

# Space News Update – August 2014

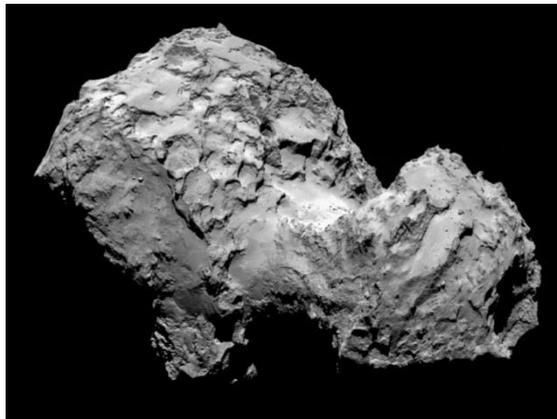
*By Pat Williams*

## IN THIS EDITION:

- Rosetta's planned rendezvous with Comet 67P/Churyumov-Gerasimenko
- The car here on Earth was driven from space
- Supplies to the International Space Station
- How space affects sleep, the immune system and exercise
- New Horizons en route to Pluto
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Disclaimer - I claim no authorship for the printed material; except where noted.

## ROSSETTA'S PLANNED RENDEZVOUS WITH COMET 67P/CHURYUMOV-GERASIMENKO



*Comet 67P/Churyumov-Gerasimenko*

*Image Credit: [ESA](#) / [Rosetta](#) / MPS for [OSIRIS Team](#); [MPS/UPD/LAM/IAA/SSO/INTA/UPM/DASP/IDA](#)*

Explanation: On August 3rd, the Rosetta spacecraft's narrow angle camera captured [this stunning image](#) of the nucleus of Comet [67P/Churyumov-Gerasimenko](#). After 10 years and 6.5 billion kilometers of travel along gravity assist trajectories [looping through](#) interplanetary space, Rosetta had approached to within 285 kilometers of its target. The [curious double-lobed shape](#) of the nucleus is [revealed in amazing detail](#) at an image resolution of 5.3 meters per pixel. About 4 kilometers across, the comet nucleus is presently just over 400 million kilometers from Earth, between the orbits of Jupiter and Mars. [Now the first spacecraft](#) to achieve a [delicate](#) orbit around a comet, Rosetta will swing to within 50 kilometers and closer in the coming weeks, identifying candidate sites for landing its probe [Philae](#) later this year.

### [Rosetta takes comet's temperature](#) (1 August 2014)

ESA's Rosetta spacecraft has made its first temperature measurements of its target comet, finding that it is too hot to be covered in ice and must instead have a dark, dusty crust.

### [How Rosetta arrives at a comet](#) (1 August 2014)

After travelling nearly 6.4 billion kilometres through the Solar System, ESA's Rosetta is closing in on its target. But how does a spacecraft actually arrive at a comet?

[Rosetta arrives at comet destination](#) (6 August 2014)

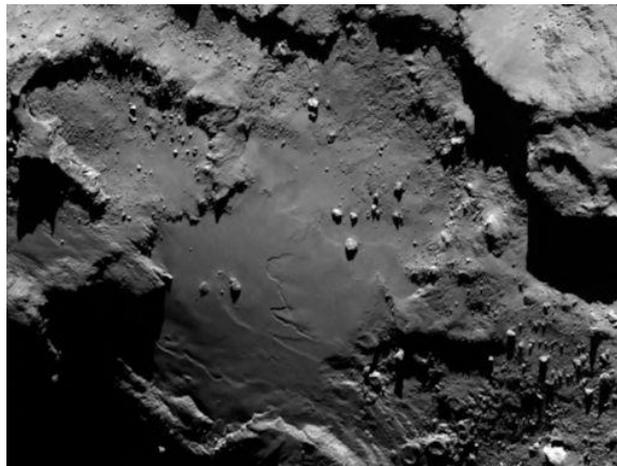
After a decade-long journey chasing its target, ESA's Rosetta has today become the first spacecraft to rendezvous with a comet, opening a new chapter in Solar System exploration.

[As seen by Rosetta: comet surface variati](#) (15 August 2014)

A new image of comet 67P/Churyumov-Gerasimenko shows the diversity of surface structures on the comet's nucleus. It was taken by the Rosetta spacecraft's OSIRIS narrow-angle camera on August 7, 2014.

