

Space News Update – February 2018

By Pat Williams

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

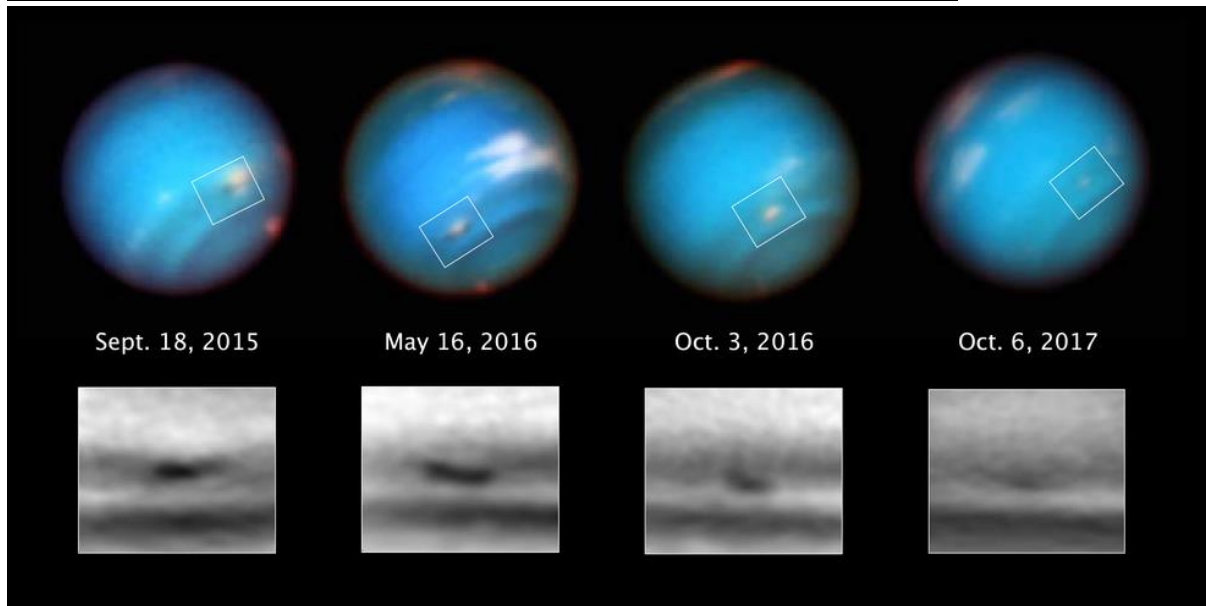
NASA ASTRONAUTS RETURN TO EARTH, LAND SAFELY IN KAZAKHSTAN



Credits: NASA/Bill Ingalls

Three members of the Expedition 54 crew aboard the International Space Station (ISS), including NASA astronauts [Mark Vande Hei](#) and [Joe Acaba](#), returned to Earth on Tuesday after months of performing research and spacewalks in low-Earth orbit. Their time on station marked the beginning of the first long-term increase in crew size on the U.S. segment, enabling NASA to double the time dedicated to research and achieve a record-setting week of research that [surpassed 100 hours](#). Highlights from this research include investigations into the manufacturing of [fibre optic filaments](#) in microgravity, improving the accuracy of an implantable [glucoses biosensor](#), and measuring the [Sun's energy input to Earth](#). (NASA) [NASA astronauts return to Earth, land safely in Kazakhstan](#) (28 February 2018)

HUBBLE SEES NEPTUNE'S MYSTERIOUS SHRINKING STORM



This series of Hubble Space Telescope images taken over 2 years tracks the demise of a giant dark vortex on the planet Neptune. The oval-shaped spot has shrunk from 3,100 miles across its long axis to 2,300 miles across, over the Hubble observation period.

Credits: NASA, ESA, and M.H. Wong and A.I. Hsu (UC Berkeley)

Three billion miles away on the farthest known major planet in our solar system, an ominous, dark storm, once big enough to stretch across the Atlantic Ocean from Boston to Portugal, is shrinking out of existence as seen in pictures of Neptune taken by NASA's Hubble Space Telescope. The first images of the dark vortex are from the Outer Planet Atmospheres Legacy (OPAL) program, a long-term Hubble project that annually captures global maps of our solar system's four outer planets. (Space Telescope Science Institute)

[Hubble sees Neptune's mysterious shrinking storm](#) (15 February 2018)

ESA PROJECT TO UPGRADE GOONHILLY EARTH STATION



Goonhilly antenna at night. Credit: Goonhilly Earth Station.

Cornwall to host world's first commercial deep-space communications station. Under a new project Goonhilly, which famously beamed images of the moon landings to millions of television viewers, will be upgraded to enable it to provide deep-space tracking and satellite communication services on a commercial basis. It will be the first time the UK has had the capability to communicate directly with deep-space missions. Goonhilly will complement the capability of the European Space Agency (ESA)'s worldwide ground station network, which today comprises seven core stations supporting more than 20 Earth, observatory, planetary and exploration spacecraft as well as European launchers. (Goonhilly Earth Station)

[ESA project to upgrade Goonhilly Earth Station](#) (22 February 2018)

UAE LAUNCHES SEED GRANTS TO SUPPORT NEW RESEARCH INTO SPACE SETTLEMENT & SPACE HABITATION



“Innovation has no borders. The future requires the skills and talents of us all. Only by working together can we build a better world, both on this planet and beyond.”

