# The Aerospace Update

Milky Way Arcs Above Zabriskie Point in Death Valley

Dec. 14, 2017

Image Credit: Miguel Claro

# Blue Origin Launches New Shepard Test Flight

*Video Credit: Blue Origin*

Blue Origin launched a reusable New Shepard sub-orbital rocket from the company's west Texas launch site Tuesday Dec. 12th, boosting an unpiloted crew capsule out of the dense lower atmosphere for a brief foray into space before a parachute descent to Earth. The booster, meanwhile, plunged back to the launch site tail first, re-starting its hydrogen-fueled BE-3 main engine to slow down, deploying four legs and settling to a picture-perfect touchdown on a circular landing pad. The launching, the first using an upgraded booster and a crew capsule equipped with the large windows that will offer space tourists spectacular panoramic views.

*Source: William Harwood @ SpaceFlightNow.com*

# Chinese Rocket Launches First Algerian Communications Satellite


*Video courtesy of CCTV+*

A Chinese-built telecom satellite for Algeria successfully launched Sunday, Dec. 10th aboard a Long March 3B rocket, heading toward a perch more than 22,000 miles over the equator to provide television broadcasts, broadband Internet, remote education and emergency communications services. The Alcomsat 1 spacecraft rode a Chinese Long March 3B rocket into orbit from the Xichang space center in Sichuan province, a mountainous launch base in the southwestern part of the country.

*Source: Stephen Clark @ SpaceFlightNow.com*

# Ariane 5 Launches Four Galileo Satellites


*Photo Credit: ESA*

Arianespace performed its eleventh and final launch of the year today, sending four Galileo European navigation satellites into medium Earth orbit. The launch, which took from the Guiana Space Centre in French Guiana, brings the Galileo constellation to 22 satellites, though four are not currently in use. Arianespace used an upgraded version of the Ariane 5, called “Evolution Storable” or Ariane 5 ES, modified further to support the deployment of Galileo, including enhancements for a nearly four hour long “ballistic” or non-propulsive transport phase of the mission. The European Commission has one more Ariane 5 launch of another four Galileo satellites planned for July 2018 to complete the constellation, ensuring complete availability of the European Global Navigation Satellite System (GNSS).

*Source: Caleb Henry @ SpaceNews.com*

# Electron Countdown Aborted at Engine Start

Rocket Lab counted down to the second test flight of its commercial Electron satellite launcher Monday Dec 11th, U.S. time, but a dramatic computer-commanded abort triggered moments after its engines ignited kept the light-class booster on its New Zealand launch pad for at least two more days.