[The search for the 'perfect' landing site](#) (21 August 2014)

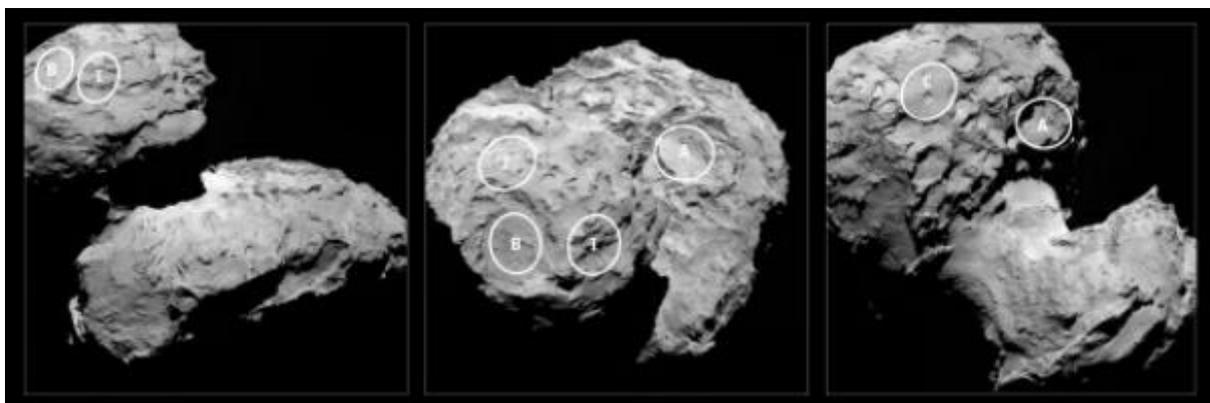
When the Philae lander reaches its landing site on Comet 67P/Churyumov-Gerasimenko, it needs to be at a level yet scientifically interesting location, with enough sunlight and the right conditions to ensure a long working life.



The image clearly shows a range of features including boulders, craters and steep cliffs. As the ESA science team noted this morning, "[choosing a landing site will not be easy](#)." More close-up shots may be found [here](#).

[Rosetta: Landing site search narrows](#) (25 August 2014)

Using detailed information collected by ESA's Rosetta spacecraft during its first two weeks at Comet 67P/Churyumov-Gerasimenko, five locations have been identified as candidate sites to set down the Philae lander in November – the first time a landing on a comet has ever been attempted.



*Philae candidate landing sites. (Courtesy: ESA/Rosetta/MPS for OSIRIS Team  
MPS/UPD/LAM/IAA/SSO/INTA/UPM/DASP/IDA)*

## **THE CAR HERE ON EARTH WAS DRIVEN FROM SPACE**

[Gerst drives car-sized rover from space](#) (8 August 2014)



*The Eurobot rover moving under control of Astronaut Alex Gerst at Estec, 7 August. (Courtesy: ESA)*

Looking down from orbit, ESA astronaut Alexander Gerst steered ESA's Eurobot rover through a series of intricate manoeuvres on the ground yesterday, demonstrating a new space network that could connect astronauts to vehicles on alien worlds.

## **SUPPLIES TO THE INTERNATIONAL SPACE STATION**

[ATV completes final automated docking](#) (12 August 2014)

In a flawless demonstration of technology and skill, ESA's fifth and final ATV, Georges Lemaître, docked with the International Space Station today, fixing itself firmly for a six-month resupply and reboost mission. It carries more than 7 tons of food, water, clothing, spare parts and scientific gear. The cargo vessel itself weighs 13 tons; the fully loaded ATV-5 is the heaviest payload ever lofted by an Ariane 5, European Space Agency (ESA).

[Orbital completes third cargo delivery mission to International Space Station](#) (18 August 2014)



Orbital Sciences Corporation has successfully completed its third cargo delivery mission to the International Space Station in the past 10 months, including the initial demonstration flight completed in October 2013 and the first two operational missions under the company's \$1.9 billion Commercial Resupply Services (CRS) contract with NASA.

## **HOW SPACE AFFECTS SLEEP, THE IMMUNE SYSTEM AND EXERCISE**

**Ten-year study highlights sleep deficiency and sleep medication use in astronauts** (7 August 2014) In an extensive study of sleep monitoring and sleeping pill use in astronauts, researchers from Brigham and Women's Hospital (BWH) Division of Sleep and Circadian Disorders, Harvard Medical School, and the University of Colorado found that astronauts suffer considerable sleep deficiency in the weeks leading up to and during space flight. The research also highlights widespread use of sleeping medication use among astronauts.

