

# Space News Update – June 2014

*Compiled by Pat Williams*

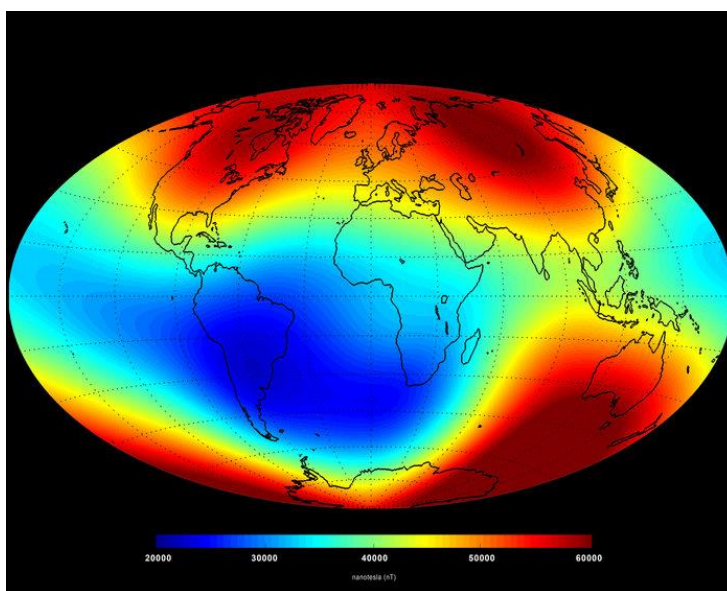
## IN THIS EDITION:

Page | 1

- Swarm reveals Earth's Changing Magnetism
- Pulsating X-rays Allow XMM-Newton to Unmask Pulsating Star
- Dwarf Galaxies Don't Fit Standard Model
- Can Spacetime Become Turbulent?
- Gigantic Explosions Buried in Dust – Gamma Ray Bursts
- Technology – Does 3D Printing Have the Right Stuff for Space?
- Links to Other Space News Published in June 2014

Disclaimer - I claim no authorship for the printed material; except where noted.

## SWARM REVEALS EARTH'S CHANGING MAGNETISM (19 June 2014)

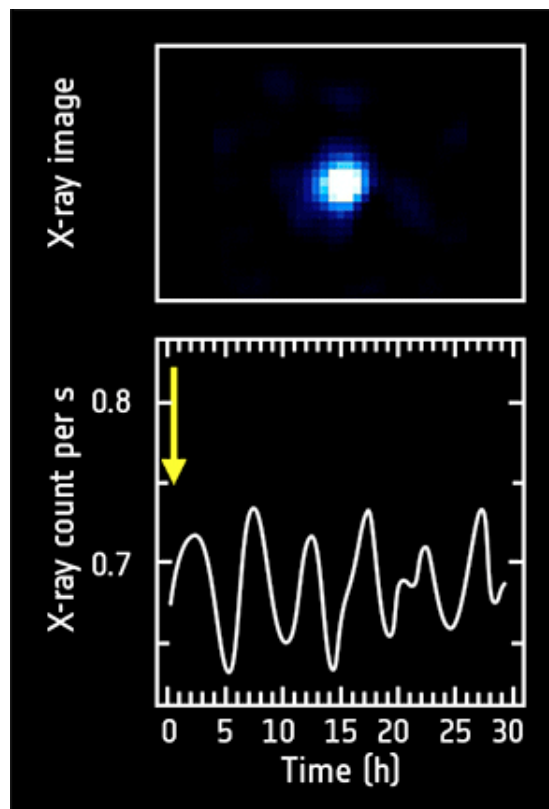


June 2014 magnetic field Credit ESA/DTU Space

Description of image: This is a “snapshot” of the main magnetic field at Earth's surface as of June 2014 based on Swarm data. The measurements are dominated by the magnetic contribution from Earth's core (about 95%) while the contributions from other sources (the mantle, crust, oceans, ionosphere and magnetosphere) make up the rest. Red represents areas where the magnetic field is stronger, while blues show areas where it is weaker.

The first set of high-resolution results from ESA's three-satellite Swarm constellation reveals the most recent changes in the magnetic field that protects our planet. Launched in November 2013, Swarm is providing unprecedented insights into the complex workings of Earth's magnetic field, which safeguards us from the bombarding cosmic radiation and charged particles. Measurements made over the past six months confirm the general trend of the field's weakening, with the most dramatic declines over the Western Hemisphere. But in other areas, such as the southern Indian Ocean, the magnetic field has strengthened since January. The latest measurements also confirm the movement of magnetic North towards Siberia.

[http://www.esa.int/Our\\_Activities/Observing\\_the\\_Earth/Swarm/Swarm\\_reveals\\_Earth\\_s\\_changing\\_magnetism](http://www.esa.int/Our_Activities/Observing_the_Earth/Swarm/Swarm_reveals_Earth_s_changing_magnetism)  
[http://www.esa.int/Our\\_Activities/Observing\\_the\\_Earth/The\\_Living\\_Planet\\_Programme/Earth\\_Explorers/Swarm/ESA\\_s\\_magnetic\\_field\\_mission\\_Swarm](http://www.esa.int/Our_Activities/Observing_the_Earth/The_Living_Planet_Programme/Earth_Explorers/Swarm/ESA_s_magnetic_field_mission_Swarm)