*Source: Stephen Clark @ SpaceFlightNow.com*

*Image Credit: Rocket Lab*

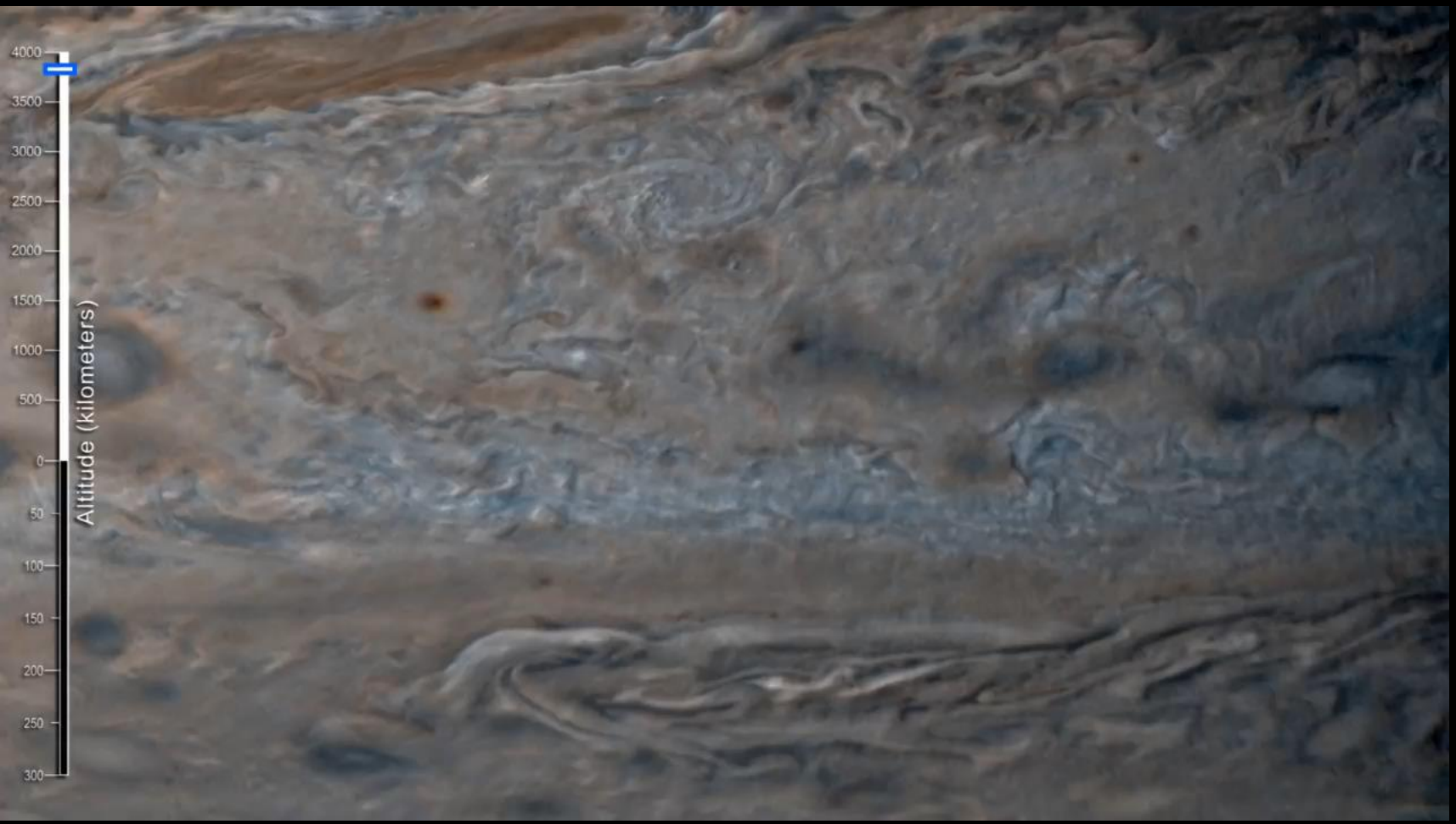
# Space station Crew Returned Thursday, Replacements will Launch Sunday

In a rapid-fire crew rotation, a Russian cosmonaut, a NASA astronaut and an Italian flier closed out a 139-day mission aboard the International Space Station with a fiery plunge back to the frigid steppe of Kazakhstan aboard their Soyuz MS-05 spacecraft early Thursday, Dec. 14th. Three days later — early Sunday morning U.S. time — three fresh crew members are scheduled for launch from the Baikonur Cosmodrome a few hundred miles away, kicking off a two-day rendezvous. In this photo, European astronaut Paolo Nespoli, Russian cosmonaut Sergey Ryazanskiy and Expedition 53 commander Randy Bresnik donned their Sokol spacesuits last week to rehearse undocking and landing procedures.

