

Space News Update – January 2015

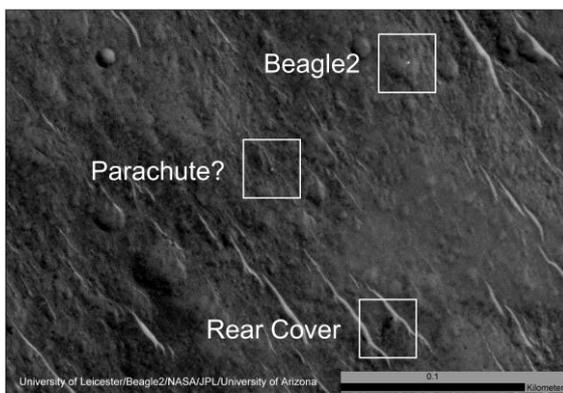
By Pat Williams

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- **Beagle-2 has indeed landed**
- **Solar eruptions preceded by a flux rope**
- **The growing problem of space debris**
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Disclaimer - I claim no authorship for the printed material; except where noted.

BEAGLE-2 HAS INDEED LANDED

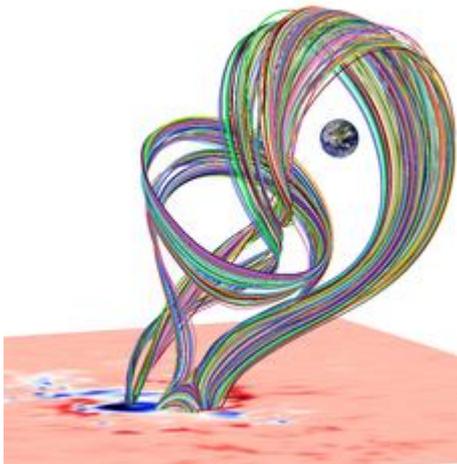


Beagle 2 lander

[Beagle-2 lander found on Mars](#) (16 January 2015)

The UK-led Beagle-2 Mars lander, which hitched a ride on ESA's Mars Express mission and was lost on Mars since 2003, has been found in images taken by a NASA orbiter at the Red Planet. Beagle-2 was released from its mother craft on 19 December 2003 and was due to land six days later. But nothing was heard from the lander after its scheduled touchdown, and searches by Mars Express and NASA's Mars Odyssey mission were fruitless. Now, over a decade later, the lander has been identified in images taken by the high-resolution camera on NASA's Mars Reconnaissance Orbiter. The lander is seen partially deployed on the surface, showing that the entry, descent and landing sequence worked and it did indeed successfully land on Mars on Christmas Day 2003. The images show the lander in what appears to be a partially deployed configuration, with only one, two or at most three of the four solar panels open, and with the main parachute and what is thought to be the rear cover with its pilot/drogue parachute still attached close by. (It is thought that a malfunction of a hinge closing one of the solar panels meant that the signal could not be transmitted – PW)

SOLAR ERUPTIONS PRECEDED BY A FLUX ROPE



*A model of the eruption of a giant magnetic rope that led to a coronal mass ejection on the sun in December 2006. The model showed that magnetic fields built up for several days before the eruption.
Image Credit: Amari/Ecole Polytechnique*

[SOHO and Hinode offer new insight into solar eruptions](#) (22 January 2015)

The sun is home to the largest explosions in the solar system. For example, it regularly produces huge eruptions known as coronal mass ejections – when billions of tons of solar material erupt off the sun, spewing into space and racing toward the very edges of the solar system. Scientists know that these ejections, called CMEs, are caused by magnetic energy building up on the sun, which suddenly releases. But the details of what causes the build-up and triggers the release are not precisely understood. The team examined what happened in the four days before the 2006 CME erupted. They could see the magnetic energy building; it was clear something was emerging. Only, however, on the last day did a flux rope develop and only then did it have enough energy built up to power a CME eruption. At this point, some small disruption was enough of a nudge to make the flux rope erupt. "In this case no weak point up in the atmosphere was needed to allow the energy to be released," said Amari. "There is, instead, a kind of critical value of energy, a value we can compute based on seeing an active magnetic region on the sun. Beneath that value the magnetic field will stay quiet. Above that, it is likely to erupt. There is also a critical height for rising flux rope, beyond which the magnetic loops above can no longer keep it confined."