**Study reveals immune system is dazed and confused during spaceflight** (18 August 2014) The results of two NASA collaborative investigations—Validation of Procedures for Monitoring Crewmember Immune Function (Integrated Immune) and Clinical Nutrition Assessment of ISS Astronauts, SMO-016E (Clinical Nutrition Assessment)—recently published in the Journal of Interferon & Cytokine Research suggest that spaceflight may temporarily alter the immune system of crew members flying long duration missions aboard the International Space Station. This is of concern as NASA looks ahead to six-month and multiple-year missions to asteroids, the moon and Mars because something as simple as a cold or the flu can be risky business in space.

**Intense exercise during long space flights can help astronauts protect aerobic capacity** (29 August 2014)

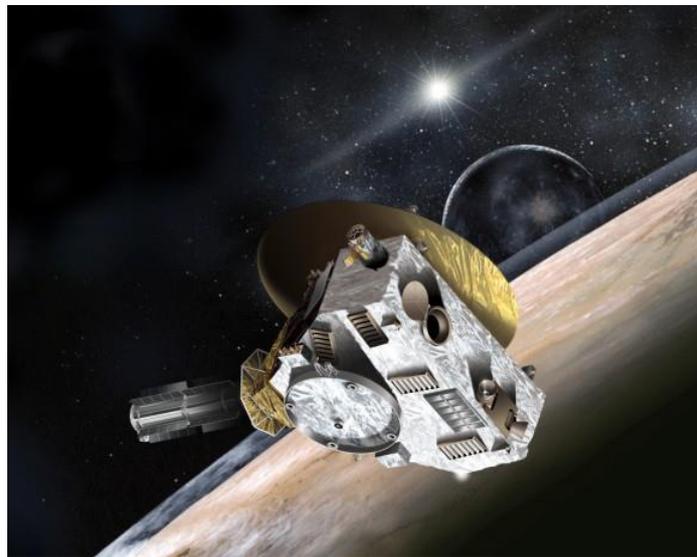


*ESA astronaut Alexander Gerst using the International Space Station's Advanced Resistive Exercise Device (ARED) to keep fit. Astronauts need to spend up to two hours each day working out to counteract the loss of bone and muscle fibre that comes from living in space. ARED is similar to a multifunctional weightlifting machine on Earth but, of course, weights are not much use in weightlessness. Instead, pneumatic resistance achieves the same result: exercising the muscles.*

Most people don't think much about their aerobic capacity while at work. But for astronauts carrying out missions on the International Space Station (ISS), maintaining their cardiovascular stamina during long space flights is part of the job.

## **NEW HORIZONS EN ROUTE TO PLUTO**

New Horizons is the first mission to the Pluto system and the Kuiper Belt of rocky, icy objects beyond. Launched in 2006, it is on approach for a dramatic flight past the icy dwarf planet of Pluto and its moons in July 2015. After 10 years and more than 3 billion miles, on a historic voyage that has already taken it over the storms and around the moons of Jupiter, New Horizons will shed light on new kinds of worlds on the outskirts of the solar system.



Artist's concept shows the New Horizons spacecraft during its 2015 encounter with Pluto and its moon, Charon.  
Credit: JHUAPL/SwRI

### **[ALMA pinpoints Pluto to help guide NASA's New Horizons spacecraft](#)** (5 August 2014)

Astronomers using the Atacama Large Millimeter/submillimeter Array (ALMA) are making high-precision measurements of Pluto's location and orbit around the Sun to help NASA's New Horizons spacecraft accurately home in on its target when it nears Pluto and its five known moons in July 2015.

### **[New Horizons spacecraft crosses Neptune orbit en route to Pluto encounter](#)** (25 August 2014)

NASA's Pluto-bound New Horizons spacecraft has traversed the orbit of Neptune.

### **[New Horizons commanded into last pre-Pluto slumber](#)** (29 August 2014)

NASA's Pluto-bound spacecraft was put into hibernation this morning, following a successful 10-week annual checkout period.

## **LINKS TO OTHER SPACE AND ASTRONOMY NEWS PUBLISHED IN AUGUST 2014**

### **ASTERIODS**

#### **[The forces that hold gravity-defying near-Earth asteroid together](#)** (13 August 2014)

Researchers at the University of Tennessee, Knoxville, have made a novel discovery that may potentially protect the world from future collisions with asteroids.

