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Astronomy & Physics Weekly News

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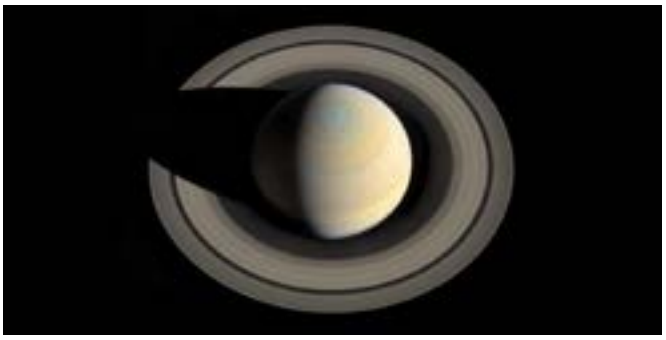
Saturn's rings are disappearing faster than anyone realized



Scientists say Saturn's rings could disappear in 100 million to 300 million years.NASA/Cassini/James O'Donoghue

aturn's rings are one of the solar system's most recognizable features, but a new study shows that the planet is losing its famous accessories — and faster than anyone realized.

Astronomers have known since the 1980s that the sixth planet from the sun is shedding its signature rings, which are made up of swirling rocks and water ice. But the study — published Dec. 17 in the journal Icarus — shows that the process is occurring so fast that the rings could disappear in 100 million to 300 million years.

While that's an almost inconceivably long time for humans, it's almost a blink of an eye on a cosmic timescale. The solar system has been around for billions of years and is expected to last for many billions more.

"The big conclusion is that ring systems are temporary features," said James O'Donoghue, a postdoctoral fellow at NASA's Goddard Space Flight Center in Greenbelt, Maryland, and lead author of the study. "They're just not built to last."

The research reveals the complex relationship between Saturn and its rings. "We used to think the ring system was fixed and would always look the same," said Henry Throop, a senior scientist at the Planetary Science Institute in Washington, D.C., who was not involved with the study. "Now we see that the ring system is a really dynamic, exciting place that is changing on a year-to-year basis."

O'Donoghue and his colleagues observed Saturn's ring system from the Keck Observatory on Hawaii's Big Island and studied data from NASA's now-defunct Cassini spacecraft, which spent 13 years orbiting Saturn before deliberately plunging into the planet last year.

The researchers found that the rings — which are thousands of miles across and 98 percent ice — are falling bit by bit onto Saturn, a phenomenon the scientists dubbed "ring rain."
"The rings are literally raining water onto the planet," O'Donoghue said. "The rate is about 2 tons per second — enough to fill an Olympic-size swimming pool every 30 minutes or so." ...Read More...

This ice-filled crater on Mars looks like a huge alien skating rink

This image from ESA's Mars Express shows Korolev Crater near the Martian north pole. ESA/DLR/FU Berlin

The Korolev Crater is almost 51 miles wide and more than a mile deep — and full of ice that never melts.

There's no skating on Mars — not yet anyway — but a stunning new photograph of the Martian surface shows an ice-filled crater that looks a bit like a giant rink. The photograph — taken by the European Space Agency's Mars Express spacecraft and released by the agency on Thursday — shows the Korolev Crater, a dish-shaped basin on the broad plain that surrounds the Martian north pole.

The impact crater is almost 51 miles wide and more than a mile deep. It holds roughly 530 cubic miles of perpetually frozen water ice, which is almost five times the volume of Lake Erie. The photo was stitched together from five images captured by a high-resolution camera aboard the uncrewed spacecraft, which has been circling the Red Planet for the past 15 years. Each of the five "strips" used to create the composite image was taken during a separate orbit.