The Mohammed bin Rashid Global Space Challenge is designed to attract the best minds from all over the world regardless of discipline, background or origin. It’s the first and only global platform for funding unconventional solutions and novel proposals from all sources to unlock the future of space settlement. (Dubai Future Foundation)

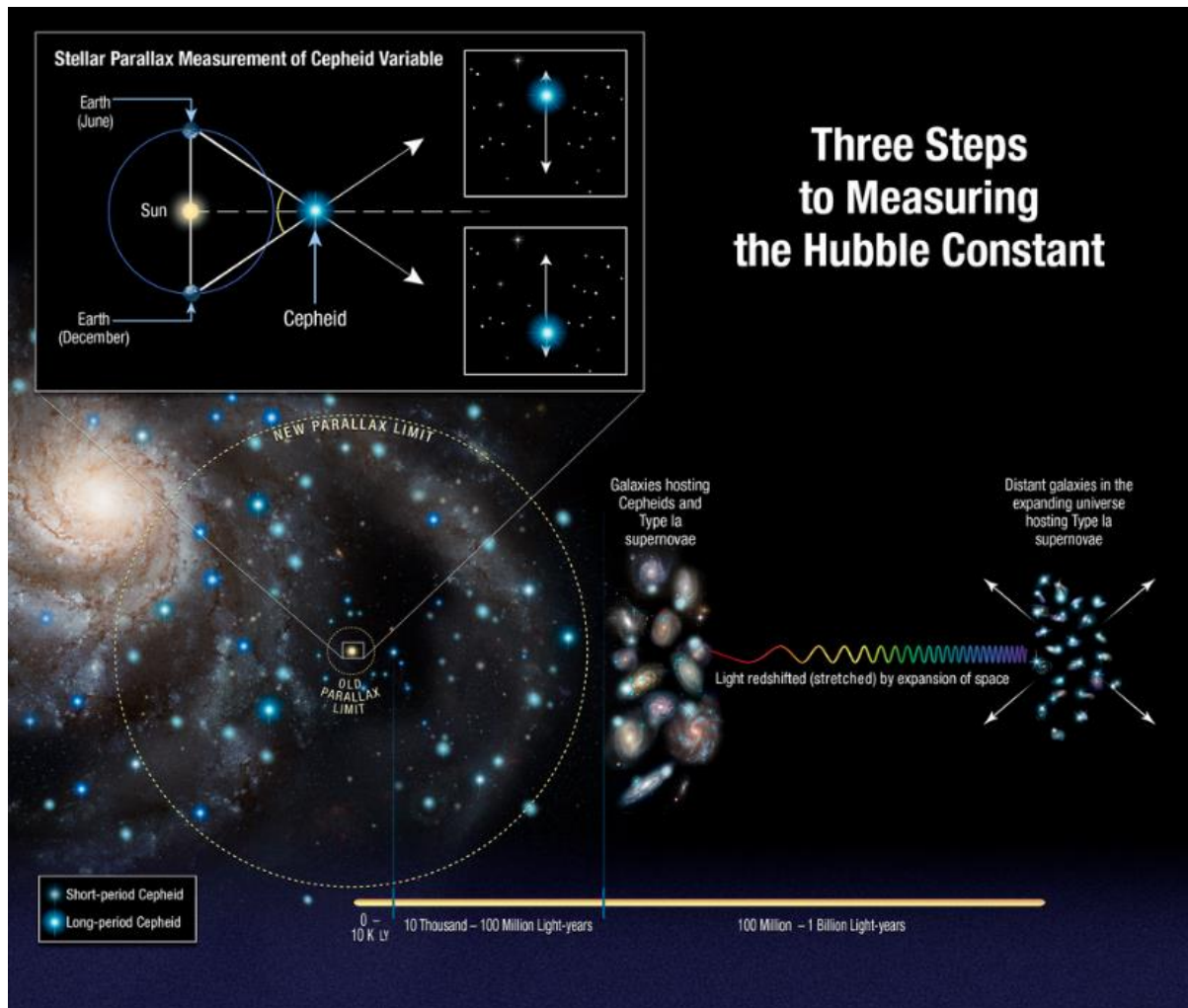
[UAE launches seed grants to support new research into space settlement & space habitation](#)
(10 February 2018)

SPACECHAIN SUCCESSFULLY LAUNCHES FIRST BLOCKCHAIN NODE INTO LOW EARTH ORBIT

SpaceChain launched its first blockchain node into orbit. The satellite was carried by CZ-2D rocket from Jiuquan Satellite Launch Center in the Gobi Desert, China. It was equipped with a Raspberry Pi hardware development board that runs a full-node program on the Qtum blockchain. This launch could go down in history as the beginning of a new era in privately funded space exploration. There is no doubt that SpaceChain is entering an area that has been nearly inaccessible for most organizations, and there is no telling where this decentralized, open source space program could lead. (SpaceChain)

[SpaceChain successfully launches first blockchain node into low Earth orbit](#)
(23 February 2018)

IMPROVED HUBBLE YARDSTICK GIVES FRESH EVIDENCE FOR NEW PHYSICS IN THE UNIVERSE



This illustration shows three steps astronomers used to measure the universe's expansion rate (Hubble constant) to an unprecedented accuracy, reducing the total uncertainty to 2.3 percent. The measurements streamline and strengthen the construction of the cosmic distance ladder, which is used to measure accurate distances to galaxies near to and far from Earth. The latest Hubble study extends the number of Cepheid variable stars analyzed to distances of up to 10 times farther across our galaxy than previous Hubble results. **Credits: NASA, ESA, A. Feild (STScI), and A. Riess (STScI/JHU)**