The team explored the initial conditions from this event and put the information into another dynamical model the team had developed. The simulation mirrored what was actually seen, with an eruption occurring only when the critical energy and height were reached on the last day.

Amari points out that just because this CME contained a flux rope prior to eruption; it doesn't mean that other CMEs can't erupt based on other physical catalysts. But it clearly describes one mechanism that is at work on the sun. By measuring and calculating the magnetic fields on the sun, coupled with determining how to measure the critical tipping point where a CME can erupt, the paper offers new ways to determine the possibility of eruption from any given active area on the sun.

THE GROWING PROBLEM OF SPACE DEBRIS



[Cleansat: New satellite technologies for cleaner low orbits](#) (12 January 2015)

What goes up must go down. When it comes to satellites, this dictum has become a statutory requirement. Otherwise, key low orbits may well become unusable as they fill with debris. There are more than 12,000 trackable items of space debris larger than 10 cm orbiting Earth, including derelict satellites, spent upper stages and fragments of old missions – all presenting a clear and present danger to current missions. The number of smaller, untraceable objects is in the millions: hundreds of thousands of 1–10 cm pieces and literally millions of smaller particles. At orbital speeds, a 1 cm nut can strike with the force of a hand grenade.

Today, international regulations state that minimal debris should be left to propagate within heavily trafficked orbits, especially the low orbits favoured by Earth-observing missions and some classes of communication satellite, not to mention manned spacecraft and the International Space Station. For these orbits, extending up to about 2000 km above Earth, the requirement is that satellites are removed within 25 years of ending their lives. Either they should end up at an altitude where atmospheric drag gradually induces re-entry, or alternatively be despatched up to quieter 'graveyard orbits'. So mitigation methods have to be built into new low-orbit missions, with important implications for their design – not least because any mass added to the platform means less is left for the payload, the part of the satellite that actually achieves the mission goal. That means smaller satellites find it more difficult to meet mitigation requirements. The workshop at ESA's ESTEC technical centre on 17–18 March will promote a common approach to debris mitigation, summarising the current state-of-the-art for both passive and active deorbiting approaches, as well as detailing ESA's new CleanSat programme - seeking to adopt debris mitigation techniques within common platform building blocks.

NEW IMAGES OF CERES



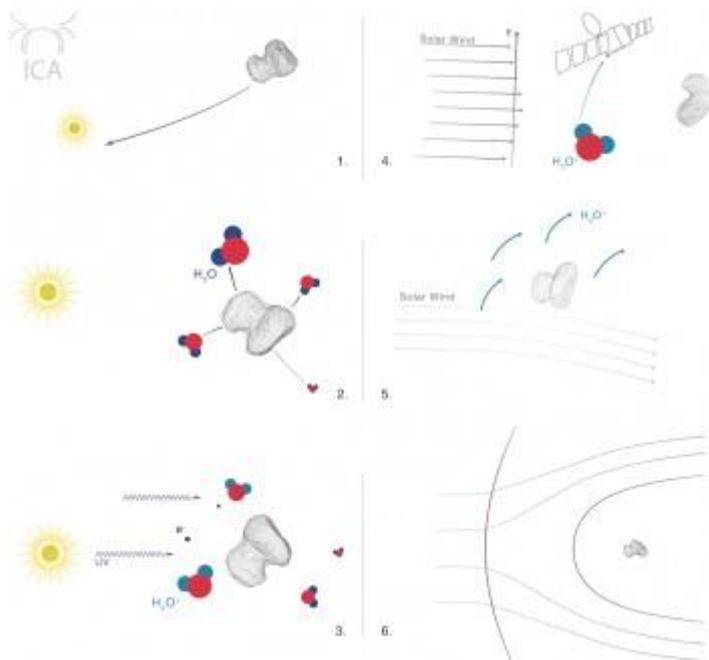
This processed image, taken Jan. 13, 2015, shows the dwarf planet Ceres as seen from the Dawn spacecraft. The image hints at craters on the surface of Ceres. Dawn's framing camera took this image at 238,000 miles (383,000 kilometers) from Ceres.