*Source: William Harwood @ SpaceFlightNow.com*

*Photo Credit: NASA*

# Juno Probes the Depths of Jupiter's Great Red Spot

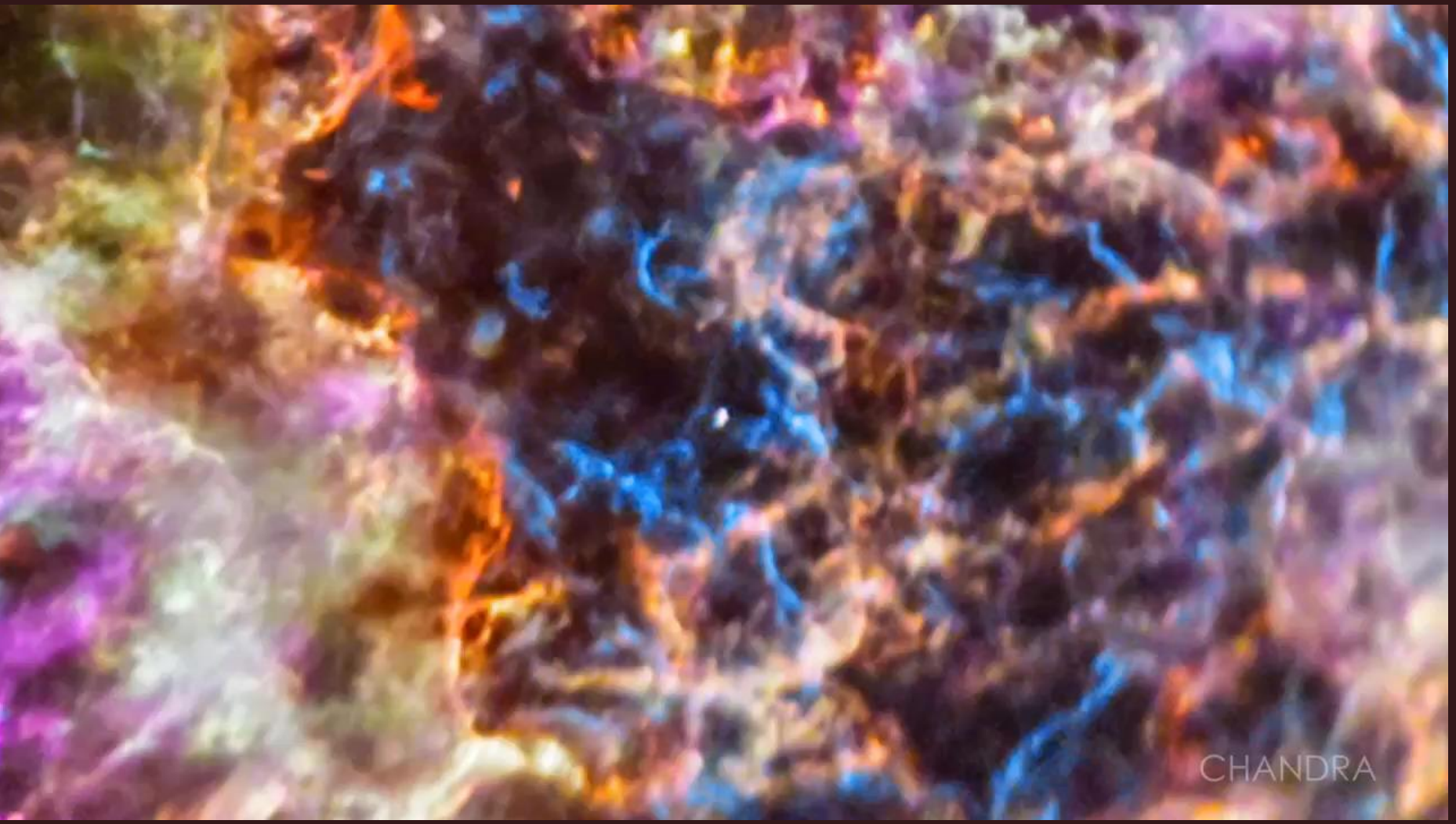



This animation takes the viewer on a simulated flight into, and then out of, Jupiter's upper atmosphere at the location of the Great Red Spot. It was created by combining an image from the JunoCam imager on NASA's Juno spacecraft with a computer-generated animation.

*Source & Animation Credits : NASA/JPL*

"One of the most basic questions about Jupiter's Great Red Spot is: how deep are the roots?" said Scott Bolton, Juno's principal investigator from the Southwest Research Institute in San Antonio. "Juno data indicate that the solar system's most famous storm is almost one-and-a-half Earths wide, and has roots that penetrate about 200 miles (300 kilometers) into the planet's atmosphere." The science instrument responsible for this in-depth revelation was Juno's Microwave Radiometer (MWR). "Juno's Microwave Radiometer which has the unique capability to peer deep below Jupiter's clouds.

# Chandra Reveals the Elementary Nature of Cassiopeia A




Where do most of the elements essential for life on Earth come from? The answer: inside the furnaces of stars and the explosions that mark the end of some stars' lives. Astronomers have long studied exploded stars and their remains – known as "supernova remnants" – to better understand exactly how stars produce and then disseminate many of the elements observed on Earth, and in the cosmos at large. Due to its unique evolutionary status, Cassiopeia A (Cas A) is one of the most intensely studied of these supernova remnants. A new image from NASA's Chandra X-ray Observatory shows the location of different elements in the remains of the explosion: silicon (red), sulfur (yellow), calcium (green) and iron (purple). Each of these elements produces X-rays within narrow energy ranges, allowing maps of their location to be created. The blast wave from the explosion is seen as the blue outer ring.