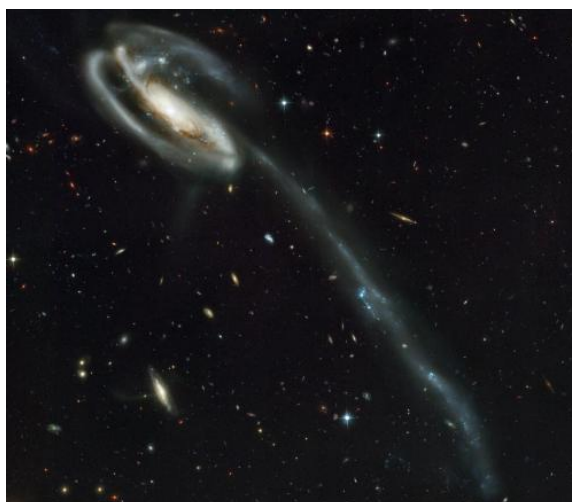


*X-ray pulses from  $\text{Xi}^1 \text{CMa}$ .*

Credit: ESA/XMM-Newton/L. Oskinova (University of Potsdam)

XMM-Newton has revealed a unique star. It is a celestial chimera with the body of a normal massive star yet the magnetic field of a dead, stellar dwarf. This massive star draws particular attention to itself because it has an immensely strong magnetic field, nearly 10 000 times stronger than Earth's and 5000 times stronger than the Sun's. "*Its magnetic field is outstandingly strong compared to other massive stars,*" says Lidia Oskinova, University of Potsdam, Germany, who led this latest study. Analysing one observation, the team immediately discovered something unexpected. The star's X-ray emission pulsed, rising and falling in a regular, repeating fashion every 5 hours. Such pulsations have never before been seen from normal stars. "*So far, we don't understand the physics behind these pulsations,*" says Oskinova, referring to  $\text{Xi}^1 \text{Canis Majoris}$ . The only stars previously known to give off pulsating X-rays were stellar corpses known as degenerate stars. These are stars in which nuclear fusion has come to an end. As a result, they no longer generate energy and so collapse into extremely dense objects called white dwarfs or neutron stars. A white dwarf is about the size of the Earth, whereas a neutron star is approximately 10 kilometres across. Neutron stars sweep beams of X-ray emission through space like a lighthouse, creating the pulsations, while white dwarfs vibrate extremely quickly, creating their X-ray pulses. Neither mechanism can work for normal stars, as both rely on the star being composed of highly compacted material, known as degenerate matter. A clue may come from the fact that  $\text{Xi}^1 \text{Canis Majoris}$  pulsates in optical light as well. This optical variability has been known for a century. The pulses are extremely stable, changing by less than a second in that time. They are driven by changes in the way radiation is absorbed and re-emitted inside the star- a process known as the kappa mechanism. "*This is breakthrough science because it shows that X-ray pulsations can take place not only in exotic objects but in normal stars too. New physical processes governing stellar winds can now be studied. Also, it highlights both the capabilities of XMM-Newton and the long lasting legacy of the Hipparcos star mapper,*" says Norbert Schartel, ESA XMM-Newton Project Scientist.

<http://sci.esa.int/xmm-newton/54101-pulsating-x-rays-allow-xmm-newton-to-unmask-a-mysterious-star/>



Material stripped from the galaxy during its collision with a smaller galaxy (seen in the upper left corner of the larger interaction partner) forms a long tidal tail. Young blue stars, star clusters and tidal dwarf galaxies are born in these tidal debris. These objects move in a common direction within a plane defined by the orientation and motion of their tidal tail. A similar galaxy interaction might have occurred in the Local Group in the past, which could explain the distribution of dwarf galaxies in co-rotating planes.

Credit: NASA, Holland Ford (JHU), the ACS Science Team and ESA

Satellite dwarf galaxies at the edges of the Milky Way and neighbouring Andromeda defy the accepted model of galaxy formation, and recent attempts to pigeon-hole them into the model are flawed, an international team of scientists reports. "The standard model contains various putative ingredients - such as dark matter and dark energy - which were introduced because the model wasn't consistent with observations," said Benoit Famaey, a senior research associate at the University of Strasbourg in France, and co-author of the study. He and the other authors are among a small but growing number of astrophysicists who find the standard model fails to replicate what's observed and therefore they seek alternatives. Dark matter is thought to be an as-yet undetected matter that provides galaxies with enough mass to prevent the speed of their rotation from pulling them apart. If present, the unseen cloud of matter would be extremely unlikely to result in the planar structures seen. The authors suggest an alternative and older explanation for the satellite dwarf galaxies: a collision between two galaxies. The collision may have ripped material from the galaxies and thrown it a great distance, much like tides on Earth. The resulting tidal dwarf galaxies are formed from the debris. "Standard galaxies must contain dark matter, but tidal galaxies cannot contain dark matter," said Pavel Kroupa, a co-author of the study and a professor at the University of Bonn in Germany. "There's a very serious conflict, and the repercussion is we do not seem to have the correct theory of gravity" The group will continue to study tidal dwarf galaxies and whether another alternative to the standard model - modified gravity - fits what they observe. The researchers say science may initially balk at the premise but has historically embraced challenges to accepted theories, and for good reason.

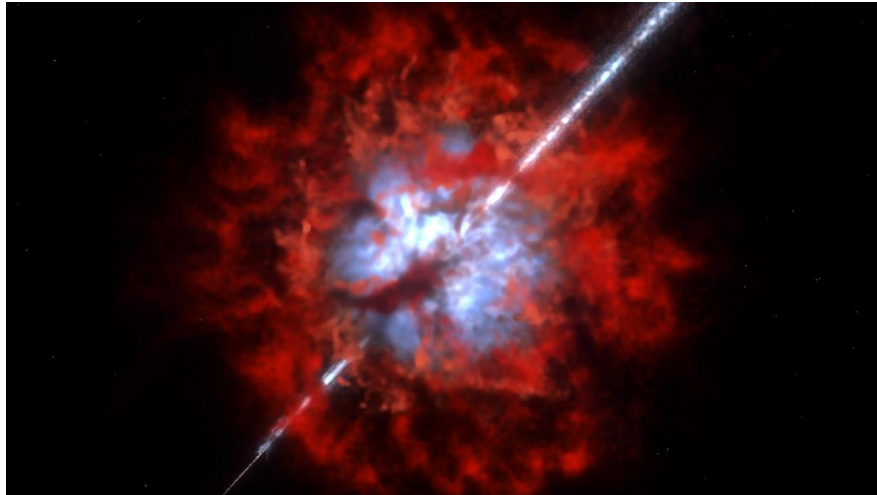
<http://phys.org/news/2014-06-universe-dwarf-galaxies-dont-standard.html>