Image Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA

[Dawn delivers new image of Ceres](#) (19 January 2015)

As NASA's Dawn spacecraft closes in on Ceres, new images show the dwarf planet at 27 pixels across, about three times better than the calibration images taken in early December. "Already, the [latest] images hint at first surface structures such as craters," said Andreas Nathues, lead investigator for the framing camera team at the Max Planck Institute for Solar System Research, Gottingen, Germany. Ceres is the largest body in the main asteroid belt, which lies between Mars and Jupiter. It has an average diameter of 590 miles (950 kilometers), and is thought to contain a large amount of ice. Some scientists think it's possible that the surface conceals an ocean. Dawn's arrival at Ceres will mark the first time a spacecraft has ever visited a dwarf planet. The spacecraft has already delivered more than 30,000 images and many insights about Vesta, the second most massive body in the asteroid belt. Dawn orbited Vesta, which has an average diameter of 326 miles (525 kilometers), from 2011 to 2012. Thanks to its ion propulsion system, Dawn is the first spacecraft ever targeted to orbit two deep-space destinations.

COMET 67P/CHURYUMOV-GERASIMENKO – WHAT'S NEW?



How a comet grows a magnetosphere

1. The comet approaches the Sun
2. Water molecules sublime from the comet as it thaws
3. The water molecules are ionised by ultraviolet light from the Sun
4. New-born ions are accelerated by the solar wind electric field and are detected by the RPC-ICA instrument
5. The solar wind accelerates the water ions in one direction, but is itself deflected in the opposite direction

Credits: ESA/Rosetta/RPC-ICA

[Watching the birth of a comet magnetosphere](#) (22 January 2015)

In an article in Science an international research group led from the Swedish Institute of Space Physics shows what happens when a magnetosphere forms round a comet.

[Getting to know Rosetta's comet](#) (22 January 2015)

Rosetta is revealing its host comet as having a remarkable array of surface features and with many processes contributing to its activity, painting a complex picture of its evolution.

[Rosetta comet 'pouring' more water into space](#) (22 January 2015)

There has been a significant increase in the amount of water "pouring" out of comet 67P/Churyumov-Gerasimenko, the comet on which the Rosetta mission's Philae lander touched down in November 2014.

[Rosetta watches comet shed its dusty coat](#) (26 January 2015)

ESA's Rosetta mission is providing unique insight into the life cycle of a comet's dusty surface, watching 67P/Churyumov-Gerasimenko as it sheds the dusty coat it has accumulated over the past four years.

LINKS TO OTHER SPACE AND ASTRONOMY NEWS PUBLISHED IN JANUARY 2015

ASTEROIDS and ASTEROID BELT

[Meteorite material born in molten spray as embryo planets collided](#) (14 January 2015)

Asteroids may be a by-product of planet formation rather than planetary building blocks, according to a recent paper in Nature.

[Gullies on Vesta suggest past water-mobilized flows](#) (21 January 2015)

Protoplanet Vesta, visited by NASA's Dawn spacecraft from 2011 to 2013, was once thought to be completely dry, incapable of retaining water because of the low temperatures and pressures at its surface.

[Asteroid that flew past Earth has moon](#) (27 January 2015)

Scientists working with NASA's 230-foot-wide (70-meter) Deep Space Network antenna at Goldstone, California, have released the first radar images of asteroid 2004 BL86.

[High-definition radar images of near-Earth asteroid](#) (30 January 2015)

A team of astronomers using the National Science Foundation's Green Bank Telescope (GBT) in West Virginia and NASA's Deep Space Network radar transmitter at Goldstone, California, has made the most detailed radar images yet of asteroid 2004 BL86.

ASTROPHYSICS

[Astronomers use vanishing neutron star to measure space-time warp](#) (8 January 2015)

In an interstellar race against time, astronomers have measured the space-time warp in the gravity of a binary star and determined the mass of a neutron star—just before it vanished from view.

[Cosmic radio burst caught red-handed](#) (19 January 2015)

A short, sharp flash of radio waves from a mysterious source up to 5.5 billion light years from Earth has been detected by CSIRO's Parkes radio telescope in eastern Australia.

[Gravitational waves remain elusive](#) (30 January 2015)

Despite earlier reports of a possible detection; a joint analysis of data from ESA's Planck satellite and the ground-based BICEP2 and Keck Array experiments has found no conclusive evidence of primordial gravitational waves.

