

Space News Update – February 2016

By Pat Williams

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

RUSSIAN SPACEWALK MARKS END OF ESA'S EXPOSED SPACE CHEMISTRY



Retrieving Expose-R2 Courtesy: ESA

ESA's Expose facility was retrieved today from outside the International Space Station by cosmonauts Yuri Malenchenko and Sergei Volkov, who were completing a spacewalk to place new experiments on the outpost's hull.



Expose-R2 Courtesy: ESA

Expose is a series of chemistry laboratories that place samples in the harsh environment of space unprotected. Subjected to vacuum, radiation, temperature differences and the full blast of our Sun's energy, 46 species of small organisms and over 150 organic compounds have returned after spending 18 months bolted to the Zvezda module.

[Russian spacewalk marks end of ESA's exposed space chemistry](#) (3 February 2016)

GRAVITATIONAL WAVES DETECTED 100 YEARS AFTER EINSTEIN'S PREDICTION.



Image credit: The SXS (Simulating eXtreme Spacetimes) Project

For the first time, scientists have observed ripples in the fabric of spacetime called gravitational waves, arriving at Earth from a cataclysmic event in the distant universe.

The image shows the collision of two black holes, a tremendously powerful event detected for the first time ever by the Laser Interferometer Gravitational-Wave Observatory, or LIGO. LIGO detected gravitational waves, or ripples in space and time generated as the black holes spiralled in toward each other, collided, and merged. It was created by solving equations from Albert Einstein's general theory of relativity using the LIGO data.

The two merging black holes are each roughly 30 times the mass of the sun, with one slightly larger than the other. The event took place 1.3 billion years ago.

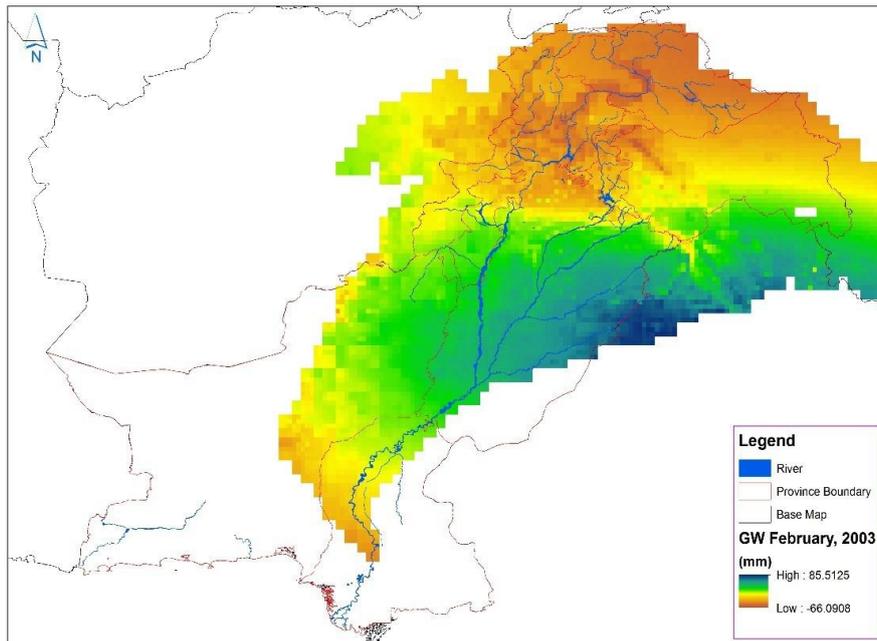
The stars appear warped due to the incredibly strong gravity of the black holes. The black holes warp space and time, and this causes light from the stars to curve around the black holes in a process called gravitational lensing. The ring around the black holes, known as an Einstein ring, arises from the light of all the stars in a small region behind the holes, where gravitational lensing has smeared their images into a ring.

The gravitational waves themselves would not be seen by a human near the black holes. The gravitational waves that are traveling outward toward the small region behind the black holes disturb that region's stellar images in the Einstein ring, causing them to slosh around, even long after the collision. The gravitational waves travelling in other directions cause weaker, and shorter-lived sloshing, everywhere outside the ring.

For more information, visit <http://www.black-holes.org>.