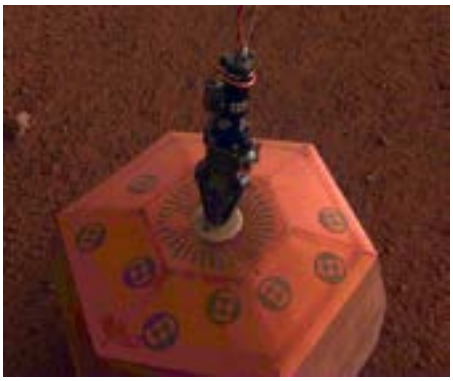
Mars has seasons just as Earth does, but the ice never melts because of the location of the crater and its topography.

"This particular crater is very close to the polar ice cap, and the inside of the crater is at a lower elevation and more shadowed, so it creates a cold trap where the ice is stable," Kirsten Siebach, a planetary geologist at Rice University in Houston, told NBC News MACH in an email.

Siebach said it was unusual to see ice-filled craters on Mars. But if the Martian landscape is notoriously dusty and barren, the pockmarked planet holds quite a bit of water. Just about all of it is frozen, although this year instruments aboard Mars Express revealed the existence of a large underground reservoir of liquid water near the planet's south pole.

"There used to be liquid water in rivers and lakes on Mars, but it largely either froze as the atmosphere dissipated or was lost to space about 3 billion years ago," Siebach said. "Ice still exists on Mars near the poles, and the Martian atmosphere has a tiny amount of water vapor."...Read More...

InSight places its first instrument on Mars



NASA's InSight lander placed its seismometer on Mars on Dec. 19, 2018. This was the first time a seismometer had ever been placed onto the surface of another planet. Image Credit: NASA/JPL-Caltech

NASA's InSight lander has deployed its first instrument onto the surface of Mars, completing a major mission milestone. New images from the lander show the seismometer on the ground, its copper-colored covering faintly illuminated in the Martian dusk. It looks as if all is calm and all is bright for InSight, heading into the end of the year.

"InSight's timetable of activities on Mars has gone better than we hoped," said InSight Project Manager Tom Hoffman, who is based at NASA's Jet Propulsion Laboratory in Pasadena, California. "Getting the seismometer safely on the ground is an awesome Christmas present."

The InSight team has been working carefully toward deploying its two dedicated science instruments onto Martian soil since landing on Mars on Nov. 26. Meanwhile, the Rotation and Interior Structure Experiment (RISE), which does not have its own separate instrument, has already begun using InSight's radio connection with Earth to collect preliminary data on the planet's core. Not enough time has elapsed for scientists to deduce what they want to know - scientists estimate they might have some results starting in about a year.

To deploy the seismometer (also known as the Seismic Experiment for Interior Structure, or SEIS) and the heat probe (also known as the Heat Flow and Physical Properties Probe, or HP3), engineers first had to verify the robotic arm that picks up and places InSight's instruments onto the Martian surface was working properly.

Engineers tested the commands for the lander, making sure a model in the test bed at JPL deployed the instruments exactly as intended. Scientists also had to analyze images of the Martian terrain around the lander to figure out the best places to deploy the instruments.

On Tuesday, Dec. 18, InSight engineers sent up the commands to the spacecraft. On Wednesday, Dec. 19, the seismometer was gently placed onto the ground directly in front of the lander, about as far away as the arm can reach - 5.367 feet, or 1.636 meters, away). ...Read More...

Self-driving rovers tested in Mars-like Morocco

This agile walking/driving SherpaTT rover was brought to the PERASPERA Morocco field trials by a team from Germany's DFKI Robotics Innovation Centre.

Robots invaded the Sahara Desert for Europe's largest rover field test, taking place in a Mars-like part of Morocco. For two weeks three rovers and more than 40 engineers tested automated navigation systems at up to five different sites.

This marked the end of the first phase of the strategic research cluster on space robotics technologies, a scheme funded by the European Union's Horizon 2020 programme.

The cluster is coordinated by the PERASPERA Ad Astra (Latin for 'to the stars through hardships') project, which is a partnership of Italy's ASI space agency, France's CNES space agency, the DLR German Aerospace Center, Spain's CDTI technology agency and the UK Space Agency, UKSA, coordinated by ESA.