<http://arxiv.org/abs/1406.1799>

## CAN SPACETIME BECOME TURBULENT? (5 June 2014)

Gravitational fields around black holes might eddy and swirl. The accepted wisdom among gravitational researchers has been that spacetime cannot become turbulent. New research from Perimeter shows that the accepted wisdom might be wrong. Turbulence is all around us. Yet we don't fully understand it. It's considered one of the greatest unsolved problems in classical physics. This research strengthens the idea that gravity can be treated as a fluid – which also means that fluids can be treated gravitationally. "We've been stuck for over 500 years on achieving a full understanding of turbulence," says Lehner. "This gravity/fluid correspondence tells us that there is a way to use gravitational tools and gravitational intuition to take a fresh look at turbulence. We may end up as stuck as we are in our standard approach, or we may end up shedding completely new light that helps the field go forward. It's very exciting

<http://www.perimeterinstitute.ca/news/turbulent-black-holes>



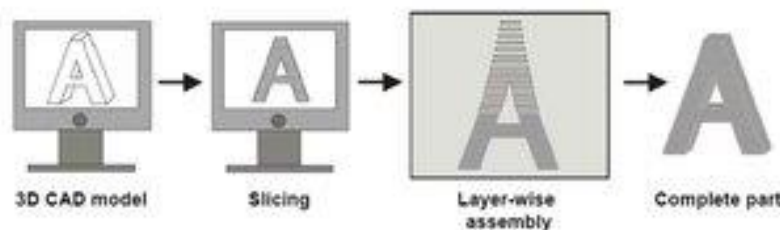
An artist's conception of the environment around GRB 020819B based on ALMA observations. Credit: NAOJ

Observations from the Atacama Large Millimeter/submillimeter Array (ALMA) have for the first time directly mapped out the molecular gas and dust in the host galaxies of gamma-ray bursts (GRBs) - the biggest explosions in the Universe. In a complete surprise, less gas was observed than expected, and correspondingly much more dust, making some GRBs appear as “dark GRBs”. Astronomers expected that the massive stars that were GRB progenitors would be found in active star-forming regions in these galaxies, which would be surrounded by a large amount of molecular gas — the fuel for star formation. However, there had been no observational result to back up this theory, leaving a long-standing mystery.

Gamma-ray bursts (GRBs) are intense bursts of extremely high energy observed in distant galaxies — the brightest explosive phenomenon in the Universe. Bursts that last more than a couple of seconds are known as long-duration gamma-ray bursts (LGRBs) and are associated with supernova explosions — powerful detonations at the ends of the lives of massive stars. Long-duration gamma-ray bursts (LGRBs), bursts lasting for over two seconds, account for about 70% of observed GRBs. Developments over the past decade have recognised a new class of GRBs with bursts of less than two seconds, the short-duration GRBs, likely due to merging neutron stars and not associated with supernovae or hypernovae.

<http://www.almaobservatory.org/en/press-room/press-releases/707-gigantic-explosions-buried-in-dust-alma-probes-environment-around-gamma-ray-bursts>  
<http://www.eso.org/public/news/eso1418/>

**DOES 3D PRINTING HAVE THE RIGHT STUFF FOR FLYING IN SPACE?** (20 June 2014)



3D-printed parts promise a revolution in the space industry, rapidly creating almost any object needed. But do the results really have the right stuff for flying in space? ESA is now checking if their surface finish comes up to scratch. 3D printing involves building an item by laying down successive layers of material, rather than cutting away from a solid block. Extremely complex parts can be printed and made as light as possible, but there's a catch: 3D printing tends to end up with rougher surfaces than their traditional counterparts. A new ESA project will investigate the surface features of 3D-printed parts to scrutinise the suitability of standard surface treatments for typical satellite materials such as aluminium, titanium and stainless steel.



Original and 3D-printed 'woov' valve

[http://www.esa.int/Our\\_Activities/Space\\_Engineering/Clean\\_Space/Does\\_3D\\_printing\\_have\\_the\\_right\\_stuff](http://www.esa.int/Our_Activities/Space_Engineering/Clean_Space/Does_3D_printing_have_the_right_stuff)

## LINKS TO OTHER SPACE NEWS PUBLISHED IN JUNE 2014

### ASTEROIDS

#### **Giant telescopes pair up to image near-Earth asteroid** (12 June 2014)

NASA scientists using Earth-based radar have produced sharp views of a recently discovered asteroid as it slid silently past our planet. <http://www.jpl.nasa.gov/news/news.php?release=2014-186>

#### **Spitzer spies an odd, tiny asteroid** (19 June 2014)

Astronomers using NASA's Spitzer Space Telescope have measured the size of an asteroid candidate for NASA's Asteroid Redirect Mission (ARM), a proposed spacecraft concept to capture either a small asteroid, or a boulder from an asteroid.

<http://www.spitzer.caltech.edu/news/1673-feature14-14-Spitzer-Spies-an-Odd-Tiny-Asteroid>

#### **Unexpected asteroid findings** (19 June 2014)

What seemed to be rock-solid assumptions about the nature of small asteroids may end in collections of rubble or even a cloud of dust, but in such findings lies the lure of the unexpected.