#### **[Spitzer telescope witnesses asteroid smash-up](#)** (28 August 2014)

NASA's Spitzer Space Telescope has spotted an eruption of dust around a young star, possibly the result of a smash-up between large asteroids.

### **BLACK HOLES**

#### **[Astrophysicists detect destruction of three stars by black holes](#)** (6 August 2014)

Researchers from MIT and the Space Research Institute of the Russian Academy of Sciences have reported registering three possible occasions of the tidal destruction of stars by supermassive black holes at the centres of galaxies.

#### **[NuSTAR sees rare blurring of black hole light](#)** (12 August 2014)

NASA's Nuclear Spectroscopic Telescope Array (NuSTAR) has captured an extreme and rare event in the regions immediately surrounding a supermassive black hole.

#### **[Light pulses illuminate a rare black hole](#)** (18 August 2014)

Astronomers have accurately measured — and thus confirmed the existence of — a rare intermediate-mass black hole about 400 times the mass of our sun in a galaxy 12 million light years from the Milky Way.

### **COMETS**

#### **[Study of comets reveals chemical factory at work](#)** (11 August 2014)

A NASA-led team of scientists has created detailed 3-D maps of the atmospheres surrounding comets, identifying several gases (**HNC and formaldehyde CH<sub>2</sub>O or HCHO**) and mapping their spread at the highest resolution ever achieved.

#### **[ALMA confirms comets forge organic molecules in their dusty atmospheres](#)** (11 August 2014)

An international team of scientists using the Atacama Large Millimeter/submillimeter Array (ALMA) has made incredible 3D images of the ghostly atmospheres surrounding comets ISON and Lemmon.

### **DARK ENERGY**

#### **[Dark Energy Survey kicks off second season cataloguing the wonders of deep space](#)**

(18 August 2014)

On Aug. 15, with its successful first season behind it, the Dark Energy Survey (DES) collaboration began its second year of mapping the southern sky in unprecedented detail.

### **EXOPLANETS AND EXOMOONS**

#### **[Planet-like object may have spent its youth as hot as a star](#)** (5 August 2014)

Astronomers have discovered an extremely cool object that could have a particularly diverse history - although it is now as cool as a planet, it may have spent much of its youth as hot as a star.

#### **[Follow the radio waves to exomoons](#)** (11 August 2014)

Scientists hunting for life beyond Earth have discovered more than 1,800 planets outside our solar system, or exoplanets, in recent years, but so far, no one has been able to confirm an exomoon.

## **GALAXIES**

### [First LOFAR observations of the “Whirlpool Galaxy”](#) (20 August 2014)

Using a radio telescope with frequencies just above those of commercial FM radio stations, a European team of astronomers has obtained the most sensitive image of a galaxy below 1 GHz.

### [NASA telescopes help uncover early construction phase of giant galaxy](#) (27 August 2014)

Astronomers have for the first time gotten a glimpse of the earliest stages of massive galaxy construction.

### [What lit up the universe?](#) (27 August 2014)

New research from UCL shows we will soon uncover the origin of the ultraviolet light that bathes the cosmos, helping scientists understand how galaxies were built.

### [Best view yet of merging galaxies in distant universe](#) (25 August 2014)

An international team of astronomers using the Atacama Large Millimeter/submillimeter Array (ALMA) and the Karl G. Jansky Very Large Array (VLA) -- among other telescopes -- has obtained the best view yet of a collision between two galaxies when the Universe was only half its current age.

## **INTERGALACTIC MEDIUM**

### [A stream of gas 2.6 million light years long](#) (7 August 2014)

Astronomers and students have found a bridge of atomic hydrogen gas 2.6 million light years long between galaxies 500 million light years away.

## **INTERSTELLAR SPACE**

### [Seven tiny grains captured by Stardust likely visitors from interstellar space](#) (14 August 2014)

Since 2006, when NASA's Stardust spacecraft delivered its aerogel and aluminium foil dust collectors back to Earth, a team of scientists has combed through the collectors in search of rare, microscopic particles of interstellar dust.

### [Stardust team reports discovery of first potential interstellar space particles](#) (14 August 2014)

Seven rare, microscopic interstellar dust particles that date to the beginnings of the solar system are among the samples collected by scientists who have been studying the payload from NASA's Stardust spacecraft since its return to Earth in 2006.