[Gravitational waves detected 100 years after Einstein's prediction](#) (11 February 2016)

NASA DATA USED TO TRACK GROUNDWATER IN PAKISTAN



*Pakistan water managers used NASA GRACE satellite data to produce this map of monthly groundwater changes in the Indus River Basin. Orange and yellow indicates areas where groundwater might be depleted, while blue and green highlights areas where groundwater is being replenished.
Credit: Pakistan Council of Research in Water Resources*

The vast farmlands of Pakistan -- a country with an economy based on agriculture -- rely on one of the largest continuous irrigation systems in the world. Farmers were once able to depend solely on rivers and man-made canals fed by glaciers and rain. But as population and urbanization boomed in recent decades, the country turned to groundwater to keep up with demand. Today, more than 60 percent of Pakistan's water is pumped from natural underground reservoirs, with no limits placed on how many wells can be drilled or how much anyone can take. Now, Pakistan's water managers are looking to NASA satellites to help them more effectively monitor and manage that precious resource, thanks to a partnership with engineers and hydrologists at the University of Washington, Seattle. [NASA data used to track groundwater in Pakistan](#) (29 February 2016)

LONG DISTANCE ULTRASOUND: MADE FOR ASTRONAUTS, NOW REACHING HOSPITALS

Patients in regional French hospitals are now being examined remotely using long-distance ultrasound technology that was originally developed for astronauts in space. Smaller secondary hospitals do not necessarily have expert radiologists available on site. This in the past has led to problems, with, for example, pregnant women having to travel hundreds of kilometres for an examination.

However, one small company is reusing the knowledge gained during past ESA telemedicine projects to market a remote-controlled ultrasound system allowing an expert radiologist to perform exams on patients from hundreds or even thousands of kilometres away.

This TESSA (Tele-Echography for ESA) technology was originally developed over a series of ESA projects with the intent to support astronauts in orbit. But whether for Earth- or space-based patients, the abiding principle of telemedicine is the same: it is much easier and cheaper to move medical data around than it is to move people.

[Long distance ultrasound: made for astronauts, now reaching hospitals](#) (12 February 2016)

LUXEMBOURG TO LAUNCH FRAMEWORK TO SUPPORT THE FUTURE USE OF SPACE RESOURCES

The Luxembourg Government announced a series of measures to position Luxembourg as a European hub in the exploration and use of space resources. Amongst the key steps undertaken, as part of the spaceresources.lu initiative, will be the development of a legal and regulatory framework confirming certainty about the future ownership of minerals extracted in space from Near Earth Objects (NEO's) such as asteroids.

Luxembourg is the first European country to announce its intention to set out a formal legal framework which ensures that private operators working in space can be confident about their rights to the resources they extract, i.e. rare minerals from asteroids. Such a legal framework will be worked out in full consideration of international law. Luxembourg is eager to engage with other countries on this matter within a multilateral framework. Luxembourg will also invest in relevant R&D projects and consider direct capital investment in companies active in this field.

The SpaceResources.lu initiative will nurture an exciting and entirely new space industry. This industry will offer unprecedented access to mineral resources to be used essentially in Earth-orbit and beyond. The aim is to stimulate economic growth on Earth and offer new horizons in space exploration.

The budget allocated to SpaceResources.lu will be part of the national space budget that will be defined in the frame of the preparation of the Luxembourg contribution to the next multiannual budget of the European Space Agency to be decided in December 2016. The government will decide on new means for a wide range of new activities and initiatives, including this one.

Luxembourg's Deputy Prime Minister and Minister of the Economy Étienne Schneider, announced the spaceresources.lu initiative today: "Our aim is to open access to a wealth of previously unexplored mineral resources on lifeless rocks hurling through space, without damaging natural habitats. We will support the long-term economic development of new, innovative activities in the space and satellite industries as a key high-tech sector for Luxembourg. At first, our aim is to carry out research in this area, which at a later stage can lead to more concrete activities in space."

[Luxembourg to launch framework to support the future use of space resources](#) (3 February 2016)

LINKS TO OTHER SPACE AND ASTRONOMY NEWS PUBLISHED IN FEBRUARY 2016

ASTEROIDS

[Destruction of asteroids close to Sun explains asteroid observations](#) (17 February 2016)

An international team composed of researchers from Finland, France, the United States and the Czech Republic originally set out to construct a state-of-the-art model of the NEO population that is needed for planning future asteroid surveys and spacecraft missions.