Astronomers have used NASA's Hubble Space Telescope to make the most precise measurements of the expansion rate of the universe since it was first calculated nearly a century ago. Intriguingly, the results are forcing astronomers to consider that they may be seeing evidence of something unexpected at work in the universe. That's because the latest Hubble finding confirms a nagging discrepancy showing the universe to be expanding faster now than was expected from its trajectory seen shortly after the big bang. Researchers suggest that there may be new physics to explain the inconsistency. Planck's result predicted that the Hubble constant value should now be 67 kilometers per second per megaparsec (3.3 million light-years) and could be no higher than 69 kilometers per second per megaparsec. This means that for every 3.3 million light-years farther away a galaxy is from us, it is moving 67 kilometers per second faster. But Riess's team measured a value of 73 kilometers per second per megaparsec, indicating galaxies are moving at a faster rate than implied by observations of the early universe. (Space Telescope Science Institute)

[Improved Hubble yardstick gives fresh evidence for new physics in the universe](#)
(22 February 2018)

LINKS TO OTHER SPACE NEWS PUBLISHED IN FEBRUARY 2018

ASTROPHYSICS

[Astronomers discover S0-2 star is single and ready for big Einstein test](#) (21 February 2018)

Einstein's Theory of General Relativity predicts that light coming from a strong gravitational field gets stretched out, or "redshifted." Researchers expect to directly measure this phenomenon beginning in the spring as S0-2 makes its closest approach to the supermassive black hole at the center of our Milky Way galaxy. (W M Keck Observatory)

BLACK HOLES

[Big black holes outpace their galaxies in growth](#) (15 February 2018)

Using data from NASA's Chandra X-ray Observatory and other telescopes, the new study provides evidence that black holes in massive galaxies have grown much faster than those in less massive ones. (Pennsylvania State University)

[Supermassive black hole simulation predicts characteristic light signals at cusp of collision](#) (14 February 2018)

The RIT-led study represents the first step toward predicting the approaching merger of supermassive black holes using the two channels of information now available to scientists, the electromagnetic and the gravitational wave spectra, known as multimessenger astrophysics. (Rochester Institute of Technology)

[Rotating dusty gaseous donut around an active supermassive black hole](#) (14 February 2018)

High resolution observations with the Atacama Large Millimeter/submillimeter Array (ALMA) imaged a rotating dusty gas torus around an active supermassive black hole. The existence of such rotating donuts-shape structures was first suggested decades ago, but this is the first time one has been confirmed so clearly. This is an important step in understanding the co-evolution of supermassive black holes and their host galaxies. (ALMA)

[Magnetic field traces gas and dust swirling around supermassive black hole](#) (21 February 2018)

The new infrared map covers a region about 1 light year on each side of the supermassive black hole. The map shows the intensity of infrared light and traces magnetic field lines within filaments of warm dust grains and hot gas, which appear as thin lines reminiscent of brush strokes in a painting. (Royal Astronomical Society)

[No relation between a supermassive black hole and its host galaxy](#) (20 February 2018)

Using the Atacama Large Millimeter/submillimeter Array (ALMA) to observe an active galaxy with a strong ionized gas outflow from the galactic center, a team led by Dr. Yoshiki Toba of the Academia Sinica Institute of Astronomy and Astrophysics (ASIAA, Taiwan) has obtained a result making astronomers even more puzzled - the team clearly detected carbon monoxide (CO) gas that is associated with the galactic disk, yet they have also found that the

CO gas which settles in the galaxy is not affected by the strong ionized gas outflow launched from the galactic center. (ALMA)

DARK ENERGY

[Solving the dark energy mystery: a new assignment for a 45-year-old telescope](#)

(12 February 2018)

Forty-five years ago this month, a telescope tucked inside a 14-story, 500-ton dome atop a mile-high peak in Arizona took in the night sky for the first time and recorded its observations in glass photographic plates. Today, the dome closes on the previous science chapters of the 4-meter [Nicholas U. Mayall Telescope](#) so that it can prepare for its new role in creating the largest 3-D map of the universe. This map could help to solve the mystery of dark energy, which is driving the accelerating expansion of the universe.

(Lawrence Berkeley National Laboratory)

DARK MATTER

[Cosmic x-rays may provide clues to the nature of dark matter](#) (9 February 2018)

Researchers have now presented a novel theory of dark matter, which implies that dark matter particles may be very different from what is normally assumed. In particular, their theory involves dark matter particles which are extremely light, almost one hundred times lighter than electrons, in stark contrast to many conventional models that involve very heavy dark matter particles instead. (Johannes Gutenberg University Mainz)

DWARF GALAXIES

[New study challenges popular theory about dwarf galaxies](#) (2 February 2018)

A new international study involving ANU has found a plane of dwarf galaxies orbiting around Centaurus A in a discovery that challenges a popular theory about how dwarf galaxies are spread around the Universe. The latest finding challenged a long-held theory among cosmologists and theoreticians that there were thousands of dwarf galaxies in all directions around these large galaxies like bees swarming around a hive. Dwarf galaxies are distributed in planes that are almost perpendicular to the disks of the Milky Way, Andromeda and Centaurus A. It is likely most large galaxies in the Universe have had a close encounter or merged with another galaxy at least once in their life. Co-rotating dwarf galaxy systems could have formed during such interactions. In this scenario dwarf galaxies should be devoid of dark matter. (Australian National University)

EARTH

[Sentinel-3B good to go](#) (2 February 2018)

After being put through its paces to make sure it is fit for life in orbit around Earth, the Copernicus Sentinel-3B satellite is ready to be packed up and shipped to Russia for liftoff.