The venue for the field test - organised by Germany's DFKI Robotics Innovation Centre - was?a site served by the Ibn Battuta Centre, near Erfoud on the northern edge of the Sahara Desert. The wind-blown desert environment was selected by the EU's Europlanet Research Infrastructure as a good match for Mars, and many others agree: the teams ended up sharing the location with a Hollywood feature film crew and Chinese documentary makers.

"What this kind of field test gives you is the proof of the pudding that your design is working well, even in some of the most challenging environments we can imagine," explains Gianfranco Visentin, head of ESA's Automation and Robotics section.

"Lab testing of the hardware we design doesn't take account of the variability nature brings, from the light of the sky to the shape of the landscape, the texture and colours of the sand and rock. Operating outdoors in this way proves that our systems work in much more complex and elaborate settings than can ever be simulated.

"To give an example during this field test, the very smoothness and homogeneity of some of the big sand dunes proved difficult for computer vision algorithms to navigate, because they are based on identifying features based on difference, so they started ..Read More...

Juno's mission to Jupiter just hit its halfway point: Here's what we've learned so far

A multitude of magnificent, swirling clouds in Jupiter's dynamic North North Temperate Belt is captured in this image from NASA's Juno spacecraft.
NASA

As the Juno spacecraft prepares for its 16th close pass by Jupiter later this month, let's recap what the ambitious project has already taught us.

Juno's Flight

NASA's solar-powered Juno spacecraft is about to fly past Jupiter yet again to gather more data on the gas giant.

On Dec. 21, at 11:49:48 a.m. EST, Juno will pass just 3,140 miles (5,053 km) from Jupiter's cloud tops at 128,802 miles per hour. This will be the spacecraft's 16th science pass of the planet, meaning that Juno's prime mission will be halfway complete.

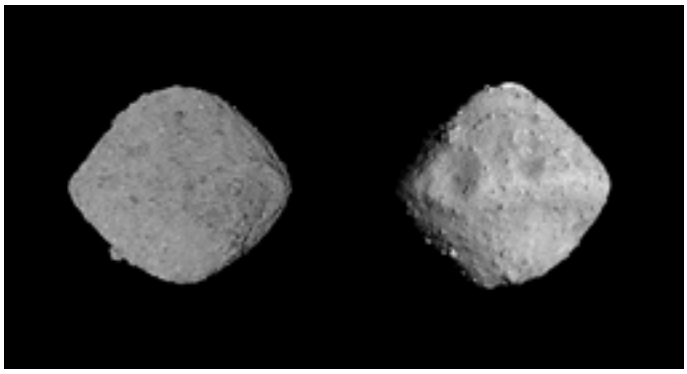
With this 16th flyby, the Juno mission will have observed the entire planet, Jack Connerney, the mission's deputy principal investigator, said in a NASA statement. Moving forward after this milestone, the craft will provide observations and measurements about the planet in greater clarity and detail.

"Over the second half of our prime mission — science flybys 17 through 32 — we will split the difference, flying exactly halfway between each previous orbit. This will provide coverage of the planet every 11.25 degrees of longitude, providing a more detailed picture of what makes the whole of Jupiter tick," Connerney said.

Mission to Jupiter

Juno has so far been in an elliptical orbit that takes it around Jupiter every 53 days. The craft initially arrived at the planet on July 4, 2016, and has been gathering scientific data since August of that same year. In the flybys that Juno has so far completed, the craft has used the scientific instruments on board to study the planet beneath its swirling clouds. Juno continues to explore Jupiter's atmosphere, magnetosphere, and interior structure, and collect data about its auroras to better understand how the planet formed and evolved. ...Read More...

Bennu and Ryugu look like spinning tops and scientists want to know why



Both Bennu (left) and Ryugu (right) have a diamond shape that is common for asteroids of their size, but scientists can't yet explain how the shape forms.