<http://news.nau.edu/nasa-nau-researchers-welcome-unexpected-asteroid-findings/#.U7MXb8JOWM8>

#### **NASA selects studies for the Asteroid Redirect Mission** (19 June 2014)

NASA has selected 18 proposals for studies under the Asteroid Redirect Mission Broad Agency Announcement (BAA).

<http://www.nasa.gov/content/nasa-selects-studies-for-the-asteroid-redirect-mission/>

#### **New model gives glimpse into the invisible world of electric asteroids** (25 June 2014)

Space may appear empty -- a soundless vacuum, but it's not an absolute void. It flows with electric activity that is not visible to our eyes. <http://www.nasa.gov/content/goddard/new-nasa-model-gives-glimpse-into-the-invisible-world-of-electric-asteroids/>

### BLACK HOLES

#### **Black hole 'batteries' keep blazars going and going** (3 June 2014)

Astronomers studying two classes of black-hole-powered galaxies monitored by NASA's Fermi Gamma-ray Space Telescope have found evidence that they represent different sides of the same cosmic coin. To be considered a blazar, an active galaxy must show either rapid changes in visible light on timescales as short as a few days, strong optical polarization, or glow brightly at radio wavelengths with a "flat spectrum" — that is, one exhibiting relatively little change in brightness among neighbouring frequencies.

<http://www.nasa.gov/content/goddard/black-hole-batteries-keep-blazars-going-and-going/>

#### **Surprisingly strong magnetic fields challenge black holes' pull** (4 June 2014)

A new study of supermassive black holes at the centres of galaxies has found magnetic fields play an impressive role in the systems' dynamics.

<http://newscenter.lbl.gov/2014/06/04/black-holes/>

**Swiftly moving gas streamer eclipses supermassive black hole** (19 June 2014)

An international team of astronomers using data from several NASA and European Space Agency (ESA) space observatories has discovered unexpected behaviour from the supermassive black hole at the heart of the galaxy NGC 5548. <http://www.nasa.gov/press/2014/june/swiftly-moving-gas-streamer-eclipses-supermassive-black-hole/>

**Astronomers pierce galactic clouds to shed light on black hole development** (19 June 2014)

An international team of scientists including a Virginia Tech physicist have discovered that winds blowing from a supermassive black hole in a nearby galaxy work to obscure observations and x-rays.

<http://www.vtnews.vt.edu/articles/2014/06/062014-science-galaxy.html>

**Black hole trio holds promise for gravity wave hunt** (25 June 2014)

The discovery of three closely orbiting supermassive black holes in a galaxy more than four billion light years away could help astronomers in the search for gravitational waves: the 'ripples in spacetime' predicted by Einstein.

<http://www.cam.ac.uk/research/news/black-hole-trio-holds-promise-for-gravity-wave-hunt>

**COMET****NASA instruments begin science on European spacecraft set to land on comet** (10 June 2014)

Three NASA science instruments aboard the European Space Agency's (ESA) Rosetta spacecraft, which is set to become the first to orbit a comet and land a probe on its nucleus, are beginning observations and sending science data back to Earth.

<https://rosetta.jpl.nasa.gov/news/nasa-instruments-european-comet-spacecraft-begin-countdown>

**Rosetta's comet loses two glasses of water a second** (30 June 2014)

ESA's Rosetta spacecraft has found that comet 67P/Churyumov–Gerasimenko is releasing the equivalent of two small glasses of water into space every second, even at a cold 583 million kilometres from the Sun.

<http://sci.esa.int/rosetta/54251-first-detection-of-water-vapour/>

**DARK MATTER****Puzzling X-rays point to dark matter** (24 June 2014)

Astronomers using ESA and NASA high-energy observatories have discovered a tantalising clue that hints at an elusive ingredient of our Universe: dark matter.

[http://www.esa.int/Our\\_Activities/Space\\_Science/Puzzling\\_X-rays\\_point\\_to\\_dark\\_matter](http://www.esa.int/Our_Activities/Space_Science/Puzzling_X-rays_point_to_dark_matter)

**EXOPLANETS AND EXOMOON****Neapolitan exoplanets come in three flavors** (2 June 2014)

The planets of our solar system come in two basic flavors, like vanilla and chocolate ice cream.

<http://www.cfa.harvard.edu/news/2014-12>

**Harsh space weather may doom potential life on red-dwarf planets** (2 June 2014)

Life in the universe might be even rarer than we thought. <http://www.cfa.harvard.edu/news/2014-11>

**Astronomers confounded by massive rocky world** (2 June 2014)

Astronomers have discovered a rocky planet that weighs 17 times as much as Earth and is more than twice as large in size.

<http://www.nasa.gov/ames/kepler/astronomers-confounded-by-massive-rocky-world/>

<http://www.cfa.harvard.edu/news/2014-14>

**First light for SPHERE exoplanet imager** (4 June 2014)

SPHERE — the Spectro-Polarimetric High-contrast Exoplanet REsearch instrument — has been installed on ESO's Very Large Telescope (VLT) at the Paranal Observatory in Chile and has achieved first light.

<http://www.eso.org/public/unitedkingdom/news/eso1417/>

**Astronomers discover ancient worlds from another galaxy next door** (4 June 2014)

An international team of scientists, led by astronomers at Queen Mary University of London, report of two new planets orbiting Kapteyn's star, one of the oldest stars found near the Sun.

<http://www.qmul.ac.uk/media/news/items/se/133164.html>

### **Nearby Earth-like planet found** (27 June 2014)

A UNSW-led team of researchers has discovered a potentially habitable Earth-like planet that is only 16 light years away.