Its twin, Sentinel-3A, has been in orbit since February 2016, systematically measuring our oceans, land, ice and atmosphere. The information feeds a range of practical applications and is used for monitoring and understanding large-scale global dynamics. The pairing of identical satellites provides the best coverage and data delivery for Europe's Copernicus programme, the largest environmental monitoring programme in the world. While the Sentinel-1 and Sentinel-2 satellites circle Earth 180° apart, the configuration for Sentinel-3 will be slightly different: the 140° separation will help to measure ocean features such as eddies as accurately as possible. (ESA)

[Software and satellites help U.S. track migrants heading for American borders](#)

(29 January 2018)

A pilot program in Panama's Darien Gap, a popular border crossing for migrants, collects data on individuals traveling toward the U.S. To remove the time lag from data collection to cross-referencing at the Darien Gap, Lepton Global Solutions was contracted to build a satellite communications solution for real-time data transfer of traveler identity. Using their global satellite communications network, Lepton Global implemented secure Internet access at the remote checkpoint, providing Panama border control forces with the ability to send and receive data inquiries instantaneously. Since the border control outpost is a permanent location, Lepton installed a satellite dish on the roof that now connects the outpost to the outside world. The availability of the secure link is monitored 24×7 to ensure data can be sent and received always, and the voice over IP capability enables what was previously a guard shack to be a full-time immigration office. This capability is being replicated throughout Panama and other neighboring countries in remote border crossing locations.

(Lepton Global Solutions)

[New NASA space sensors to address key Earth questions](#) (5 February 2018)

Why is the Arctic warming faster than the rest of the planet? Does mineral dust warm or cool the atmosphere? NASA has selected two new, creative research proposals to develop small, space-based instruments that will tackle these fundamental questions about our home planet and its environment. NASA's Jet Propulsion Laboratory in Pasadena, California, is a key participant on both instruments. (JPL)

[NOAA satellites aid in the rescue of 275 lives in 2017](#) (8 February 2018)

Beacon owners are required to [register their devices with NOAA online](#). That registration information often helps provide better and faster assistance to people in distress. It can provide information about the location of the emergency, how many people need assistance, what type of help may be needed and ways to contact the owner. At the end of 2017, NOAA's database contained more than 560,566 registrations. (NOAA)

[The ICARUS antenna is on its way to the International Space Station](#) (13 February 2018)

ICARUS intends to research the global migration flows of animals, at the focus first of all are small animals such as birds, bats or flying foxes. Tiny transmitters, which weigh less than five grams and are known as tags, collect information on their migratory behaviour and transmit this to the ISS. Entered into a database, the aim is to help protect animals, better understand Earth's climate and the spread of diseases as well as helping to practise more sustainable agriculture. This is because animals often react much earlier and with greater sensitivity to changes in the environment. (DLR)

[Swarm details energetic coupling](#) (15 February 2018)

The theory about the exchange and momentum between solar wind and our magnetic field actually goes back more than 100 years. The Active Magnetosphere and Planetary Electrodynamics Response Experiment satellite network has allowed scientists to study large-scale field-aligned currents. A new [paper](#) explores the dynamics of this energetic coupling across different spatial scales and finds that it's all in the detail. We have a good understanding of how these currents exchange energy between the ionosphere and the magnetosphere at large scales, so we assumed that smaller-scale currents behaved in the same way but carried proportionally less energy. Swarm has allowed us to effectively zoom in on these smaller currents and we see that, under certain conditions, this is not the case. These smaller currents carry significant energy and that their relationship with the larger currents is very complex. Moreover, large and small currents affect the magnetosphere–ionosphere differently. (ESA)

[Swarm trio becomes a quartet](#) (22 February 2018)

In orbit since 2013, ESA's three identical Swarm satellites have been returning a wealth of information about how our magnetic field is generated and how it protects us from dangerous electrically charged atomic particles in the solar wind. Canada's Cassiope satellite carries three instrument packages, one of which is e-POP. It delivers information on space weather which complements that provided by Swarm. Therefore, the mission teams began looking into how they could work together to make the most of a four-satellite mission to shed even more light on space weather and features such as the aurora borealis. (ESA)

[PAZ Earth observation satellite successfully launched](#) (22 February 2018)

Together with the two formation flying satellites TerraSAR-X and TanDEM-X, PAZ can record almost any region of Earth's surface within three days. On average, the satellites can capture a location or repeat a recording within 24 hours. They fly over the same point on the ground with the same geometry every 11 days. With PAZ it will be possible to achieve a higher recording capacity and shorter repetition rates in future; recordings will thus be made available more quickly. The PAZ mission is planned to last five and a half years. Designed as a dual-use satellite, it addresses both commercial and government requirements, particularly in terms of civil surveillance tasks and defence and security applications. (DLR)

EXOPLANETS

[Astrophysicists discover planets in extragalactic galaxies](#) (2 February 2018)

A University of Oklahoma astrophysics team has discovered for the first time a population of planets beyond the Milky Way galaxy. (University of Oklahoma)

[Hubble probes atmospheres of exoplanets in TRAPPIST-1 habitable zone](#) (5 February 2018)