*Video Credit: Chandra X-Ray Center*

*Source: NASA/Phys.org*

# Engine Burn Refines New Horizons' Journey to KBO 2014 MU69

To optimize the timing of New Horizons' closest flyby of Kuiper Belt Object (KBO) 2014 MU69, mission engineers carried out the spacecraft's last engine burn during the long "cruise" phase of its journey – between Pluto and its second target (MU69) – on Saturday, December 9, 2017. The probe's thrusters were fired for 152 seconds, or about two-and-a-half minutes, via timed commands uploaded to New Horizons' computer. Done to both refine the spacecraft's course toward MU69 and to set an ideal arrival time, the engine burn adjusted *New Horizons'* trajectory by about 151 centimeters per second (approximately 3.4 miles per hour). The closest approach to the KBO should occur just over half an hour after the New Year is ushered in on the U.S. East Coast, at 12:33 a.m. EST (5:33 GMT) on January 1, 2019.

*Source: Laurel Kornfeld @ SpaceFlightInsider.com*

*Image Credit: Carlos Hernandez*

# Oumuamua Will be Probed for Signs of Life

If there are aliens living in the strange cigar-shaped asteroid 'Oumuamua and visiting us from another solar system, SETI scientists say the Robert Ct. Byrd Green Bank Telescope (dubbed the world's largest steerable radio telescope) will hear them talking to each other with smart phones. Of course, if ET is beaming information back to a mothership parked in the outer reaches of our solar system, SETI's Green Bank should hear that too. In short, if the strange object was made by an extraterrestrial intelligence, and they've got anything running that gives off radio waves, we're gonna know about it possibly as soon as this week. The observation campaign will begin on Wednesday, December 13 at 3:00 pm ET. Using the Robert C. Byrd Green Bank Telescope, it will continue to observe 'Oumuamua across four radio bands, from 1 to 12 GHz. Its first phase of observations will last a total of 10 hours, divided into four "epochs" based on the object's period of rotation

*SOURCE: JAKE ELLISON @ SEATTLEPI.COM*

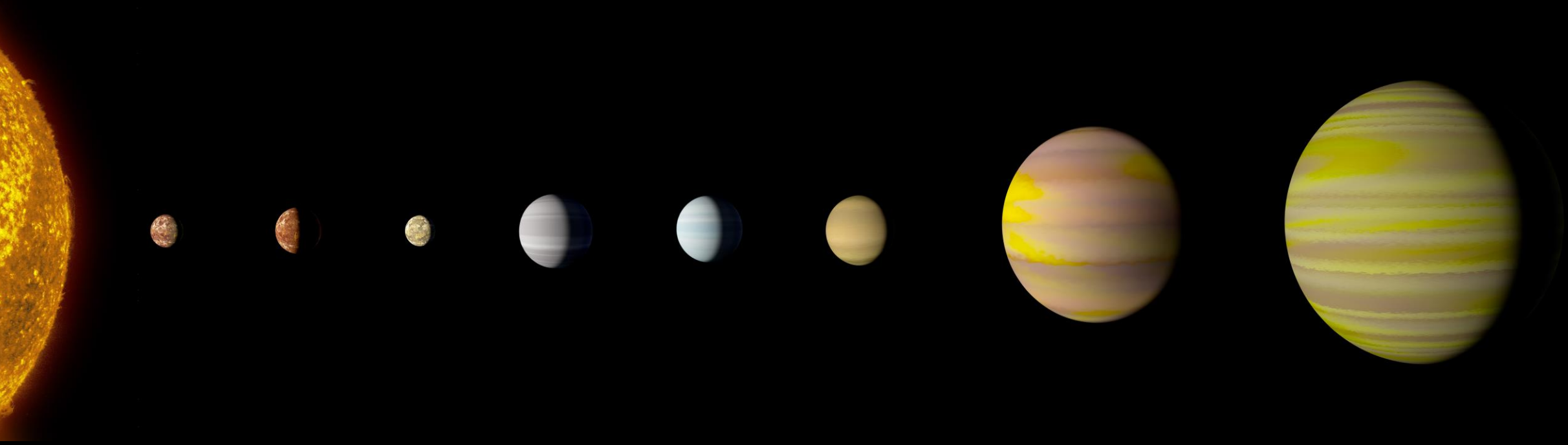
*Image Credit: M. Kornmesser/European Southern Observatory/AFP*

# Heads Up, Earthlings! The 2017 Geminids Are Here!

The annual Geminid meteor shower has arrived. It's a good time to bundle up, go outside and let the universe blow your mind! The shower will peak overnight Dec. 13-14 with rates around one per minute under good conditions, according to Cooke. Geminids can be seen on nights before and after the Dec. 14 peak, although they will appear less frequently. The Geminids are active every December, when Earth passes through a massive trail of dusty debris shed by a weird, rocky object named 3200 Phaethon. The dust and grit burn up when they run into Earth's atmosphere in a flurry of "shooting stars.