<http://newsroom.unsw.edu.au/news/science/nearby-earth-planet-found>

### **EXTRATERRESTRIAL LIFE**

#### **Hunt for extraterrestrial life gets massive methane boost** (17 June 2014)

A powerful new model to detect life on planets outside of our solar system, more accurately than ever before, has been developed by UCL researchers.

<http://www.ucl.ac.uk/news/news-articles/0614/170614-methane-spectra>

### **FUTURE MISSIONS**

#### **Hubble to begin search beyond Pluto for a New Horizons mission target** (16 June 2014)

After careful consideration and analysis, the Hubble Space Telescope Time Allocation Committee has recommended using Hubble to search for an object the Pluto-bound NASA New Horizons mission could visit after its flyby of Pluto in July 2015.

<http://hubblesite.org/newscenter/archive/releases/2014/29/full/>

### **GALAXIES**

#### **Mining data archives yields haul of "red nuggets"** (11 June 2014)

The world of astronomy has changed. An astronomer used to have to travel to a remote location and endure long, cold nights, patiently guiding a telescope to collect precious photons of light.

<http://www.cfa.harvard.edu/news/2014-15>

**Dwarf galaxies formed more than their fair share of the universe's stars** (19 June 2014) New observations from NASA's Hubble Space Telescope show that small galaxies, also known as dwarf galaxies, are responsible for forming a large proportion of the universe's stars.

<http://hubblesite.org/newscenter/archive/releases/2014/25/full/>

#### **Clumped galaxies give general relativity its toughest test yet** (25 June 2014)

Nearly 100 years since Albert Einstein developed general relativity, the theory has passed its toughest test yet in explaining the properties of observable Universe.

<http://www.ras.org.uk/news-and-press/2475-clumped-galaxies-give-general-relativity-its-toughest-test-yet>

### **GAMMA-RAY BURSTS**

#### **Light from huge explosion 12 billion years ago reaches Earth** (3 June 2014)

Intense light from the enormous explosion of a star more than 12 billion years ago — shortly after the Big Bang — recently reached Earth and was visible in the sky.

<http://blog.smu.edu/research/2014/06/03/texas-telescope-spots-light-reaching-earth-from-rare-huge-explosion-12-billion-years-ago/>

### **INFRARED ASTRONOMY**

#### **NASA begins testing of new spectrograph on airborne observatory** (3 June 2014)

Astronomers are eagerly waiting to begin use of a new instrument to study celestial objects: a high-resolution, mid-infrared spectrograph mounted on NASA's Stratospheric Observatory for Infrared Astronomy (SOFIA), the world's largest flying telescope.

<http://www.nasa.gov/press/2014/june/nasa-begins-testing-of-new-spectrograph-on-agencys-airborne-observatory/>

#### **SOFIA airborne observatory has landed in Hamburg** (28 June 2014)

The Stratospheric Observatory for Infrared Astronomy (SOFIA), a modified Boeing 747SP, is a joint project of the US Space Agency, NASA, and the German Aerospace Centre (Deutsches Zentrum für Luft- und Raumfahrt; DLR). [http://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151\\_read-10778/#/gallery/15435](http://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-10778/#/gallery/15435)

## **INTERNATIONAL SPACE STATION**

### **One docking ring to rule them all** (3 June 2014)

Connecting spacecraft in orbit will never be simple, but ESA is taking the next step to allow the next generation of vehicles of all types from around the world to link up with each other.

[http://www.esa.int/Our\\_Activities/Human\\_Spaceflight/One\\_docking\\_ring\\_to\\_rule\\_them\\_all](http://www.esa.int/Our_Activities/Human_Spaceflight/One_docking_ring_to_rule_them_all)

### **Decontamination system to up research on space station** (13 June 2014)

Just like eating, drinking and even trying to wash your hair aboard the International Space Station, conducting science experiments in space is not a simple task for astronauts.

[http://www.nasa.gov/mission\\_pages/station/research/news/decontamination.html](http://www.nasa.gov/mission_pages/station/research/news/decontamination.html)

### **Coffee in space** (13 June 2014)

“An espresso coffee is what I miss most aboard the International Space Station.”

<http://www.collectspace.com/news/news-061614a-isspresso-espresso-coffee-space.html>

[http://www.asi.it/it/press\\_room/comunicati\\_stampa/2014\\_caffe\\_nello\\_spazio\\_lespresso\\_italiano\\_in\\_orbita\\_con\\_arcotec\\_lavazz](http://www.asi.it/it/press_room/comunicati_stampa/2014_caffe_nello_spazio_lespresso_italiano_in_orbita_con_arcotec_lavazz)

### **Space-tested robot inspires medicine and manufacturing uses** (26 June 2014)

Humans doing difficult, repetitive tasks or those who need assistance with movement may soon get a helping hand – literally – thanks to robotic technology developed to serve astronauts in space.

[http://www.nasa.gov/mission\\_pages/station/research/news/robonaut\\_uses/](http://www.nasa.gov/mission_pages/station/research/news/robonaut_uses/)

### **Astronaut health check with single drop of blood** (26 June 2014)

ESA is building a prototype tester for crews on the International Space Station to provide diagnoses within a few minutes from a pinprick of blood. The ultimate device will offer rapid health checks and results for scientific research.

[http://www.esa.int/Our\\_Activities/Technology/Astronaut\\_health\\_check\\_with\\_single\\_drop\\_of\\_blood](http://www.esa.int/Our_Activities/Technology/Astronaut_health_check_with_single_drop_of_blood)

### **Closing the recycling circle** (27 June 2014)

The International Space Station welcomes up to eight supply vessels a year bringing oxygen, water and food for the six astronauts continuously circling our planet.