Astronomers using NASA's Hubble Space Telescope have conducted the first spectroscopic survey of the Earth-sized planets (d, e, f, and g) within the habitable zone around the nearby star TRAPPIST-1. This study is a follow-up to Hubble observations made in May 2016 of the atmospheres of the inner TRAPPIST-1 planets b and c. (Space Telescope Science Institute)

[Carnegie astronomers help unlock the mysteries of super-Earths](#) (8 February 2018)

A star about 100 light years away in the Pisces constellation, GJ 9827, hosts what may be one of the most massive and dense super-Earth planets detected to date. The GJ 9827 star hosts a trio of planets, discovered by NASA's exoplanet-hunting Kepler/K2 mission, and all three are slightly larger than Earth. The Planet Finding Spectrograph PFS observations indicate that planet b is roughly eight times the mass of Earth, which would make it one of the most-massive and dense super-Earths yet discovered. The masses for planet c and planet d are estimated to be about two and a half and four times that of Earth respectively, although the uncertainty in these two determinations is very high. More observations are needed to pin down the compositions of these three planets, but they do seem like some of the best candidates to test our ideas about how super-Earths form and evolve, potentially using NASA's upcoming James Webb Space Telescope. (Carnegie Institution for Science)

[NASA's Transiting Exoplanet Survey Satellite arrives at Kennedy Space Center for launch](#) (15 February 2018)

NASA's next planet-hunting mission has arrived in Florida to begin preparations for launch. The Transiting Exoplanet Survey Satellite (TESS) is scheduled to launch on a SpaceX Falcon 9 rocket from Cape Canaveral Air Force Station nearby NASA's Kennedy Space Center in Florida no earlier than April 16, pending range approval. (NASA Goddard)

HUMAN SPACEFLIGHT

[3-D printable tools may help study astronaut health](#) (8 February 2018)

The aim is to develop technology used to study "omics" fields of microbiology that are important to human health. Omics includes research into genomes, microbiomes and proteomes. The Omics in Space project is being led by NASA who hope to develop 3-D printable designs for instruments on the International Space Station (ISS), that can handle liquids like blood samples without spilling in microgravity. These tools could enable astronauts to analyze biological samples without sending them back to Earth. Learning how bacteria affect crew health, or how genes affect aging and disease, can ensure the safety of long-term missions to Mars and beyond. (JPL)

INTERNATIONAL SPACE STATION

[NASA twins study confirms preliminary findings](#) (31 January 2018)

The Twin Study propelled NASA into the genomics era of space travel. It was a groundbreaking study comparing what happened to astronaut Scott Kelly, in space, to his identical twin brother, Mark, who remained on Earth. The perfect nature versus nurture study was born. (NASA)

[All-in-one service for the Space Station](#) (7 February 2018)

Bartolomeo aims to attract new European users to the Station, including a community of start-ups and space entrepreneurs. As companies piggyback off existing Station resources to reduce cost, new commercial opportunities will arise. Earth observation and telecommunications, exobiology and space weather research are areas of great demand that will benefit. The Bartolomeo All-in-one Mission Service will provide end-to-end access for external payloads on the Station. It provides unobstructed view of Earth, direct control of the

experiments from the ground and the possibility of retrieving samples. Today, ESA and Airbus Defence and Space signed a commercial partnership that will make Bartolomeo a reality next year. (ESA)

[Sierra Nevada Corporation receives official NASA launch window for Dream Chaser spacecraft](#) (7 February 2018)

Sierra Nevada Corporation (SNC) received NASA's Authority to Proceed for the Dream Chaser spacecraft's first mission, with a launch window for late 2020. The mission will provide cargo resupply to the International Space Station under the Commercial Resupply Services Contract 2 (CRS2). (Sierra Nevada Corporation)

[bSpace ARQ small satellite deployer to be launched to the International Space Station](#) (14 February 2018)

Launch your satellite or entire constellation from the International Space Station. Introducing the bSpace ARQ, our latest innovation for reaching low-earth-orbit. Designed by a team of experienced spaceflight engineers to deliver unprecedented reliability, the modular launch system enables complete flexibility for sizes up to 27U with a 200U deployment capacity on each launch. That means you can reliably deploy an entire constellation from a single box or replenish your constellation on a known schedule. (bSpace)

[Bigelow Space Operations announces partnership with CASIS to fly payloads to the International Space Station](#) (20 February 2018)

Bigelow Space Operations (BSO) is proud to announce a partnership with the Center for the Advancement of Science in Space (CASIS), manager of the International Space Station (ISS) U.S. National Laboratory. BSO is officially a user of the ISS National Lab and will be facilitating the integration of payloads for commercial, academic and government customers. (Bigelow Space Operations)

LAUNCH SERVICES

[140 successful tests and several "firsts" for Vinci, the engine for Ariane 6](#) (15 February 2018)

Its main feature is its multiple ignition capability: Vinci® will be able to re-ignite in flight as many times as necessary, in order to place several payloads in orbit at different locations, according to the specific needs of the mission. This engine will enable Ariane 6 to carry out all types of missions, regardless of duration and target orbit, particularly the deployment of satellite constellations, for which demand will continue to grow. (Ariane Group)

MAGNETISM AND THE MAGNETOSPHERE

[Astrophysicists settle century-old cosmic debate on magnetism of planets and stars](#)

(9 February 2018)