### [New Milky Way maps could help solve stubborn interstellar material mystery](#) (14 August 2014)

An international team of sky scholars, including a key researcher from Johns Hopkins, has produced new maps of the material located between the stars in the Milky Way.

### [Pebble-size particles may jump-start planet formation](#) (27 August 2014)

Rocky planets like Earth start out as microscopic bits of dust tinier than a grain of sand, or so theories predict.

## **JUPITER AND MOONS**

### [A hellacious two weeks on Jupiter's moon Io](#) (4 August 2014)

Three massive volcanic eruptions occurred on Jupiter's moon Io, a satellite the size of Earth's moon, within a two-week period last August, leading astronomers to speculate that these presumed rare outbursts, which can send material hundreds of miles above the surface, might be much more common than previously thought.

### [Two dynamos drive Jupiter's magnetic field](#) (20 August 2014)

Superlatives are the trademark of the planet Jupiter. The magnetic field at the top edge of the cloud

surrounding the largest member of the solar system is around ten times stronger than Earth's, and is by far the largest magnetosphere around a planet.

## **MARS**

[Climate history of Mars uncovered in unique meteorite](#) (27 August 2014)

Was Mars — now a cold, dry place — once a warm, wet planet that sustained life? And if so, how long has it been cold and dry?

## **METEORITES**

[Violent solar system history uncovered by WA meteorite](#) (8 August 2014)

Curtin University planetary scientists have shed some light on the bombardment history of our solar system by studying a unique volcanic meteorite recovered in Western Australia.

[California meteorite's rough and tumble journey](#) (15 August 2014)

A meteorite that fell onto the roof of a house in Novato, California, on Oct. 17, 2012, has revealed a detailed picture of its origin and tumultuous journey through space and Earth's atmosphere.

## **MISCELLANEOUS**

[Measurement at Big Bang conditions confirms lithium problem](#) (27 August 2014)

The field of astrophysics has a stubborn problem and it's called lithium. The quantities of lithium predicted to have resulted from the Big Bang are not actually present in stars.

## **MOON**

[Tidal heating in the deepest part of the lunar mantle](#) (7 August 2014)

An international research team, led by Dr Yuji Harada from Planetary Science Institute, China University of Geosciences, has found that there is an extremely soft layer deep inside the Moon and that heat is effectively generated in the layer by the gravity of the Earth.

[Electric sparks may alter evolution of lunar soil](#) (21 August 2014)

The moon appears to be a tranquil place, but modelling done by University of New Hampshire and NASA scientists suggests that, over the eons, periodic storms of solar energetic particles may have significantly altered the properties of the soil in the moon's coldest craters through the process of sparking—a finding that could change our understanding of the evolution of planetary surfaces in the solar system.

## **NEPTUNE AND MOONS**

[Voyager map details Neptune's strange moon Triton](#) (21 August 2014)

NASA's Voyager 2 spacecraft gave humanity its first close-up look at Neptune and its moon Triton in the summer of 1989.

## **QUASARS**

[Feeding a hungry quasar](#) (7 August 2014)

The universe's oldest, brightest beacons may have gorged themselves in the dense, cold, gas flows of the early cosmos — creating a kind of energy drink for infant black holes in the young universe — according to new research by scientists at Yale University and the Weizmann Institute in Israel.

## **SATURN AND MOONS**

[Cassini prepares for its biggest remaining burn](#) (7 August 2014)

NASA's Cassini spacecraft will execute the largest planned manoeuvre of the spacecraft's remaining

mission on Saturday, Aug. 9. The manoeuvre will target Cassini toward an Aug. 21 encounter with Saturn's largest moon, Titan.

[Cassini tracks clouds developing over a Titan sea](#) (12 August 2014)

NASA's Cassini spacecraft recently captured images of clouds moving across the northern hydrocarbon seas of Saturn's moon Titan.

## STARS AND STAR CLUSTERS

[White dwarfs crashing into neutron stars explain loneliest supernovae](#) (8 August 2014)

A research team led by astronomers and astrophysicists at the University of Warwick have found that some of the Universe's loneliest supernovae are likely created by the collisions of white dwarf stars into neutron stars.

[New star catalogue reveals unexpected 'solar salad'](#) (18 August 2014)

An Arizona State University alumnus has devised the largest catalogue ever produced for stellar compositions.

[Fluorine formed in stars](#) (21 August 2014)

The fluorine that is found in products such as toothpaste was likely formed billions of years ago in now dead stars of the same type as our sun.