[Destruction of asteroids close to Sun explains asteroid observations](#)

ASTROPHYSICS

[Starting small on the road to building gigantic DUNE neutrino detector](#) (17 February 2016)

The planned Deep Underground Neutrino Experiment will require 70,000 tons of liquid argon, making it the largest experiment of its kind — 100 times larger than the liquid-argon particle detectors that came before it.

ASTRONOMY

[NASA introduces new, wider set of eyes on the universe](#) (18 February 2016)

After years of preparatory studies, NASA is formally starting an astrophysics mission designed to help unlock the secrets of the universe -- the Wide Field Infrared Survey Telescope (WFIRST).

[EPIR calorimeters in orbit on Hitomi X-ray observatory](#) (22 February 2016)

On February 17, 2016, Hitomi, (also known as ASTRO-H) successfully launched from the Tanegashima Space Center in Kagoshima, Japan.

[Advanced NASA-developed instrument flies on Japan's Hitomi](#) (23 February 2016)

Now that Japan's Hitomi spacecraft is safely in orbit, a team of NASA scientists is now ready to begin gathering data about the high-energy universe with an advanced instrument that carries never-before-flown technologies.

BLACK HOLES

[Black holes banish matter into cosmic voids](#) (25 February 2016)

We live in a universe dominated by unseen matter, and on the largest scales, galaxies and everything they contain are concentrated into filaments that stretch around the edge of enormous voids.

[LIGO's twin black holes might have been born inside a single star](#) (23 February 2016)

On September 14, 2015, the Laser Interferometer Gravitational-wave Observatory (LIGO) detected gravitational waves from the merger of two black holes 29 and 36 times the mass of the Sun.

COMET

[Inside Rosetta's comet](#) (4 February 2016)

There are no large caverns inside Comet 67P/Churyumov-Gerasimenko. ESA's Rosetta mission has made measurements that clearly demonstrate this, solving a long-standing mystery.

[Rosetta's lander faces eternal hibernation](#) (12 February 2016)

Silent since its last call to mothership Rosetta seven months ago, the Philae lander is facing conditions on Comet 67P/Churyumov-Gerasimenko from which it is unlikely to recover.

EARTH

[Third Sentinel satellite launched for Copernicus](#) (16 February 2016)

The third ESA-developed satellite carrying four Earth-observing instruments was launched today, ready to provide a 'bigger picture' for Europe's Copernicus environment programme.

[Multiple cosmic impacts 790,000 years ago](#) (22 February 2016)

Approximately 790,000 years ago there were multiple cosmic impacts on earth with global consequences.

[New CubeSats to test Earth science tech in space](#) (23 February 2016)

Sometimes we need to leave our home planet to better understand it.

[CubeSat to test techniques for eliminating the noise](#) (23 February 2016)

It's getting noisier and noisier out there and now the cacophony of broadcast and other communications signals has begun to seriously interfere with important Earth science research.

[NASA contributes to global navigation standard update](#) (24 February 2016)

The surface of Earth is constantly being reshaped by earthquakes, volcanic eruptions, landslides, floods, changes in sea level and ice sheets, and other processes.

EXOPLANETS

[Earth-like planets have Earth-like interiors](#) (8 February 2016)

Every school kid learns the basic structure of the Earth: a thin outer crust, a thick mantle, and a Mars-sized core.

[Planet-forming potential of a protoplanetary disk](#) (13 February 2016)

Astronomers struggle to understand how planets form in binary star systems.

[First detection of super-Earth atmosphere](#) (16 February 2016)

For the first time astronomers were able to analyse the atmosphere of an exoplanet in the class known as super-Earths.

[Safer seafaring with satellites](#) (17 February 2016)

Sailing in the regions that polar researcher Arved Fuchs is currently navigating in his ship 'Dagmar Aaen' is a not an easy task.

[Hubble directly measures rotation of cloudy 'super-Jupiter'](#) (18 February 2016)

Astronomers using NASA's Hubble Space Telescope have measured the rotation rate of an extreme exoplanet by observing the varied brightness in its atmosphere. This is the first measurement of the rotation of a massive exoplanet using direct imaging.

[Imaging technique may help discover Earth-like planets around other stars](#) (23 February 2016)

One of the biggest quests in astrophysics is to find Earth-like planets around other stars – places where life may exist.