*Source & Video Credits: NASA*

# Artificial Intelligence, NASA Data Used to Discover Eighth Planet Circling Distant Star



Our solar system now is tied for most number of planets around a single star, with the recent discovery of an eighth planet circling Kepler-90, a Sun-like star 2,545 light years from Earth. The planet was discovered in data from NASA's Kepler Space Telescope. The newly-discovered Kepler-90i – a sizzling hot, rocky planet that orbits its star once every 14.4 days – was found using machine learning from Google. Machine learning is an approach to artificial intelligence in which computers "learn." In this case, computers learned to identify planets by finding in Kepler data instances where the telescope recorded signals from planets beyond our solar system, known as exoplanets.

*Source: NASA.gov*

*Image Credit: NASA/Wendy Stenzel*

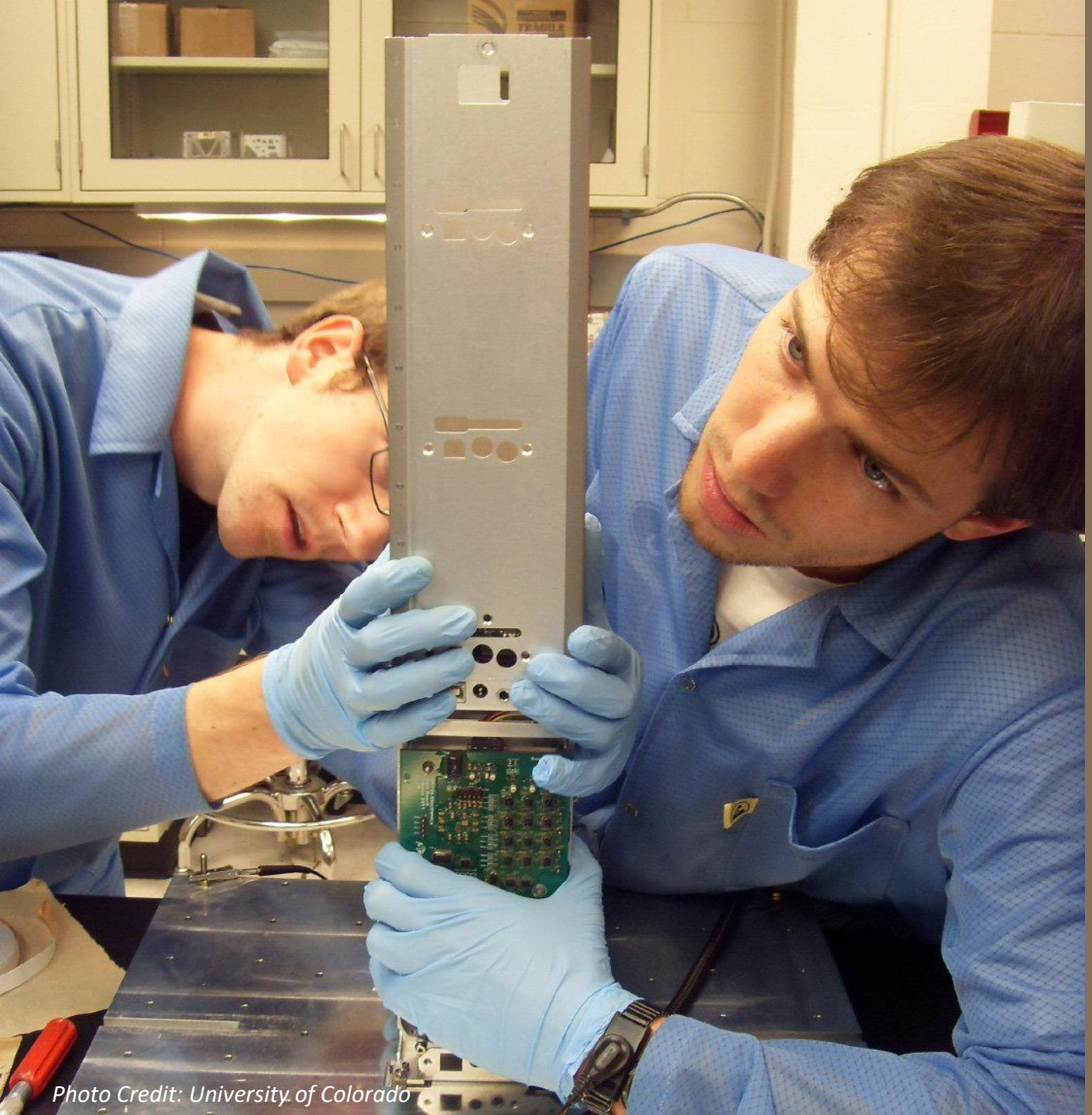


Photo Credit: University of Colorado

# Major Space Mystery Solved Using Data From Student CubeSat

A 60-year-old mystery regarding the source of some energetic and potentially damaging particles in Earth's radiation belts is now solved using data from a shoebox-sized satellite built and operated by University of Colorado Boulder students. The results from the new study indicate energetic electrons in Earth's inner radiation belt - primarily near its inner edge - are created by cosmic rays born from explosions of supernovas. The team showed that during a process called "cosmic ray albedo neutron decay" (CRAND), cosmic rays entering Earth's atmosphere collide with neutral atoms, creating a "splash" which produces charged particles, including electrons, that become trapped by Earth's magnetic fields. The findings have implications for understanding and better forecasting the arrival of energetic electrons in near-Earth space, which can damage satellites and threaten the health of space-walking astronauts.

*Source: Phys.org*

# 13 December 1972: Last Man to Walk on The Moon

At approximately 22:26 UTC, NASA astronauts Eugene A. Cernan and Harrison H. Schmitt began the last of three Moon walks or EVAs, on the surface of the Moon at the Taurus-Littrow Valley. This was the final EVA of the Apollo Program, lasting 7 hours, 15 minutes. Then both astronauts climbed up into the Lunar Module Challenger to prepare to lift off the following day. Gene Cernan was the last man on the surface of the Moon.