New up-close images of Bennu have confirmed that the asteroid is shaped like a spinning top. That look, characterized by a raised equatorial ridge, is shared by other similarly sized asteroids in the solar system including Ryugu, currently being explored by Japan's Hayabusa2 spacecraft. NASA's OSIRIS-REx spacecraft arrived at Bennu on December 3.

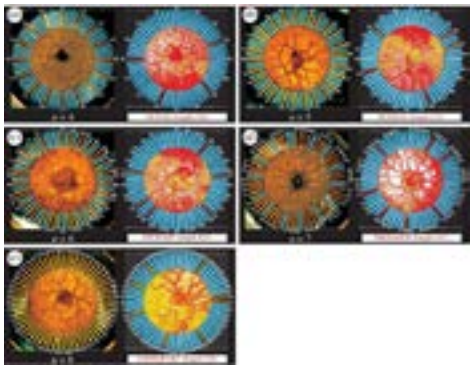
But new observations show that both asteroids are spinning on their axes too slowly to explain their shape, says Hayabusa2's mission manager Makoto Yoshikawa of the Japanese space agency JAXA. If the rotation is fast enough, momentum can push loose rocks toward the equator, giving an asteroid a spinning-top shape. But Ryugu rotates once on its axis only every 7.6 hours; new data show that Bennu rotates once every 4.3 hours.

With spacecraft now exploring both Bennu and Ryugu, researchers hope to figure out the asteroids' puzzling appearance. "It's an asteroid geologist's dream to have a mystery like this to solve," OSIRIS-REx principal investigator Dante Lauretta of the University of Arizona in Tucson said December 10 in a news conference at the American Geophysical Union meeting.

The asteroids' spin rates could have once been faster but slowed over time due to a phenomenon called the YORP effect. It occurs when particles of light in the sun's rays hit different types of surface materials on an asteroid. That light bounces off some materials, adding a little bit of momentum that can accumulate over time and act as a counter to an asteroid's spin. Other materials absorb that light and then radiate it back out as heat, exerting a force that can also change an asteroid's spin, and therefore its shape.

As OSIRIS-REx continues to monitor Bennu, it will compare the observed rotation rate of the nearly 500-meter-wide world with ground-based observations in hopes of tracking how its spin may shift over time. Those observations could reveal if Bennu's spin was ever fast enough to give it its diamond shape. Yet another remote possibility, says Patrick Michel, an astrophysicist at the Observatoire de la Côte d'Azur in Nice, France, is that the shapes ...Read More...

Amoeba finds approximate solutions to NP-hard problem in linear time



TSP solutions obtained by the amoeba-based computing system for 4, 5, 6, 7, and 8 cities. Credit: Zhu et al. ©2018 Royal Society Open Science

Researchers have demonstrated that an amoeba—a single-celled organism consisting mostly of gelatinous protoplasm—has unique computing abilities that may one day offer a competitive alternative to the methods used by conventional computers.

The researchers, led by Masashi Aono at Keio University, assigned an amoeba to solve the Traveling Salesman Problem (TSP). The TSP is an optimization problem in which the goal is to find the shortest route between several cities, so that each city is visited exactly once, and the start and end points are the same.

The problem is NP-hard, meaning that as the number of cities increases, the time needed for a computer to solve it grows exponentially. The complexity is due to the large number of possible solutions. For example, for four cities, there are only three possible routes. But for eight cities, the number of possible routes increases to 2520.

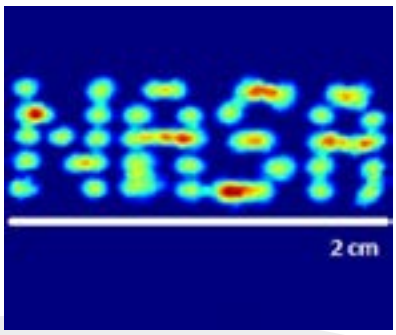
In the new study, the researchers found that an amoeba can find reasonable (nearly optimal) solutions to the TSP in an amount of time that grows only linearly as the number of cities increases from four to eight. Although conventional computers can also find approximate solutions in linear time, the amoeba's approach is completely different than traditional algorithms. As the scientists explain, the amoeba explores the solution space by continuously redistributing the gel in its amorphous body at a constant rate, as well as by processing optical feedback in parallel instead of serially.