[http://www.esa.int/Our\\_Activities/Human\\_Spaceflight/Research/Closing\\_the\\_recycling\\_circle](http://www.esa.int/Our_Activities/Human_Spaceflight/Research/Closing_the_recycling_circle)

## **INTERPLANETARY MEDIUM**

### **International collaboration replicates amplification of cosmic magnetic fields** (1 June 2014)

Astrophysicists have established that cosmic turbulence could have amplified magnetic fields to the strengths observed in interstellar space.

<http://news.uchicago.edu/article/2014/06/02/international-collaboration-replicates-amplification-cosmic-magnetic-fields>

## **JUPITER AND MOONS**

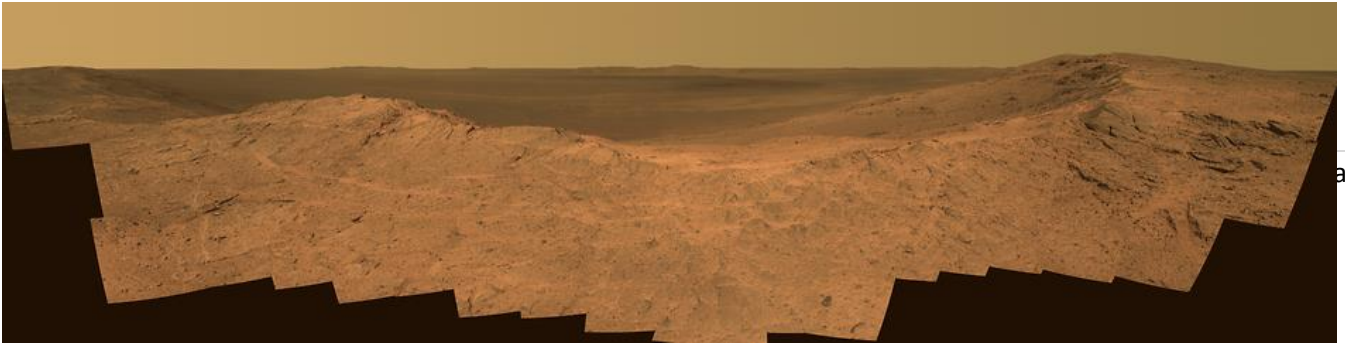
### **Jupiter's moons remain slightly illuminated, even in eclipse** (18 June 2014)

Astronomers using the Subaru Telescope and Hubble Space Telescope have found that Jupiter's Galilean satellites (Io, Europa, Ganymede, and Callisto) remain slightly bright (up to one millionth of their normal state) even when in the Jovian shadow and not directly illuminated by the Sun.

<http://www.naoj.org/Pressrelease/2014/06/18/index.html>



## **MARS**



'Pillinger Point' Overlooking Endeavour Crater on Mars.

Image Credit: NASA/JPL-Caltech/Cornell Univ. /Arizona State Univ.

### **Swift satellite tallies water production of Mars-bound comet** (19 June 2014)

In late May, NASA's Swift satellite imaged comet Siding Spring, which will brush astonishingly close to Mars later this year. <http://www.nasa.gov/content/goddard/nasas-swift-satellite-tallies-water-production-of-mars-bound-comet/>

### **Mars Curiosity Rover marks first Martian year** (23 June 2014)

NASA's Mars Curiosity rover will complete a Martian year -- 687 Earth days -- on June 24, having accomplished the mission's main goal of determining whether Mars once offered environmental conditions favourable for microbial life. <http://www.nasa.gov/press/2014/june/nasa-s-mars-curiosity-rover-marks-first-martian-year-with-mission-successes/>

### **New type of dust in Martian atmosphere discovered** (23 June 2014)

A group of French and Russian scientists, including three MIPT specialists, has discovered a new peculiarity of the Martian atmosphere. <http://phys.org/news/2014-06-martian-atmosphere.html>

### **Aluminium-bearing site on Mars draws NASA visitor** (24 June 2014)

With its solar panels their cleanest in years, NASA's decade-old Mars Exploration Rover Opportunity is inspecting a section of crater-rim ridgeline chosen as a priority target due to evidence of a water-related mineral.

<http://www.jpl.nasa.gov/news/news.php?release=2014-201>

### **Curiosity travels through ancient glaciers on Mars** (24 June 2014)

3,500 million years ago the Martian crater Gale, through which the NASA rover Curiosity is currently traversing, was covered with glaciers, mainly over its central mound.

<http://www.sciencedaily.com/releases/2014/06/140625101554.htm>

## **MERCURY**

### **MESSENGER Modifies Orbit to Prepare for Low-Altitude Campaign** (17 June 2014)

MESSENGER successfully completed the first orbit-correction manoeuvre of its Second Extended Mission this morning to raise its minimum altitude above Mercury from 113.9 kilometres (70.8 miles) to 155.1 kilometers (96.4 miles).

[http://solarsystem.nasa.gov/news/display.cfm?News\\_ID=47633](http://solarsystem.nasa.gov/news/display.cfm?News_ID=47633)

## **MILKY WAY**

### **3D map shows dusty structure of the Milky Way** (23 June 2014)

A team of international astronomers has created a detailed three-dimensional map of the dusty structure of the Milky Way – the star-studded bright disc of our own galaxy – as seen from Earth's northern hemisphere.