Using one of the world's most powerful laser facilities, a team of scientists experimentally confirmed one of the most popular theories for cosmic magnetic field generation: the turbulent dynamo. By creating a hot turbulent plasma, the size of a penny, which lasts a few

billionths of a second, the researchers recorded how the turbulent motions can amplify a weak magnetic field to the strengths of those observed in our sun, distant stars and galaxies. (University of Chicago)

[Pulsating aurora mysteries uncovered with help from NASA's THEMIS mission](#)

(20 February 2018)

Unlike the long, shimmering veils of typical auroral displays, pulsating auroras are much dimmer and less common. Pulsating auroras have a slightly different cause to typical auroras. The magnetosphere is home to a type of plasma wave known as whistler mode chorus. These waves have characteristic rising tones, reminiscent of the sounds of chirping birds, and can efficiently disturb the electrons. When these waves make their appearance within the magnetosphere, some of the electrons scattered by the wave career down into Earth's atmosphere, causing the pulsating auroras.

(NASA Goddard)

[Clearest infrared image yet of the centre of our galaxy](#) (26 February 2018)

A research team has published a new study. It reveals a new high-resolution map of the magnetic field lines in gas and dust swirling around the supermassive black hole at the center of our galaxy. The team created the map, which is the first of its kind, using the CanariCam infrared camera attached to the Gran Telescopio Canarias on the island of La Palma.

(University of Texas at San Antonio)

MANNED SPACE

[OHB expands activities in the NewSpace sector with the founding of Blue Horizon](#)

Deutschland (16 February 2018)

Blue Horizon Germany, space and technology group OHB SE is broadening its activities in the New Space sector. A company intended to substantiate the vision of enabling sustainable living in outer space and revitalizing desolated landscapes on Earth. Both are enabled by technologies and processes from the field of "life sciences". We see great business potential in life sciences in space, which particularly follows OHB's practical approach of engaging in useful space activities that benefit life on Earth. (OHB)

[Bigelow Aerospace announces the creation of Bigelow Space Operations](#) (20 February 2018)

Bigelow Space Operations (BSO), a new commercial space company that is the sales, operational and customer service company that manages and operates space stations developed by Bigelow Aerospace. With the two launches of B330-1 and B330-2 expected in 2021, the time is now in 2018 to begin BSO activity. These single structures that house humans on a permanent basis will be the largest, most complex structures ever known as stations for human use in space. The customers that B330 will seek to accommodate will be very diverse. These and other space stations including future generations developed by Bigelow Aerospace are so capable, so diverse and so large that they can accommodate virtually unlimited use almost anywhere. (Bigelow Aerospace)

MARS

[Mars Reconnaissance Orbiter preparing for years ahead](#) (9 February 2018)

MRO continues to investigate Mars with all six of the orbiter's science instruments, a decade after what was initially planned as a two-year science mission to be followed by a two-year relay mission. More than 1,200 scientific publications have been based on MRO observations. Teams operating the two instruments named most often in research papers, the High-Resolution Imaging Science Experiment (HiRISE) camera and the Compact Reconnaissance Imaging Spectrometer for Mars (CRISM) mineral-mapper, are dealing with challenges but are ready to continue providing valuable observations. (JPL)

[Long-lived Mars rover Opportunity keeps finding surprises](#) (15 February 2018)

NASA's Mars Exploration Rover Opportunity keeps providing surprises about the Red Planet, most recently with observations of possible "rock stripes." (JPL)

[Surfing complete](#) (21 February 2018)

Slowed by skimming through the very top of the upper atmosphere, ESA's ExoMars has lowered itself into a planet-hugging orbit and is about ready to begin sniffing the Red Planet for methane. The ExoMars Trace Gas Orbiter arrived at Mars in October 2016 to investigate the potentially biological or geological origin of trace gases in the atmosphere. It will also serve as a relay, connecting rovers on the surface with their controllers on Earth. (ESA)

[Curiosity tests a new way to drill on Mars](#) (28 February 2018)

NASA's Curiosity Mars rover used a new drill method to produce a hole on February 26 in a target named Lake Orcadie. The hole marks the first operation of the rover's drill since a motor problem began acting up more than a year ago. (JPL)

MOON

[OHB awarded a study for 3D printing on the moon](#) (15 February 2018)

The study will investigate the ability of additive manufacturing techniques by performing two parallel surveys. The first one is concerned with mapping the required hardware for a continuously human tended lunar base. From permanent infrastructures to "on demand" items, a wide range of elements of different scales will be investigated for their potential to be 3D printed. The other survey is an analysis of available additive layer manufacturing technologies and their potential capabilities in a lunar environment. The assessment includes the state of the art of 3D printing related to several materials such as metals, polymers, ceramics, concrete, food ingredients, and living tissues. (OHB)

[Moon's water may be widespread and immobile](#) (23 February 2018)

A new analysis of data from two lunar missions finds evidence that the Moon's water is widely distributed across the surface and is not confined to a particular region or type of terrain. The water appears to be present day and night, though it's not necessarily easily accessible. The findings could help researchers understand the origin of the Moon's water and how easy it would be to use as a resource. If the Moon has enough water with reasonably

convenient to access, future explorers might be able to use it as drinking water or to convert it into hydrogen and oxygen for rocket fuel or oxygen to breathe. (NASA Goddard)

[Research details mineralogy of potential lunar exploration site](#) (28 February 2018)