Although a conventional computer can still solve the TSP much faster than an amoeba, especially for small problem sizes, the new results are intriguing and may lead to the development of novel analogue computers that derive approximate solutions of computationally complex problems of much larger sizes in linear time.

How it works

The particular type of amoeba that the scientists used was a plasmodium or "true slime mold," which weighs about 12 mg and consumes oat flakes. ....Read More...

NASA industry team creates and demonstrates first quantum sensor for satellite gravimetry



This image demonstrates the control that the Goddard-AOSense team has over the paths of atoms. In this demonstration, they manipulated the path to form the acronym, NASA.

NASA and the Sunnyvale, California-based AOSense, Inc., have successfully built and demonstrated a prototype quantum sensor capable of obtaining highly sensitive and accurate gravity measurements - a stepping stone toward next-generation geodesy, hydrology, and climate-monitoring missions in space.

The prototype sensor, developed in collaboration with NASA's Goddard Space Flight Center in Greenbelt, Maryland, employs a revolutionary measurement technique called atom interferometry, which former U.S. Energy Department Secretary Steven Chu and his colleagues invented in the late 1980s. In 1997, Chu received the Nobel Prize in Physics for his work.

Since the discovery, researchers worldwide have attempted to build practical, compact, more sensitive quantum sensors, such as atom interferometers, that scientists could use in space-constrained areas, including spacecraft.

With funding from NASA's Small Business Innovation Research, Instrument Incubator, and Goddard's Internal Research and Development programs, the Goddard-AOSense team developed an atom-optics gravity gradiometer primarily for mapping Earth's time-varying gravitational field. Although Earth's gravitational field changes for a variety of reasons, the most significant cause is a change in water mass. If a glacier or an ice sheet melts, this would affect mass distribution and therefore Earth's gravitational field

"Our sensor is smaller than competing sensors with similar sensitivity goals," said Babak Saif, a Goddard optical physicist and collaborator in the effort.

"Previous atom interferometer-based instruments included components that would literally fill a room. Our sensor, in dramatic comparison, is compact and efficient. It could be used on a spacecraft to obtain an extraordinary data set for understanding Earth's water cycle and its response to climate change. In fact, the sensor is a candidate for future NASA missions across a variety ...Read More...

The coolest experiment in the universe

The International Space Station, shown here in 2018, is home to many scientific experiments, including NASA's Cold Atom Laboratory. Credit: NASA

What's the coldest place you can think of? Temperatures on a winter day in Antarctica dip as low as -120°F (-85°C). On the dark side of the Moon, they hit -280°F (-173°C). But inside NASA's Cold Atom Laboratory on the International Space Station, scientists are creating something even colder.

The Cold Atom Lab (CAL) is the first facility in orbit to produce clouds of "ultracold" atoms, which can reach a fraction of a degree above absolute zero: -459°F (-273°C), the absolute coldest temperature that matter can reach. Nothing in nature is known to hit the temperatures achieved in laboratories like CAL, which means the orbiting facility is regularly the coldest known spot in the universe.

NASA's Cold Atom Laboratory on the International Space Station is regularly the coldest known spot in the universe. But why are scientists producing clouds of atoms a fraction of a degree above absolute zero? And why do they need to do it in space? Quantum physics, of course.

Seven months after its May 21, 2018, launch to the space station from NASA's Wallops Flight Facility in Virginia, CAL is producing ultracold atoms daily. Five teams of scientists will carry out experiments on CAL during its first year, and three experiments are already underway.