<http://www.ras.org.uk/news-and-press/2472-3d-map-shows-dusty-structure-of-the-milky-way>

## **MISCELLANEOUS**

### **Citizen scientists successfully communicate with spacecraft** (30 May 2014)

A group of citizen scientists has successfully established communication with an inactive NASA spacecraft in

an attempt to breathe new scientific life into a more than 35-year-old agency mission.  
<http://www.nasa.gov/content/citizen-scientists-successfully-communicate-with-spacecraft-0/>

## **MOON**

**New isotopic evidence supports moon formation via Earth collision with planet-sized body** (5 June 2014)

A new series of measurements of oxygen isotopes provides increasing evidence that the Moon formed from the collision of the Earth with another large, planet-sized astronomical body, around 4.5 billion years ago.  
<http://www.eag.eu.com/about/media/new-isotopic-evidence/>

**55-year-old dark side of the moon mystery solved** (9 June 2014)

The "man in the moon" appeared when meteoroids struck the Earth-facing side of the moon creating large flat seas of basalt that we see as dark areas called maria.  
<http://news.psu.edu/story/317841/2014/06/09/research/55-year-old-dark-side-moon-mystery-solved>

**Solar photons drive water off the moon** (17 June 2014)

Water is thought to be embedded in the moon's rocks or, if cold enough, "stuck" on their surfaces.  
<http://www.news.gatech.edu/2014/06/16/solar-photons-drive-water-moon>

## **PLANETARY NEBULA**

**New molecules around old stars** (17 June 2014)

Using ESA's Herschel space observatory, astronomers have discovered that a molecule vital for creating water exists in the burning embers of dying Sun-like stars.  
[http://www.esa.int/Our\\_Activities/Space\\_Science/Herschel/New\\_molecules\\_around\\_old\\_stars](http://www.esa.int/Our_Activities/Space_Science/Herschel/New_molecules_around_old_stars)

## **PLUTO**

**Cracks in Pluto's moon could indicate it once had an underground ocean** (13 June 2014)

If the icy surface of Pluto's giant moon Charon is cracked, analysis of the fractures could reveal if its interior was warm, perhaps warm enough to have maintained a subterranean ocean of liquid water, according to a new NASA-funded study.  
<http://www.nasa.gov/content/goddard/cracks-in-plutos-moon-could-indicate-it-once-had-an-underground-ocean/>

**Telescope digs for ice on Pluto** (26 June 2014)

In just over a year, the New Horizons spacecraft will fly past Pluto, giving us our first detailed look at the dwarf planet. <http://www.ras.org.uk/news-and-press/2477-telescope-digs-for-ice-on-pluto>

## **SATURN AND ITS MOONS**

**Experiments recreate aromatic flavors of Titan** (13 June 2014)

NASA scientists have created a new recipe that captures key flavors of the brownish-orange atmosphere around Saturn's largest moon, Titan.  
<http://www.nasa.gov/content/goddard/nasa-experiments-recreate-aromatic-flavors-of-titan/>

**Titan flybys test the talents of Cassini team** (17 June 2014)

As NASA's Cassini spacecraft zooms toward Saturn's smoggy moon Titan for a targeted flyby on June 18, mission scientists are excitedly hoping to repeat a scientific tour de force that will provide valuable new insights into the nature of the moon's surface and atmosphere.  
<http://saturn.jpl.nasa.gov/news/cassinifeatures/feature20140617/>

**Mysterious 'Magic Island' appears on Saturn moon** (22 June 2014)

Astronomers have discovered a bright, mysterious geologic object – where one never existed – on Cassini mission radar images of Ligeia Mare, the second-largest sea on Saturn's moon Titan.  
<http://news.cornell.edu/stories/2014/06/mysterious-magic-island-appears-saturn-moon>

**Titan's building blocks might pre-date Saturn** (23 June 2014)

A combined NASA and European Space Agency (ESA)-funded study has found firm evidence that nitrogen in

the atmosphere of Saturn's moon Titan originated in conditions similar to the cold birthplace of the most ancient comets from the Oort cloud.

<http://www.jpl.nasa.gov/news/news.php?release=2014-200>

### **Mysterious features spotted on Titan reveal the moon's seasonal changes** (27 June 2014)

At first glance, Titan has little in common with Earth. The largest moon of Saturn, temperatures on Titan's surface dip nearly 300 F below zero, its seas slosh with liquid methane, and its sky is a murky shade of creamsicle. <http://news.stanford.edu/news/2014/june/titan-moon-seasons-062614.html>

<http://www.nature.com/ngeo/journal/v7/n7/full/ngeo2190.html>

## **STARS AND STAR CLUSTERS**

### **Star will swallow two planets** (2 June 2014)

Two worlds orbiting a distant star are about to become a snack of cosmic proportions.

<http://www.cfa.harvard.edu/news/2014-13>

### **First Thorne-Zytkow object, a bizarre type of hybrid star** (4 June 2014)

In a discovery decades in the making, scientists have detected the first of a "theoretical" class of stars first proposed in 1975 by physicist Kip Thorne and astronomer Anna Zytkow.

<http://www.colorado.edu/news/releases/2014/06/04/astronomers-discover-first-thorne-%C5%BCytkow-object-bizarre-type-hybrid-star>

### **Mapping space's icy wastes** (24 June 2014)

Using the AKARI orbiting observatory, astronomers from the Open University have made the first large-scale maps of icy material where stars are forming.

<http://www.ras.org.uk/news-and-press/2479-astronomers-map-space-s-icy-wastes>

### **How the 'Pillars of Creation' ... were created** (26 June 2014)

The 'Pillars of Creation', an image made with the Hubble Space Telescope in 1995, is one of the most famous astronomical views.

<http://www.ras.org.uk/news-and-press/2467-how-the-pillars-of-creation-were-created>

### **Remarkable white dwarf star possibly coldest, dimmest ever detected** (23 June 2014)

A team of astronomers has identified possibly the coldest, faintest white dwarf star ever detected. This ancient stellar remnant is so cool that its carbon has crystallized, forming -- in effect -- an Earth-size diamond in space.