ASTRONOMY

[Massive new astronomy database now available to the public](#) (8 January 2015)

Penn State astronomers are among the scientists of the Sloan Digital Sky Survey (SDSS) who this week are releasing to the public a massive collection of new information about the universe.

[Astronomers preparing to map the Universe with largest radio telescope ever built](#) (19 January 2015)

Scientists from around the world have joined forces to lay the foundations for an experiment of truly astronomical proportions: putting together the biggest map of the Universe ever made.

BLACK HOLES

[Chandra detects record-breaking outburst from Milky Way's black hole](#) (5 January 2015)

Astronomers have observed the largest X-ray flare ever detected from the supermassive black hole at the centre of the Milky Way galaxy.

[Unusual light signal yields clues about elusive black hole merger](#) (7 January 2015)

The central regions of many glittering galaxies, our own Milky Way included, harbour cores of impenetrable darkness—black holes with masses equivalent to millions, or even billions, of suns.

EARTH

[Electromagnetic waves linked to particle fallout in Earth's atmosphere](#) (5 January 2015)

In a new study that sheds light on space weather's impact on Earth, Dartmouth researchers and their colleagues show for the first time that plasma waves buffeting the planet's radiation belts are responsible for scattering charged particles into the atmosphere.

[DSCOVR to provide "EPIC" views of Earth](#) (7 January 2015)

NASA has contributed two Earth science instruments for NOAA's space weather observing satellite called the Deep Space Climate Observatory or DSCOVR, set to launch in January 2015.

[Alaskan sounding rocket campaign study role of solar wind on Earth's atmosphere and meteorology](#)

(13 January 2015)

The interaction of solar winds and Earth's atmosphere produces northern lights, or auroras, that dance across the night sky and mesmerize the casual observer.

[Radiometer tunes in to soil's frequency](#) (27 January 2015)



NASA's Soil Moisture Active Passive (SMAP) mission will produce high-resolution global maps of soil moisture to track water availability around our planet and guide policy decisions. Image Credit: NASA/JPL-Caltech

Whether it's a parched field or a boggy marsh, the ground naturally emits microwave energy. Not much energy – but enough that NASA's newest, more technologically advanced radiometer instrument can detect it from space, allowing scientists to study how much water is in the soil.

[Mapping forest structure from space](#) (30 January 2015)

Over the last 10 years a new method using satellite radar data has been maturing to provide 3D views of Earth's natural resources and urban environments.

[NASA launches ground-breaking soil moisture mapper](#) (31 January 2015)

NASA successfully launched its first Earth satellite designed to collect global observations of the vital soil moisture hidden just beneath our feet.

EXOMOONS

[NASA supercomputer assists the hunt for exomoons](#)

(30 January 2015) A team of 21st-century explorers working for the Hunt for Exomoons with Kepler (HEK) project, based at Harvard University, are searching for exomoons using data from NASA's Kepler mission and the Pleiades supercomputer at the NASA Advanced Supercomputing (NAS) facility at NASA's Ames Research Center.

EXOPLANETS

[New instrument reveals recipe for other Earths](#) (5 January 2015)

How do you make an Earth-like planet?

[Super-Earths have long-lasting oceans](#) (5 January 2015)

For life as we know it to develop on other planets, those planets would need liquid water, or oceans.

[Kepler marks 1,000th exoplanet discovery](#) (6 January 2015)

How many stars like our sun host planets like our Earth? NASA's Kepler Space Telescope continuously monitored more than 150,000 stars beyond our solar system, and to date has offered scientists an assortment of more than 4,000 candidate planets for further study -- the 1,000th of which was recently verified.

[Volunteer 'disk detectives' top 1 million classifications of possible planetary habitats](#) (6 January 2015)

A NASA-sponsored website designed to crowdsource analysis of data from the agency's Wide-field Infrared Survey Explorer (WISE)

[Eight new planets found in "Goldilocks" zone](#) (6 January 2015)

Astronomers announced today that they have found eight new planets in the "Goldilocks" zone of their stars, orbiting at a distance where liquid water can exist on the planet's surface.

[Extrasolar storms: how's the weather way out there?](#) (12 January 2015)

Like galactic storm chasers, UA astronomers are leading an effort to discover how clouds and weather systems change over time on other worlds.

