Calendar

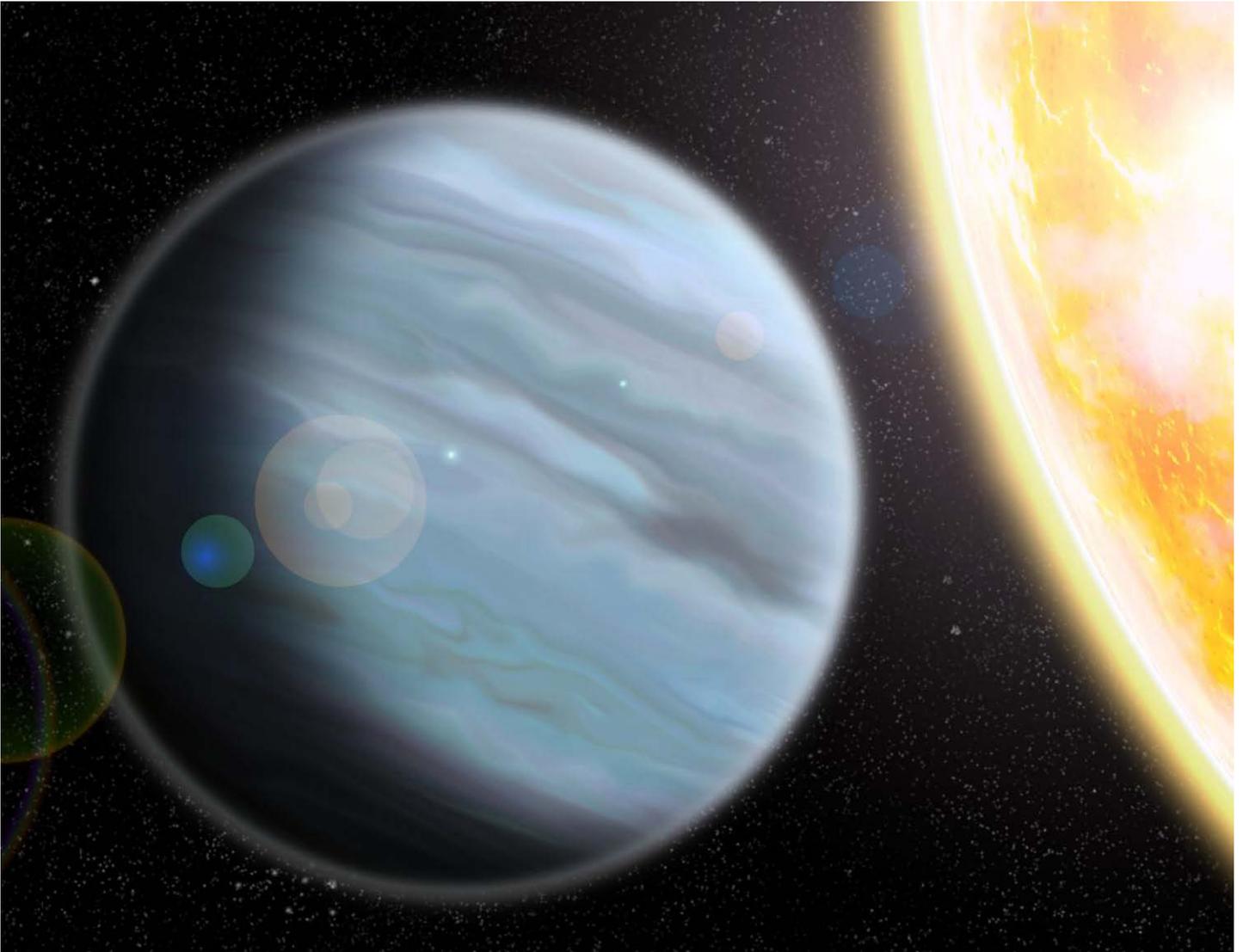
- May 16 - [Comet 73P-AE/Schwassmann-Wachmann Perihelion](#) (0.966 AU)
- May 16 - [Comet 216P/LINEAR Closest Approach To Earth](#) (2.294 AU)
- May 16 - [Apollo Asteroid 2012 EC Near-Earth Flyby](#) (0.050 AU)
- May 16 - [Asteroid 93 Minerva Closest Approach To Earth](#) (1.469 AU)
- May 16 - [Asteroid 6143 Pythagoras Closest Approach To Earth](#) (1.879 AU)
- May 16 - [Asteroid 188534 Mauna Kea Closest Approach To Earth](#) (1.941 AU)
- May 16 - [Event: On the Launchpad - Return to Deep Space](#), Washington DC
- May 16 - [Forrest Petersen's 95th Birthday](#) (1922)
- May 17 - [Mercury At Its Greatest Western Elongation](#) (26 Degrees)
- May 17 - [Comet C/2017 A1 \(PANSTARRS\) Perihelion](#) (2.290 AU)
- May 17 - [Asteroid 3 Juno Occults TYC 5141-02093016-1](#) (10.7 Magnitude Star)
- May 17 - [Apollo Asteroid 4341 Poseidon Closest Approach To Earth](#) (0.930 AU)
- May 17 - [Asteroid 5430 Luu Closest Approach To Earth](#) (1.004 AU)
- May 17 - [Asteroid 144633 Geogecarroll Closest Approach To Earth](#) (1.985 AU)
- May 17 - [Asteroid 241418 Darmstadt Closest Approach To Earth](#) (2.466 AU)
- May 17 - [Kuiper Belt Object 65407 \(2002 RP120\) At Opposition](#) (28.250 AU)
- May 17 - [Kuiper Belt Object 2015 KH162 At Opposition](#) (58.438 AU)
- May 18 - [SES-15 Soyuz-STB Fregat-MT Launch](#)
- May 18 - [Comet 169P/NEAT At Opposition](#) (2.600 AU)
- May 18 - [Apollo Asteroid 4581 Asclepius Closest Approach To Earth](#) (0.364 AU)
- May 18 - [Asteroid 9969 Braille Closest Approach To Earth](#) (0.818 AU)
- May 18 - [Asteroid 1225 Ariane Closest Approach To Earth](#) (1.311 AU)
- May 18 - [Asteroid 2309 Mr. Spock Closest Approach To Earth](#) (2.295 AU)
- May 18 - [Jeana Yeager's 65th Birthday](#) (1952)
- May 18 - [Robert Verish's 70th Birthday](#) (1947)
- May 19 -  [May 12] [Juno, Jupiter Flyby](#)
- May 19 - [Comet C/2016 A8 \(LINEAR\) Closest Approach To Earth](#) (2.639 AU)
- May 19 - [Comet C/2014 OE4 \(PANSTARRS\) Closest Approach To Earth](#) (6.247 AU)
- May 19 - [Asteroid 3153 Lincoln Closest Approach To Earth](#) (1.680 AU)
- May 19 - [Asteroid 15058 Billcooke Closest Approach To Earth](#) (2.608 AU)
- 