Why cool atoms to such an extreme low? Room-temperature atoms typically zip around like hyperactive hummingbirds, but ultracold atoms move much slower than even a snail. Specifics vary, but ultracold atoms can be more than 200,000 times slower than room-temperature atoms. This opens up new ways to study atoms as well as new ways to use them for investigations of other physical phenomena. CAL's primary science objective is to conduct fundamental physics research—to try to understand the workings of nature at the most fundamental levels.

"With CAL we're starting to get a really thorough understanding of how the atoms behave in microgravity, how to manipulate them, how the system is different than the ones we use on Earth," said Rob Thompson, a cold atom physicist at NASA's Jet Propulsion Laboratory in Pasadena, California, and the mission scientist for CAL. "This is all knowledge that is going to build a foundation for what I hope is a long future of cold atom science...Read more...

Satellite study proves global quantum communication will be possible

Credit: CCO Public Domain

Researchers in Italy have demonstrated the feasibility of quantum communications between high-orbiting global navigation satellites and a ground station, with an exchange at the single photon level over a distance of 20,000km.

The milestone experiment proves the feasibility of secure quantum communications on a global scale, using the Global Navigation Satellite System (GNSS). It is reported in full today in the journal Quantum Science and Technology.

Co-lead author Dr. Giuseppe Vallone is from the University of Padova, Italy. He said: "Satellite-based technologies enable a wide range of civil, scientific and military applications like communications, navigation and timing, remote sensing, meteorology, reconnaissance, search and rescue, space exploration and astronomy.

"The core of these systems is to safely transmit information and data from orbiting satellites to ground stations on Earth. Protection of these channels from a malicious adversary is therefore crucial for both military and civilian operations.

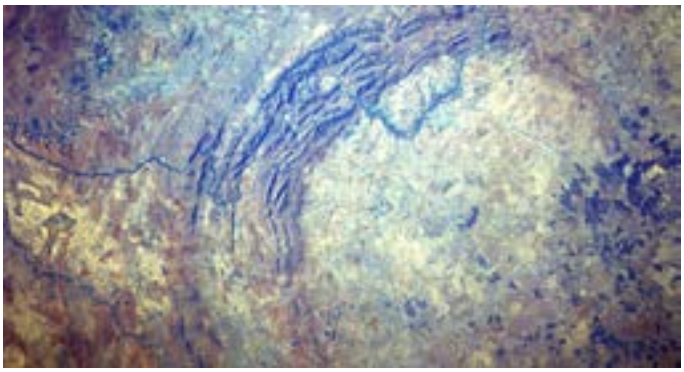
"Space quantum communications (QC) represent a promising way to guarantee unconditional security for satellite-to-ground and inter-satellite optical links, by using quantum information protocols as quantum key distribution (QKD)."

The team's results show the first exchange of a few photons per pulse between two different satellites in the Russian GLONASS constellation and the Space Geodesy Centre of the Italian Space Agency.

Co-lead author Professor Paolo Villoresi said: ""Our experiment used the passive retro-reflectors mounted on the satellites. By estimating the actual losses of the channel, we can evaluate the characteristics of both a dedicated quantum payload and a receiving ground station.

"Our results prove the feasibility of QC from GNSS in terms of achievable signal-to-noise ratio and detection rate. Our work extends the limit of long-distance free-space single-photon exchange. The longest channel length previously demonstrated was around 7,000 km ...Read More...

Erosion has erased most of Earth's impact craters. Here are the survivors



South Africa's Vredefort crater, which formed an estimated 2 billion years ago, is the largest known crater on Earth.

When it comes to impact craters, Earth is the pauper of the solar system.

Even with a recent, still-to-be-confirmed crater discovery under Greenland's ice, there are fewer than 200 known impact craters on the planet. Mars, for comparison, has hundreds of thousands.

Produced by falling space rocks, most impact craters on Earth have been wiped away over time by wind, rain, shifting ice and the crawl of tectonic plates. Here are the 190 confirmed survivors, as recorded in the Earth Impact Database, maintained by the University of New Brunswick in Canada — plus the newcomer in Greenland.