GALAXIES

[Violent wind blown from the heart of a galaxy tells the tale of a merger](#) (3 February 2016)

An international team led by a researcher from Hiroshima University has succeeded in revealing the detailed structure of a massive ionized gas outflow streaming from the starburst galaxy NGC 6240.

[Galactic space oddity discovered](#) (8 February 2016)

An international team of researchers led by Aaron Romanowsky of San José State University has used the Subaru Telescope to identify a faint dwarf galaxy disrupting around a nearby giant spiral galaxy.

[Hidden galaxies behind the Milky Way](#) (10 February 2016)

Hundreds of hidden nearby galaxies have been studied for the first time, shedding light on a mysterious gravitational anomaly dubbed the Great Attractor.

[Galaxy trailed by stunning plume of gas](#) (22 February 2016)

Astronomers have discovered a spectacular tail of gas more than 300,000 light years across coming from a nearby galaxy.

GAMMA-RAY BURST

[Galactic centre's gamma rays unlikely to originate from dark matter, evidence shows](#)

(3 February 2016)

Bursts of gamma rays from the centre of our galaxy are not likely to be signals of dark matter but rather other astrophysical phenomena such as fast-rotating stars called millisecond pulsars, according to two new studies, one from a team based at Princeton University and the Massachusetts Institute of Technology and another based in the Netherlands.

[New source of intense gamma-radiation](#) (17 February 2016)

Analysing the data collected by the Fermi Gamma-ray Space Telescope Maxim Pshirkov (The Sternberg Astronomical Institute, MSU) discovered a new source that confirmed the fact that binary systems with strong colliding stellar winds comprise a separate new population of high-energy gamma-ray sources.

GRAVITATIONAL WAVES

[First locks released from LISA Pathfinder's cubes](#) (3 February 2016)

Today, the lock fingers that kept the two test masses on LISA Pathfinder secure during the launch and cruise phase were successfully unlocked.

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[Test cubes floating freely inside LISA Pathfinder](#) (16 February 2016)

ESA's LISA Pathfinder has released both of its gold-platinum cubes, and will shortly begin its demanding science mission, placing these test masses in the most precise freefall ever obtained to demonstrate technologies for observing gravitational waves from space.

[Freefall achieved on LISA Pathfinder](#) (24 February 2016)

On Monday, the two cubes housed in the core of ESA's LISA Pathfinder were left to move under the effect of gravity alone – another milestone towards demonstrating technologies to observe gravitational waves from space.

[Pulsar web could detect low-frequency gravitational waves](#) (24 February 2016)

The recent detection of gravitational waves by the Laser Interferometer Gravitational-Wave Observatory (LIGO) came from two black holes, each about 30 times the mass of our sun, merging into one.

INTERNATIONAL SPACE STATION

[MEI Technologies celebrates successful satellite deployment](#) (23 February 2016)

MEI Technologies (MEIT) recently celebrated the successful deployment of two satellites – built by two Texas universities – from the International Space Station.

[Orbital ATK completes OA-4 cargo delivery mission to ISS](#) (22 February 2016)

Orbital ATK today announced the successful completion of its fourth cargo delivery mission (OA-4) to the International Space Station (ISS), including the initial demonstration flight and three operational missions under NASA's Commercial Resupply Services (CRS) contract.

INTERSTELLAR MEDIUM

[CHESS-2 studying the birthplace of stars and planets](#) (16 February 2016)

To the casual onlooker, the space between the stars is benign and quiet. However, this space -- also called the interstellar medium – is, in fact, very active and contains the raw materials for future solar systems.

[IBEX observations pin down interstellar magnetic field](#) (26 February 2016)

Immediately after its 2008 launch, NASA's Interstellar Boundary Explorer, or IBEX, spotted a curiosity in a thin slice of space: More particles streamed in through a long, skinny swath in the sky than anywhere else.

JAMES WEBB SPACE TELESCOPE

[James Webb Space Telescope primary mirror fully assembled](#) (4 February 2016)

The 18th and final primary mirror segment is installed on what will be the biggest and most powerful space telescope ever launched.

JUPITER AND MOONS

[Juno spacecraft burns for Jupiter](#) (3 February 2016)

NASA's solar-powered Juno spacecraft successfully executed a manoeuvre to adjust its flight path today, Feb. 3.