Source: [JPL Space Calendar](#)

[Return to Contents](#)

## Food for Thought

New 'styrofoam' planet provides tools in search for habitable planets



Fifth-graders making styrofoam solar system models may have the right idea. Researchers at Lehigh University have discovered a new planet orbiting a star 320 light years from Earth that has the density of styrofoam. This "puffy planet" outside our solar system may hold opportunities for testing atmospheres that will be useful when assessing future planets for signs of life.

"It is highly inflated, so that while it's only a fifth as massive as Jupiter, it is nearly 40 percent larger, making it about as dense as styrofoam, with an extraordinarily large atmosphere," said Joshua Pepper, astronomer and assistant professor of physics at Lehigh University, who led the study in collaboration with researchers from Vanderbilt University and Ohio State University, along with researchers at universities and observatories and amateur astronomers around the world.

The research, "KELT-11b: A Highly Inflated Sub-Saturn Exoplanet Transiting the V+8 Subgiant HD 93396," is published online in *The Astronomical Journal*.

The planet's host star is extremely bright, allowing precise measurement of the planet's atmosphere properties and making it "an excellent testbed for measuring the atmospheres of other [planets](#)," Pepper said. Such observations help astronomers develop tools to see the types of gases in atmospheres, which will be necessary in the next 10 years when they apply similar techniques to Earthlike exoplanets with next-generation telescopes now under construction.

The planet, called KELT-11b, is an extreme version of a gas planet, like Jupiter or Saturn, but is orbiting very close to its host star in an orbit that lasts less than five days. The star, KELT-11, has started using up its nuclear fuel and is evolving into a red giant, so the planet will be engulfed by its star and not survive the next hundred million years.