Identifying and studying such features could give scientists clues about the history of Earth, including the evolution of life itself. Researchers have tried to link various craters to the five known mass extinctions, for example. But only the space rock that created Chicxulub, hidden under Mexico's Yucatán Peninsula and the Gulf of Mexico, is widely accepted as causing a major die-off. That space rock left a crater 150 kilometers wide and may have done in the dinosaurs and many other creatures about 66 million years ago (SN: 2/4/17, p. 16).

Popigai, in Siberia, which measures about 90 kilometers from rim to rim, might be connected to a smaller die-off of mostly marine creatures about 34 million years ago. But that's far from settled.

Chicxulub and Popigai are the largest craters dating to the last 100 million years. But the roughly 160-kilometer-wide Vredefort crater in South Africa edges out Chicxulub as the largest known ever. Estimates put Vredefort's origin around 2 billion years ago, making it the oldest known impact crater too. ...Read More...

Outer solar system experts find 'far out there' dwarf planet

Artist concept of 2018 VG18, nicknamed "Farout." Credit: Roberto Molar Candanosa, Carnegie Institution for Science.

A team of astronomers has discovered the most-distant body ever observed in our Solar System. It is the first known Solar System object that has been detected at a distance that is more than 100 times farther than Earth is from the Sun.

The new object was announced on Monday, December 17, 2018, by the International Astronomical Union's Minor Planet Center and has been given the provisional designation 2018 VG18. The discovery was made by Carnegie's Scott S. Sheppard, the University of Hawaii's David Tholen, and Northern Arizona University's Chad Trujillo.

2018 VG18, nicknamed "Farout" by the discovery team for its extremely distant location, is at about 120 astronomical units (AU), where 1 AU is defined as the distance between the Earth and the Sun. The second-most-distant observed Solar System object is Eris, at about 96 AU. Pluto is currently at about 34 AU, making 2018 VG18 more than three-and-a-half times more distant than the Solar System's most-famous dwarf planet.

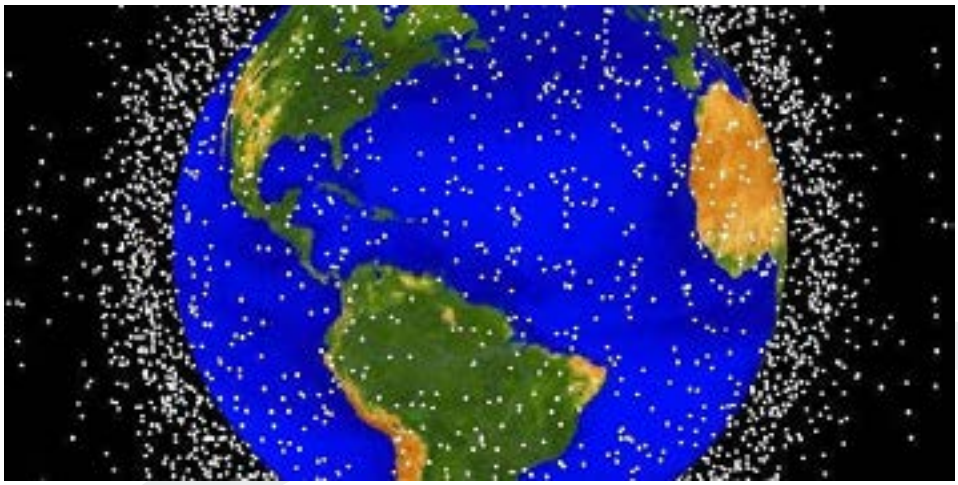
2018 VG18 was discovered as part of the team's continuing search for extremely distant Solar System objects, including the suspected Planet X, which is sometimes also called Planet 9. In October, the same group of researchers announced the discovery of another distant Solar System object, called 2015 TG387 and nicknamed "The Goblin," because it was first seen near Halloween. The Goblin was discovered at about 80 AU and has an orbit that is consistent with it being influenced by an unseen Super-Earth-sized Planet X on the Solar System's very distant fringes.