METEORITES

[The lost meteorites of Antarctica](#) (16 February 2016)

A hidden reserve of iron-rich meteorites which could hold secrets to the formation of the Solar System

may be hidden beneath the surface of the Antarctic ice sheet, according to a study by a team from The University of Manchester.

PLUTO

[Pluto's mysterious, floating hills](#) (4 February 2016)

The nitrogen ice glaciers on Pluto appear to carry an intriguing cargo: numerous, isolated hills that may be fragments of water ice from Pluto's surrounding uplands.

[Pluto's 'hulk-like' moon Charon: a possible ancient ocean?](#) (18 February 2016)

Pluto's largest moon may have gotten too big for its own skin.

QUASARS

[Object located around a black hole 5 billion light-years from Earth has been measured](#)

(25 February 2016)

A team of Spanish researchers, with the participation of the University of Granada (UGR), has accurately detected a structure in the innermost region of a quasar at a distance of more than five billion light-years from Earth.

SPACE TOURISM

[Virgin Galactic unveils new spaceship - VSS Unity](#) (19 February 2016)

Virgin Galactic today unveiled its newly completed SpaceShipTwo.

STARS AND STAR CLUSTERS

[Cannibalism between stars](#) (5 February 2016)

Stars do not accumulate their final mass steadily, but in a series of violent events manifesting themselves as sharp stellar brightening.

[Longest-lasting stellar eclipse discovered](#) (18 February 2016)

Imagine living on a world where, every 69 years, the sun disappears in a near-total eclipse that lasts for three and a half years. That is just what happens in an unnamed binary star system nearly 10,000 light years from Earth.

[Subaru-HiCIAO spots young stars surreptitiously gluttonizing their birth clouds](#) (24 February 2016)

An international team led by researchers at the Academia Sinica Institute of Astronomy and Astrophysics (ASIAA) has used a new infrared imaging technique to reveal dramatic moments in star and planet formation.

SUPERNOVA

[Rare supernova 'impostor' in a nearby galaxy](#) (12 February 2016)

Breanna Binder, a University of Washington postdoctoral researcher in the Department of Astronomy and lecturer in the School of STEM at UW Bothell, spends her days pondering X-rays.

TECHNOLOGY and TECHNOLOGY TRANSFER

[New bedrest adventure adds artificial gravity](#) (2 February 2016)

The human body is made for living on Earth – take away the constant pull of gravity and muscles and bones begin to waste away.

[New galaxy-hunting sky camera sees redder better](#) (2 February 2016)

A newly upgraded camera that incorporates light sensors developed at the U.S. Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Lab) is now one of the best cameras on the planet for studying outer space at red wavelengths that are too red for the human eye to see.

[ICESat-2 equipped with unique 3-D manufactured part](#) (2 February 2016)

NASA's follow-on to the successful ICESat mission will employ a never-before-flown technique for determining the topography of ice sheets and the thickness of sea ice, but that won't be the only first for this mission.

[New x-ray space observatory to study black holes and history of galaxy clusters](#) (10 February 2016)

Black hole enthusiasts, galaxy cluster aficionados, and X-ray astronomers have much to be excited about.

[Proton-M vehicle to support ExoMars 2016 mission delivered to Baikonur](#) (12 February 2016)

The Proton-M launch vehicle earmarked for the Russian-European ExoMars-2016 mission has been delivered to Baikonur.

[CubeSat mission will demonstrate virtual-telescope tech](#) (18 February 2016)

NASA engineers Neerav Shah and Phil Calhoun will realize a long-held ambition later this year when a Space-X launch vehicle deploys two tiny satellites that will fly in a precise formation to create, in effect, a single or "virtual" telescope benefitting a range of scientific disciplines.

[Simulating re-entries for safer satellites](#) (24 February 2016)

It's not often that space engineers get to practise the destruction of satellites, but a team came together at ESA to simulate and analyse just that – the culmination of a 14-month 'design for demise' project.

[New NIST method may find elusive flaws in medical implants and spacecraft](#) (29 February 2016)

Medical implants and spacecraft can suddenly go dead, often for the same reason: cracks in ceramic capacitors, devices that store electric charge in electronic circuits.

UNIVERSE

[New fast radio burst discovery finds 'missing matter' in the universe](#) (24 February 2016)

An international team of scientists using a combination of radio and optical telescopes identified the distant location of a fast radio burst (FRB) for the first time.

Pat Williams. February 2016