[New exoplanet-hunting telescopes on Paranal](#) (14 January 2015)

The Next-Generation Transit Survey (NGTS) has achieved first light at ESO's Paranal Observatory in northern Chile.

[Planets outside our solar system more hospitable to life than thought](#) (15 January 2015)

A study by astrophysicists at the University of Toronto suggests that exoplanets - planets outside our solar system - are more likely to have liquid water and be more habitable than we thought.

[Three nearly Earth-size planets found orbiting nearby star](#) (16 January 2015)

NASA's Kepler Space Telescope, despite being hobbled by the loss of critical guidance systems, has discovered a star with three planets only slightly larger than Earth.

[Telescope to seek dust where other Earths may lie](#) (20 January 2015)

The NASA-funded Large Binocular Telescope Interferometer, or LBTI, has completed its first study of dust in the "habitable zone" around a star, opening a new door to finding planets like Earth.

[Recreating planet formation, super-Earths and giant planets in the laboratory](#) (22 January 2015)

New laser-driven compression experiments reproduce the conditions deep inside exotic super-Earths and giant planet cores, and the conditions during the violent birth of Earth-like planets, documenting the material properties that determined planets' formation and evolution processes.

[Gigantic ring system around J1407b much larger, heavier than Saturn's](#) (26 January 2015)

Astronomers at the Leiden Observatory, The Netherlands, and the University of Rochester, USA, have discovered that the ring system that they see eclipse the very young Sun-like star J1407 is of enormous proportions, much larger and heavier than the ring system of Saturn.

[Dawn spacecraft captures best-ever view of dwarf planet](#) (27 January 2015)

NASA's Dawn spacecraft has returned the sharpest images ever seen of the dwarf planet Ceres.

[Ancient star system reveals Earth-sized planets forming near start of universe](#) (27 January 2015)

A Sun-like star with orbiting planets, dating back to the dawn of the Galaxy, has been discovered by an international team of astronomers.

[Some potentially habitable planets began as gaseous, Neptune-like worlds](#) (28 January 2015)

Two phenomena known to inhibit the potential habitability of planets — tidal forces and vigorous stellar activity — might instead help chances for life on certain planets orbiting low-mass stars, University of Washington astronomers have found.

GALAXIES

[Milky Way core drives wind at 2 million miles per hour](#) (5 January 2015)

At a time when our earliest human ancestors had recently mastered walking upright, the heart of our Milky Way galaxy underwent a titanic eruption, driving gases and other material outward at 2 million miles per hour.

[Study of Andromeda's stellar disk indicates more violent history than Milky Way](#) (8 January 2015)

A detailed study of the motions of different stellar populations in the disk of the Andromeda galaxy has found striking differences from our own Milky Way, suggesting a more violent history of mergers with smaller galaxies in Andromeda's recent past.

[Map of mysterious molecules in our galaxy sheds new light on century-old puzzle](#) (9 January 2015)

By analysing the light of hundreds of thousands of celestial objects, Johns Hopkins astronomers from the Sloan Digital Sky Survey (SDSS) have created a unique map of enigmatic molecules in our galaxy that are responsible for puzzling features in the light from stars.

[Galactic 'hailstorm' in the early Universe](#) (16 January 2015)

Astronomers have been able to peer back to the young Universe to determine how quasars – powered by supermassive black holes with the mass of a billion suns – form and shape the evolution of galaxies.

[An exceptionally powerful trio in the Large Magellanic Cloud](#) (22 January 2015)

H.E.S.S. discovers three extremely luminous gamma-ray sources in Milky Way's satellite galaxy.

[Lofar's record-sharp image gives astronomers a new view of galaxy M 82](#) (29 January 2015)

An international team of astronomers led from Chalmers has used the giant radio telescope Lofar to create the sharpest astronomical image ever taken at very long radio wavelengths.

INTERNATIONAL SPACE STATION

[Astronaut feels the force](#) (5 January 2015)

In a milestone for space robotics, the International Space Station has hosted the first full run of ESA's experiment with a force-reflecting joystick.

[Space station worms help battle muscle and bone loss](#) (12 January 2015)

Two Japan Aerospace Exploration Agency (JAXA) investigations on the International Space Station help researchers seek clues to physiological problems found in astronauts by studying *Caenorhabditis elegans* -- a millimetre-long roundworm that, like the fruit fly, is widely used as a model for larger organisms.