[Eta Carinae: our neighbouring superstars](#) (26 August 2014) The Eta Carinae star system does not lack for superlatives. Not only does it contain one of the biggest and brightest stars in our galaxy, weighing at least 90 times the mass of the sun, it is also extremely volatile and is expected to have at least one supernova explosion in the future.

[Radio telescopes settle controversy over distance to Pleiades](#) 443 light years (28 August 2014) Astronomers have used a worldwide network of radio telescopes to resolve a controversy over the distance to a famous star cluster -- a controversy that posed a potential challenge to scientists' basic understanding of how stars form and evolve.

[Why sibling stars look alike: early, fast mixing in star birth clouds](#) (31 August 2014)

Stars are made mostly of hydrogen and helium, but they also contain trace amounts of other elements, such as carbon, oxygen, iron, and even more exotic substances.

## SUN

[Best evidence yet for coronal heating theory detected by NASA sounding rocket](#) (1 August 2014)

Scientists have recently gathered some of the strongest evidence to date to explain what makes the sun's outer atmosphere so much hotter than its surface.

[Step closer to birth of the sun](#) (7 August 2014)

Researchers are a step closer to understanding the birth of the sun.

[The Sun as Borexino sees it in real time](#) (27 August 2014)

The neutrino experiment in the INFN Gran Sasso Laboratories has managed to measure the energy of our star in real time: the energy released today at the centre of the Sun is exactly the same as that produced 100,000 years ago.

[Researchers use NASA and other data to look into the heart of a solar storm](#) (28 August 2014)

A space weather storm from the sun engulfed our planet on Jan. 21, 2005. The event got its start on Jan. 20, when a cloud of solar material, a coronal mass ejection or CME, burst off the sun and headed toward Earth.

[NASA probes studying Earth's radiation belts to celebrate two year anniversary](#) (29 August 2014) NASA's twin Van Allen Probes will celebrate on Saturday two years of studying the sun's influence on our planet and near-Earth space.

## **SUPERNOVA**

[Hubble finds supernova star system linked to potential 'zombie star'](#) (6 August 2014)

Astronomers using NASA's Hubble Space Telescope for the first time have spotted a star system that later produced an unusual supernova explosion of a white dwarf, the stripped-down core of an ordinary star at the end of its life.

[Supernova SN 2014J reveals insights into supernova triggers](#) (14 August 2014)

New data from NASA's Chandra X-ray Observatory has provided stringent constraints on the environment around one of the closest supernovas discovered in decades.

[INTEGRAL catches dead star exploding in a blaze of glory](#) (27 August 2014)

Astronomers using ESA's INTEGRAL gamma-ray observatory have demonstrated beyond doubt that dead stars known as white dwarfs can reignite and explode as supernovae.

[Radioactive cobalt in supernova explosion](#) (29 August 2014)

A group of astrophysicists, including researchers from MIPT, have detected the formation of radioactive cobalt during a supernova explosion, lending credence to a corresponding theory of supernova explosions.

## **TECHNOLOGY**

[UA optics at heart of telescope poised to catch the action in the universe](#) (6 August 2014)

The National Science Foundation agreed on Friday to fund the construction of the Large Synoptic Survey Telescope project, the first observatory capable of scanning large swaths of night sky very quickly and capture exploding stars, passing asteroids and other highly variable, dynamic or short-lived phenomena in the universe. <http://phys.org/news/2014-08-ua-optics-heart-telescope-poised.html>

[Super-black nano-coating to be tested for the first time in space](#) (12 August 2014)

An emerging super-black nanotechnology that promises to make spacecraft instruments more sensitive without enlarging their size will be tested for the first time on the International Space Station within a year.

[New UK facility aims to protect next generation microchips from cosmic ray chaos](#) (21 August 2014)

UK scientists have built a new facility aimed at understanding how particles from space can interact with electronic devices, and to investigate the chaos that cosmic rays can cause – such as taking communications satellites offline, wiping a device's memory or affecting aircraft electronics.

[Solar power, origami-style](#) (14 August 2014)

As a high school student at a study program in Japan, Brian Trease would fold wrappers from fast-food cheeseburgers into cranes. He loved discovering different origami techniques in library books.

## **TECHNOLOGY TRANSFER**

[Space station inspired robot to help heal sick children](#) (20 August 2014)

A space-inspired robotic arm is helping doctors care for children who require intensive surgical care.