A detailed study of a giant impact crater on the Moon's far side could provide a roadmap for future lunar explorers. The study maps the mineralogy of the South Pole-Aitken (SPA) basin, a gash in the lunar surface with a diameter of approximately 2,500 kilometers (1,550 miles). SPA is thought to be the oldest and largest impact basin on the Moon, and scientists have long had their eyes on it as a target for future lunar landers. (Brown University)

NEBULAE

[New models give insight into the heart of the Rosette Nebula](#) (13 February 2018)

Through computer simulations, astronomers at Leeds and at Keele University have found the formation of the Nebula is likely to be in a thin sheet-like molecular cloud rather than in a spherical or thick disc-like shape, as some photographs may suggest. A thin disc-like structure of the cloud focusing the stellar winds away from the cloud's centre would account for the comparatively small size of the central cavity. (University of Leeds)

STARS AND STAR CLUSTERS

[Stellar winds behaving unexpectedly](#) (2 February 2018)

When stellar winds collide, the shocked material releases plenty of X-rays. However, if the hot matter radiates too much light, it rapidly cools, the shock becomes unstable and the X-ray emission dims. This somewhat counterintuitive process is what the scientists thought happened at the time of the first observations, more than 10 years ago. But by 2016, the shock had relaxed, and the instabilities had diminished, allowing the X-ray emission to rise eventually. These are the first observations that substantiate this previously hypothetical scenario. (ESA)

[Baby, it's cold outside: understanding conditions for star formation](#) (5 February 2018)

The mechanism by which hydrogen sulphide is released as gas in interstellar molecular clouds is described by scientists in Japan and Germany, in the journal Nature Astronomy. The process, known as chemical desorption, is more efficient than previously believed, and this has implications for our understanding of star formation in molecular clouds. (Hokkaido University)

[Stars around the Milky Way: cosmic space invaders or victims of galactic eviction?](#)

(26 February 2018)

An international team of astronomers led by the Max Planck Institute for Astronomy (MPIA) has made a surprising discovery about the birthplace of groups of stars located in the halo of our Milky Way galaxy. Astronomers now have compelling evidence showing that some of these halo structures actually originate from the Milky Way's disk itself but were kicked out. (W M Keck Observatory)

[XMM-Newton spies first clear X-ray flares from massive stellar lighthouse](#)

(26 February 2018)

The flickering view of massive star [Rho Ophiuchi A](#), as observed by ESA's XMM-Newton space observatory in 2016, showed this star periodically throws off X-ray flares from its surface as it rotates – a behaviour somewhat akin to a cosmic lighthouse. Follow-up observations using ESO's [Very Large Telescope](#) confirmed that this star has a strong magnetic field, and that the X-ray flares are thus linked to an active magnetic region on the star's surface that rotates in and out of view. (ESA)

[Beaming with the light of millions of suns](#) (26 February 2018)

Observations beginning in 2014 from [NASA's NuSTAR](#) (Nuclear Spectroscopic Telescope Array) and other space telescopes are showing that some ultra-luminous X-ray sources (ULXs), which glow with X-ray light equal in energy to millions of suns, are actually neutron stars. (Caltech)

[Powerful flare from star Proxima Centauri detected with ALMA](#) (26 February 2018)

Space weather emitted by Proxima Centauri, the star closest to our sun, may make that system rather inhospitable to life after all. (NRAO)

[Astronomers detect ancient signal from first stars in universe](#) (28 February 2018)

For the first time, astronomers have detected a signal from stars emerging in the early universe. Using a radio antenna not much larger than a refrigerator, the researchers discovered that ancient suns were active within 180 million years of the Big Bang. (National Science Foundation)

SUN

[Hinode captures record breaking solar magnetic field](#) (6 February 2018)

Astronomers at the National Astronomical Observatory of Japan (NAOJ) using the Hinode spacecraft observed the strongest magnetic field ever directly measured on the surface of the Sun. Analyzing data for 5 days around the appearance of this record breaking magnetic field, the astronomers determined that it was generated because of gas outflow from one sunspot pushing against another sunspot. (National Astronomical Observatory of Japan)

[Leaky atmosphere linked to lightweight planet](#) (8 February 2018)

The Red Planet's low gravity and lack of magnetic field makes its outermost atmosphere an easy target to be swept away by the solar wind, but new evidence from ESA's Mars Express spacecraft shows that the Sun's radiation may play a surprising role in its escape. (ESA)

[Towards a better prediction of solar eruptions](#) (8 February 2018)

Just one phenomenon may underlie all solar eruptions, according to researchers. They have identified the presence of a confining 'cage' in which a magnetic rope forms, causing solar eruptions. It is the resistance of this cage to the attack of the rope that determines the power

and type of the upcoming flare. This work has enabled the scientists to develop a model capable of predicting the maximum energy that can be released during a solar flare, which could have potentially devastating consequences for the Earth. (CNRS)

[SDO reveals how magnetic cage on the Sun stopped solar eruption](#) (23 February 2018)

The team of scientists included SDO's observations of magnetic fields at the Sun's surface in powerful models that calculate the magnetic field of the Sun's corona, or upper atmosphere, and examined how it evolved in the time just before the flare. The model reveals a battle between two key magnetic structures: a twisted magnetic rope, known to be associated with the onset of CMEs, and a dense cage of magnetic fields overlying the rope. The scientists found that this magnetic cage physically prevented a CME from erupting that day. Just hours before the flare, the sunspot's natural rotation contorted the magnetic rope and it grew increasingly twisted and unstable, like a tightly coiled rubber band. But the rope never erupted from the surface: Their model demonstrates it didn't have enough energy to break through the cage. It was, however, volatile enough that it lashed through part of the cage, triggering the strong solar flare. (NASA Goddard)