The KELT (Kilodegree Extremely Little Telescope) survey uses two small robotic telescopes, one in Arizona and the other in South Africa. The telescopes scan the sky night after night, measuring the brightness of about five million [stars](#). Researchers search for stars that seem to dim slightly at regular intervals, which can indicate a planet is orbiting that star and eclipsing it. Researchers then use other telescopes to measure the gravitational "wobble" of the star - the slight tug a planet exerts on the star as it orbits - to verify that the dimming, called a "transit," is due to a planet and to measure the planet's mass.



The KELT-South robotic telescope in South Africa that made the discovery of KELT-11b. Credit: Joshua Pepper

### **Scientists and Citizens Search Sky**

Pepper built the two telescopes used in the KELT survey, which he runs with researchers at Vanderbilt University, Ohio State University, Fisk University and the South African Astronomical Observatory. Among the more than 30 contributors to the research are partners at NASA, Harvard University, University of Pennsylvania, Princeton University and University of California at Berkeley. Lehigh University physics graduate student Jonathan Labadie-Bartz is a member of the KELT team and a co-author on the paper. Some 40 "citizen

scientists" in 10 countries across four continents have also contributed to the KELT project and several contributed directly to the discovery of KELT-11b and are co-authors on the paper.

While several projects using small robotic telescopes have found hundreds of planets orbiting other stars - and space telescopes like the NASA Kepler mission have discovered thousands - most of those planets orbit faint stars, making it difficult to measure the planets' properties precisely.

"The KELT project is specifically designed to discover a few scientifically valuable planets orbiting very bright stars, and KELT-11b is a prime example of that," Pepper said. The star, KELT-11, is the brightest in the southern hemisphere known to host a transiting planet by more than a magnitude and the sixth brightest transit host discovered to date. Planets discovered by the KELT survey will be observed in detail by large space telescopes such as Hubble and Spitzer and the James Webb Space Telescope, scheduled to launch in 2018, to understand how planets form and evolve and how their atmospheres behave, Pepper said.

The KELT researchers set out to discover [gas giant planets](#) orbiting bright stars, but did not expect to find planets with such low mass and large sizes. Located in the southern sky, the "extraordinarily inflated" KELT-11b is the third-lowest density planet with a precisely measured mass and radius that has been discovered. "We were very surprised by the amazingly low density of this planet," Pepper said. "It's extremely big for its mass. It's got a fifth of the mass of Jupiter but is puffed up into this really underdense planet."

Though researchers are debating the cause of KELT-11b's inflation, further study of the planet could provide additional information about the mechanism that causes inflated planets, Pepper said. The planet's large [atmosphere](#) also provides good opportunities for developing techniques needed to identify chemicals in planets' atmospheres to assess habitability or products of life in the atmospheres of other planets.

"We don't know of any real Earthlike planets or stars for which we can measure their atmospheres, though we expect to discover more in future years," Pepper said. "These (giant gas) planets are the gold standards or testbeds for learning how to measure the atmospheres of planets."

The research was supported by the National Science Foundation, NASA and a variety of universities and foundations.

Source: [Phys.org](#)

[Return to Contents](#)

## Space Image of the Week



### **Short Shadow**

The projection of Saturn's shadow on the rings grows shorter as Saturn's season advances toward northern summer, thanks to the planet's permanent tilt as it orbits the sun. This will continue until Saturn's solstice in May 2017. At that point in time, the shadow will extend only as far as the innermost A ring, leaving the middle and outer A ring completely free of the planet's shadow.

Over the course of the Cassini mission, the shadow of Saturn first lengthened steadily until equinox in August 2009. Since then, the shadow has been shrinking. These changes can be seen by comparing the shadow in the above view to its appearance as Cassini approached Saturn in 2004 ([PIA06077](#)), equinox in 2009 ([PIA11667](#)), and two years ago, in 2015 ([PIA20498](#)).

This view looks toward the sunlit side of the rings from about 10 degrees above the ring plane. The image was taken in visible light with the Cassini spacecraft wide-angle camera on Feb. 3, 2017.

The view was acquired at a distance of approximately 760,000 miles (1.2 million kilometers) from Saturn. Image scale is 46 miles (73 kilometers) per pixel.

Source: [NASA](#)

[Return to Contents](#)