MARS

[Martian chemical maps suggest water bound to sulphates in soil](#) (5 January 2015)

A research team led by LSU Geology and Geophysics Assistant Professor Suniti Karunatillake reveals a spatial association between the presence of sulphur and hydrogen found in Martian soil.

[Gully patterns document Martian climate cycles](#) (28 January 2015)

Geologists from Brown University have found new evidence that glacier-like ice deposits advanced and retreated multiple times in the mid latitude regions of Mars in the relatively recent past.

[The 2 faces of Mars](#) (28 January 2015)

The two hemispheres of Mars are more different from any other planet in our solar system.

[Meteorite may represent 'bulk background' of Mars' battered crust](#) (30 January 2015)

NWA 7034, a meteorite found a few years ago in the Moroccan desert, is like no other rock ever found on Earth.

METEORITES

[Death of a dynamo](#) (21 January 2015)

Hidden magnetic messages contained within ancient meteorites are providing a unique window into the processes that shaped our solar system, and may give a sneak preview of the fate of the Earth's core as it continues to freeze.

PLUTO and TRANS NEPTUNIAN OBJECTS

[New Horizons spacecraft begins first stages of Pluto encounter](#) (15 January 2015)

NASA's New Horizons spacecraft recently began its long-awaited, historic encounter with Pluto. The spacecraft is entering the first of several approach phases that culminate July 14 with the first close-up flyby of the dwarf planet, 4.67 billion miles (7.5 billion kilometers) from Earth.

QUASARS

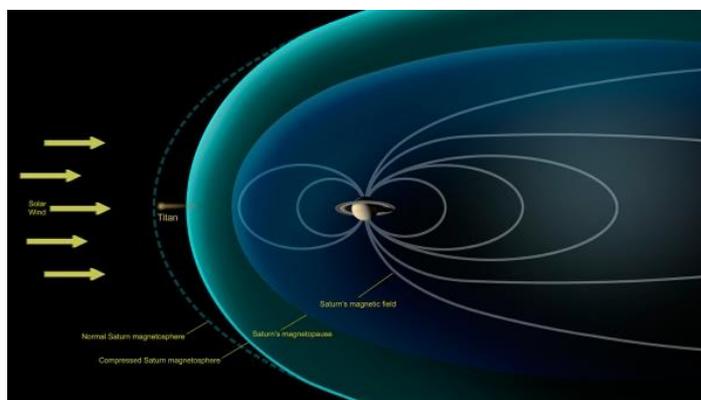
[Black hole on a diet creates a 'changing look' quasar](#) (22 January 2015)

Yale University astronomers have identified the first "changing look" quasar, a gleaming object in deep space that appears to have its own dimmer switch.

SATURN AND MOONS

[Pinpointing Saturn with exquisite accuracy](#) (8 January 2015)

Scientists have paired NASA's Cassini spacecraft with the National Science Foundation's Very Long Baseline Array (VLBA) radio-telescope system to pinpoint the position of Saturn and its family of moons to within about 2 miles (4 kilometers).



This diagram depicts conditions observed by NASA's Cassini spacecraft during a flyby in Dec. 2013, when Saturn's magnetosphere was highly compressed, exposing Titan to the full force of the solar wind. (courtesy: NASA/JPL-Caltech)

Researchers studying data from NASA's Cassini mission have observed that Saturn's largest moon, Titan, behaves much like Venus, Mars or a comet when exposed to the raw power of the solar wind.

SOLAR SYSTEM

[Trans-Neptunian objects suggest that there are more planets in the solar system](#) (13 January 2015)



There could be at least two unknown planets hidden well beyond Pluto, whose gravitational influence determines the orbits and strange distribution of objects observed beyond Neptune.

[Study shows how planetary building blocks evolved from porous to hard objects](#) (16 January 2015)

Thinking small has enabled an international team of scientists to gain new insight into the evolution of planetary building blocks in the early solar system.

STARS AND STAR CLUSTERS

[Stars' spins reveal their ages](#) (5 January 2015)

Stars slow down as they age, and their ages are well-kept secrets.

[An unprecedented look into superstar Eta Carinae](#) (7 January 2015)

Eta Carinae, the most luminous and massive stellar system within 10,000 light-years of Earth, is known for its surprising behaviour, erupting twice in the 19th century for reasons scientists still don't understand.