*Source: Bryan R. Swopes@thisdayinaviation.com*

*Image Credit: Harrison H. Schmitt/NASA*

# In The News

**Trump Makes Moon Missions NASA's Near-Term Goal**. In a brief White House ceremony Monday, President Trump formally directed NASA to set its sights on sending astronauts back to the moon followed by eventual flights to Mars as part of a new national space policy intended to make sure America "once again leads and inspires all of humanity" on the high frontier. *(William Harwood @ SpaceFlightNow.com)*

**New Russian Lunar Orbiter Contracted to be Built.** The Russian Space Agency (Roscosmos) is proceeding with a new project to build a lunar orbiter which will be the first of numerous new lunar missions the agency is planning. Based on information TASS obtained from the official government procurement website, the new Luna-Resurs Orbiter will be contracted out to several different companies with a total price tag not to exceed 2 billion rubles (a little over $33,500,000 at the current exchange rate). *(Lloyd Campbell @ SpaceFlightInsider.com)*

**Airbus May Cut A380 Production to Six Planes a Year**. Airbus is exploring plans to cut A380 superjumbo production to as low as 6 aircraft per year as it battles to make the world's largest airliner commercially viable beyond the end of the decade, industry sources said. Squeezed by smaller but more efficient twin-engine jets, Airbus has announced plans to lower output to 12 aircraft in 2018 and 8 in 2019, down from a annual peak of 30, as it holds out for what it believes will be a recovery in demand. *(Tim Hepher @ reuters.com)*

**Qatar Signs $8 Billion Typhoon Deal**. The Qatari government has inked a deal with Britain to purchase 24 Eurofighter Typhoon fighter jets. The agreement, signed in Doha on Dec. 10…follows the signing of a statement of intent in September for closer defense cooperation between the UK and Qatar. *(Tony Osborne @ aviationweek.com)*

**Delta Picks A321neo for Narrowbody Replacement**. Delta Air Lines has committed to 200 Airbus A321neos for the next phase of its narrowbody fleet replacement programme. The deal includes 100 firm aircraft and another 100 options with deliveries from 2020 to 2023, the Atlanta-based carrier says today. The A321neos, which Delta will configure with 197 seats, will replace ageing narrowbodies in the airline's fleet, including the Airbus A320, Boeing 757-200 and MD-90. *(EDWARD RUSSELL @ FLIGHTGLOBAL.COM)*