SUPERNOVA

[Amateur astronomer captures rare first light of massive exploding star](#) (21 February 2018)

Thanks to lucky snapshots taken by an amateur astronomer in Argentina, scientists have obtained their first view of the initial burst of light from the explosion of a massive star. (W. M. Keck Observatory)

TECHNOLOGY

[New technology can help scientists peer into deep space](#) (2 February 2018)

A team of Australian scientists have found a new way to use the telecommunications network to synchronize radio telescopes, which help scientists peer into deep space. Linking radio telescopes in an array currently requires that each telescope has access to an atomic clock to record the precise time when a signal is detected from an object in space. The team demonstrated, for the first time, that a stable frequency reference can be reliably transmitted more than 300 kilometres over the fibre optic network to link two radio telescopes. The new technology could be particularly useful for the Square Kilometre Array, a global effort to detect faint radio waves from deep space with a sensitivity about 50 times greater than that of the Hubble telescope. This highly stable method for transmitting the frequency reference promises to replace the need for expensive atomic clocks, which cost around two hundred thousand dollars each. Square Kilometre Array (SKA) is an international effort to build the world's largest radio telescope using arrays in Australia and South Africa. Individual radio telescopes will be linked to create a total collecting area of about 1 million square metres. (Australian National University)

[NASA tests atomic clock for deep space navigation](#) (6 February 2018)

In deep space, accurate timekeeping is vital to navigation, but many spacecraft lack precise

timepieces on board. For 20 years, NASA's Jet Propulsion Laboratory in Pasadena, California, has been perfecting a clock. It's not a wristwatch; not something you could buy at a store. It's the Deep Space Atomic Clock (DSAC), an instrument perfect for deep space exploration. (JPL)

[Falcon Heavy test flight success](#) (6 February 2018)

Falcon Heavy is the most powerful operational rocket in the world by a factor of two, with the ability to lift into orbit nearly 64 metric tons (141,000 lb.) a mass greater than a 737 jet-liner loaded with passengers, crew, luggage and fuel. (SpaceX)

[Waterbeds simulate weightlessness to help Skinsuits combat back pain in space](#)

(21 February 2018)

Researchers at King's College London, UK, have been testing a Skinsuit to combat back problems, using a novel simulation of microgravity: adding magnesium salts to a half-filled waterbed. They were inspired by the Dead Sea, where swimmers float on the surface because of the high salt content. The university and the Space Medicine Office of ESA's European Astronaut Centre have worked together to develop the Skinsuit, a spandex-based garment designed to squeeze the body from the shoulders to the feet like gravity. (ESA)

[RS-25 engine throttles up for deep space exploration](#) (21 February 2018)

The RS-25 is an updated version of the Space Shuttle Main Engine that helped power the Space Shuttle into space. There are 16 flight engines that will power the first four SLS flights in inventory at Aerojet Rocketdyne's Stennis facility. Fourteen of the engines previously flew aboard the Space Shuttle. The SLS rocket was designed for missions beyond low-Earth orbit carrying crew or cargo to the Moon or beyond. The initial configuration for what SLS can carry past low-Earth orbit and on to the Moon is more than 26 metric tons, with a final configuration of at least 45 metric tons. (Aerojet Rocketdyne)

[Atacama Rover Astrobiology Drilling Studies \(ARADS\)](#) (26 February 2018)

How would you search for signs of life, traces of tiny, living microbes or their fossilized remains, in an extreme and distant environment? NASA scientists and engineers are working on an answer to that question, aiming to find out if life ever evolved on the planet Mars and if it still harbours life today. A project called the Atacama Rover Astrobiology Drilling Studies, or ARADS, has been designing tools and techniques for future exploration and testing them in one of the most Mars-like places on Earth: Chile's Atacama Desert. (NASA Ames)

TELESCOPES

[Combined optics and science instruments of NASA's James Webb Space Telescope arrive at Northrop Grumman](#) (5 February 2018)

The two halves of NASA's James Webb Space Telescope now reside at Northrop Grumman in Redondo Beach, Calif., where they will come together to form the complete observatory. (Northrop Grumman)

[VLT working as 16-metre telescope for first time](#) (13 February 2018)

One of the original design goals of ESO's [Very Large Telescope](#) (VLT) was for its four Unit Telescopes (UTs) to work together to create a single giant telescope. With the first light of the [ESPRESSO](#) spectrograph using the four-Unit-Telescope mode of the VLT, this milestone has now been reached (ESO)

UNIVERSE

[New galaxy survey to precisely measure the expanding Universe](#) (1 February 2018)

Australian National University (ANU) will play a major role in the Taipan galaxy survey, which will for the first time measure the current expansion rate of the Universe with one per cent precision. The Taipan survey aims to resolve a nagging discrepancy between previous measurements of the current expansion rate using the 'distance ladder' method and measurements of the long-ago expansion rate using the radiation left over from the Big Bang. The new TAIPAN facility is installed on the refurbished UK Schmidt Telescope. The Taipan galaxy survey, due to start in mid-2018, which will be the most comprehensive spectroscopic survey of the southern sky. It will map the entire southern hemisphere and part of the northern hemisphere and determine both the age and size of the Universe with extraordinary precision. To do so, it will measure the position of two million galaxies and the velocities for 100,000 of those galaxies. (Australian National University)

Pat Williams February 2018