[Belgian and French researchers succeed in measuring the temperature at the heart of stars](#) (8 January 2015)

Researchers from the Université libre de Bruxelles and the Université de Montpellier have succeeded, for the first time, in measuring the temperature at the heart of certain stars, as well as dating them.

[International effort probes strong gravity in a binary neutron star system](#) (14 January 2015)

A West Virginia University professor has contributed to an international team of astronomers successfully measuring the precession of a young neutron star, just before it disappeared from visibility.

[Stellar astronomers answer question posed by citizen scientists: 'What are yellowballs?'](#) (26 January 2015)

Some four years ago, a citizen scientist helping the Milky Way Project study Spitzer Space Telescope images for the tell-tale bubble patterns of star formation noticed something else.

SUPERNOVA

[Novel vision of the death of massive stars](#) (8 January 2015)

An international consortium, in which the University of the Basque Country (UPV/EHU), Ikerbasque and CSIC are participating, has published in a single article a compendium of data obtained after the simultaneous research of three supernovas and of their corresponding Gamma-Ray Bursts (GRB).

[“Assassin” targets supernovae in our neighbourhood of the universe](#) (8 January 2015)

While many astronomical collaborations use powerful telescopes to target individual objects in the distant universe, a new project at The Ohio State University is doing something radically different: using small telescopes to study a growing portion of the nearby universe all at once.

[Ocean floor dust gives new insight into supernovae](#) (20 January 2015)

Scientists plumbing the depths of the ocean have made a surprise finding that could change the way we understand supernovae, exploding stars way beyond our solar system.

[CAT scan of nearby supernova remnant reveals frothy interior](#) (29 January 2015)

Cassiopeia A, or Cas A for short, is one of the most well studied supernova remnants in our galaxy.

SUN

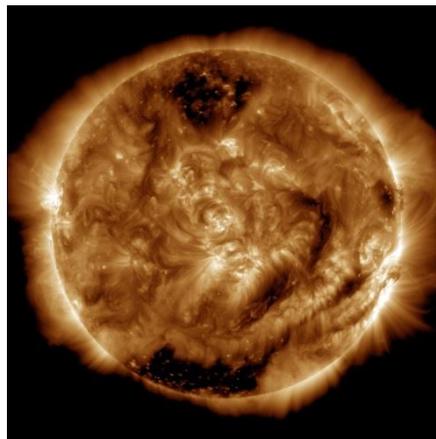
[How stars transmit energy](#) (6 January 2015)

Working at temperatures matching the interior of the sun, researchers at Sandia National Laboratories' Z machine have been able to determine experimentally, for the first time in history, iron's role in inhibiting energy transmission from the centre of the sun to near the edge of its radiative band — the section of the solar interior between the sun's core and outer convection zone.

[Rejigging the Cluster quartet](#) (16 January 2015)

Aiming to study Earth's 'bow shock' in the solar wind, the constellation of Cluster satellites is being rejigged to bring two of the four to within almost touching distance.

[Telescope on NASA's SDO collects its 100-millionth image](#) (20 January 2015)



The Atmospheric Imaging Assembly on NASA's Solar Dynamics Observatory captured its 100 millionth image of the sun on Jan. 19, 2015. The dark areas at the bottom and the top of the image are coronal holes -- areas of less dense gas, where solar material has flowed away from the sun. Credit: NASA/SDO/AIA/LMSAL

On Jan. 19, 2015, at 12:49 p.m. EST, an instrument on NASA's Solar Dynamics Observatory captured its 100 millionth image of the sun.

TECHNOLOGY

[Helicopter could be 'scout' for Mars rovers](#) (22 January 2015)

Getting around on Mars is tricky business.

[Integral manoeuvres for the future](#) (23 January 2015)

Since 2002, ESA's Integral spacecraft has been observing some of the most violent events in the Universe, including gamma-ray bursts and black holes.

[Moon Express makes history as first company to demonstrate a commercial lunar lander](#) (27 January 2015)

Moon Express (MoonEx) has been awarded \$1M by Google Lunar XPRIZE for its recent lander test flights, taking home the only Lander System milestone prize awarded for a full lander system demonstration.

Pat Williams. January 2015