<https://public.nrao.edu/news/pressreleases/cold-white-dwarf>

### **Catching a gravitational wave** (26 June 2014)

When Albert Einstein proposed the existence of gravitational waves as part of his theory of relativity, he set in train a pursuit for knowledge that continues nearly a century later.

<http://phys.org/news/2014-06-gravitational.html>

## **SUN**

### **The Interface Region Imaging Spectrograph (IRIS)** (30 May 2014)

The region between the Sun's surface and its hot, million-degree corona is a complex interface zone.

<http://www.cfa.harvard.edu/news/su201422>

<http://www.nasa.gov/content/goddard/nasas-iris-spots-its-largest-solar-flare/>

### **Discovering hidden sources of solar surges** (3 June 2014)

Solar activity entails numerous processes occurring in the star nearest to Earth. These processes have far-reaching effects, generating "space weather" that brings bursts of charged particles and high-energy radiation in the direction of Earth at nearly the speed of light.

[http://www.bbso.njit.edu/AAS\\_SPD\\_2014/Press2.html](http://www.bbso.njit.edu/AAS_SPD_2014/Press2.html)

### **Solar wind breaks through the Earth's magnetic field** (9 June 2014)

Space is not empty. A wind of charged particles blows outwards from the Sun, carrying a magnetic field with it.

<http://www.sen.com/news/how-the-solar-wind-breaks-through-our-magnetic-field><http://www.irf.se/Topical/Other/?newsid=27&group=P4>

### **Big solar blowouts hold a clue to space weather** (23 June 2014)

Solar jets are ejections from the surface of the Sun, where 1-10 tonnes of hot material are expelled at speeds of up to 1000 kilometres per second.

<http://www.ras.org.uk/news-and-press/2465-big-solar-blowouts-hold-clue-to-space-weather>

### **Solar moss shakes at 16,000 km an hour** (23 June 2014)

Using a state-of-the-art ultraviolet camera, two astronomers from Northumbria University have obtained exceptionally sharp images of 'solar Moss', bright features on the Sun that may hold the key to a longstanding mystery.

<http://www.ras.org.uk/news-and-press/news-archive/254-news-2014/2466-solar-moss-shakes-at-16-000-km-an-hour>

### **Puffing Sun gives birth to reluctant eruption** (23 June 2014)

A suite of Sun-gazing spacecraft, SOHO, STEREO and Solar Dynamics Observatory (SDO), have spotted an unusual series of eruptions in which a series of fast 'puffs' force the slow ejection of a massive burst of plasma from the Sun's corona.

<http://www.ras.org.uk/news-and-press/news-archive/254-news-2014/2470-puffing-sun-gives-birth-to-reluctant-eruption>

### **When it rains, it pours... on the Sun** (24 June 2014)

Just like on Earth, the Sun has spells of bad weather, with high winds and showers of rain.

<http://www.ras.org.uk/news-and-press/2476-when-it-rains-it-pours-on-the-sun>

### **STEREO maps much larger solar atmosphere than previously observed** (25 June 2014)

Surrounding the sun is a vast atmosphere of solar particles, through which magnetic fields swarm, solar flares erupt, and gigantic columns of material rise, fall and jostle each other around.

<http://www.nasa.gov/content/goddard/nasas-stereo-maps-much-larger-solar-atmosphere-than-previously-observed/>

## **SUPERNOVA**

### **New suspect identified in supernova explosion** (4 June 2014)

Supernovas are often thought of as the tremendous explosions that mark the ends of massive stars' lives.

<http://www.jpl.nasa.gov/news/news.php?release=2014-173>

See Gamma-ray bursts above (11 June 2014)

### **Discovery of exotic supernova sees Dark Energy Survey start off with a bang!** (25 June 2014)

The first images taken by the Dark Energy Survey (DES) after the survey began in August 2013 have revealed a rare, 'superluminous' supernova that erupted in a galaxy 7.8 billion light years away.

<http://www.ras.org.uk/news-and-press/2478-discovery-of-exotic-supernova-sees-dark-energy-survey-start-off-with-a-bang>

## **TELESCOPE or TECHNOLOGY?**

### **A telescope is born** (11 June 2014)

It may look like just dots on a page, but an image of distant galaxies taken last week represents a huge step forward for CSIRO's Australia SKA Pathfinder (ASKAP) radio telescope in Western Australia.

<http://www.csiro.au/Portals/Media/A-telescope-is-born.aspx>

## **UNIVERSE**

### **Athena to study the hot and energetic universe** (27 June 2014)

ESA has selected the Athena advanced telescope for high-energy astrophysics as its second 'Large-class' science mission.

[http://www.esa.int/Our\\_Activities/Space\\_Science/Athena\\_to\\_study\\_the\\_hot\\_and\\_energetic\\_Universe](http://www.esa.int/Our_Activities/Space_Science/Athena_to_study_the_hot_and_energetic_Universe)

## **VIRGIN GALACTIC**

### **NASA, Virgin Galactic announce payloads for SpaceShipTwo flight** (3 June 2014)

NASA has selected 12 technology experiments to fly on the first commercial research flight on Virgin Galactic's SpaceShipTwo.

<http://www.nasa.gov/ames/nasa-virgin-galactic-announce-payloads-for-spaceshiptwo-flight/>

<http://www.virgingalactic.com/research/>

## **VENUS**

### **Space weather report for Venus** (6 June 2014)

For the first time, ESA is providing regular space-weather reports for a spacecraft orbiting another planet.

[http://www.esa.int/Our\\_Activities/Operations/Space\\_Situational\\_Awareness/Space\\_weather\\_report\\_for\\_an alien\\_world](http://www.esa.int/Our_Activities/Operations/Space_Situational_Awareness/Space_weather_report_for_an alien_world)

*Pat Williams. June 2014*