The existence of a ninth major planet at the fringes of the Solar System was first proposed by this same research team in 2014 when they discovered 2012 VP113, nicknamed Biden, which is currently near 84 AU.

2015 TG387 and 2012 VP113 never get close enough to the Solar System's giant planets, like Neptune and Jupiter, to have significant gravitational interactions with them. This means that these extremely distant objects can be probes of what is happening in the Solar System's outer reaches. The team doesn't know ...Read More...

Special Read:

Despite concerns, space junk continues to clutter Earth orbit



Earth orbit is getting cluttered. NASA

Even tiny objects can do some serious damage when they travel at orbital speeds.

Humans have a tendency to litter wherever we go. Whether it's the local park, a music festival, or Mt. Everest, we're just not good at cleaning up after ourselves. And space is no exception.

Space is pretty big. Infinite, in fact. But the same can't be said of low-Earth orbit (LEO) and, in particular, the most popular orbital lanes used by Earth-sensing and communications satellites. We're launching more objects skyward every year and not, in many cases, cleaning up when we're done with them. So the space around us is starting to fill up.

Messy Space

Even when Sputnik launched in 1957, it wasn't alone. The shiny ball was accompanied by its core stage and payload fairing, both of which tumbled around Earth in nearby orbits. Much of the hardware we launch is similarly partnered, meaning each launch can be responsible for multiple pieces of orbital debris. Much of this "debris" is, of course, composed of hard-working satellites performing valuable jobs. But the majority is derelict, either drifting past its useful lifetime or genuine trash like the spent rocket stages. And "drifting" is a relative term here: Some objects in orbit are moving at up to 17,000 miles per hour.

As human technology needs have become greater, we've also become more reliant on growing numbers of satellites. Newly proposed "constellations" of dozens or even thousands of satellites could greatly expand the number of artificial companions in orbit around us —communications networks more or less require them in order to deliver global coverage. The well-established Iridium satellite phone network uses 66 satellites (plus a few spares if something goes wrong — more on that below). SpaceX recently received FCC approval to launch roughly 12,000 satellites for their planned space-based internet.

Many of the new generation of satellites could by tiny, but numerous. CubeSats are tiny satellites much touted as gateways for even small research groups or companies to gain access to space science, thanks to the low cost of launch and development. But that very ease of access means they're flooding the skies in greater numbers every year.

The more cluttered space becomes, the greater risk there is for a collision. And this is no hypothetical. In fact, a large fraction of the debris we know about in space is the result of just two past collisions. The first, in 2007, was China's intentional "destruction" of a weather satellite as a test of their ability to destroy objects in space. The problem is that while they very successfully demolished the satellite (one China also owned, by the way), what they also did was turn it from one orbiting object into a few thousand, many of which are still circling us today. These drifting bits of debris are a lot harder to track than one derelict weather satellite. This alone angered other space agencies, not to even mention the thorny issue of militarizing space. ..Read More...

This Week's Sky at a Glance - Dec. 22-28, 2018

Dec 22	Sa	02:22	Winter Solstice
		12:05	Mercury-Antares: 6° N
		19:03	Jupiter-Antares: 5.2° N
		21:49	Full Moon
Dec 23	Su	01:00	Ursid Shower: ZHR = 10
		15:48	Moon North Dec.: 21.6° N
Dec 24	Mo	13:52	Moon Perigee: 361100 km
		15:54	Moon Ascending Node
Dec 25	Tu	08:52	Moon-Beehive: 0.6° N
Dec 26	We	20:06	Moon-Regulus: 2.5° S

Kazakhstan Cosmonaut Aidyn Aimbetov Visits UoS/SCASS Dec. 20, 2018

Kazakhstan cosmonaut Aidyn Aimbetov visited the University of Sharjah and met with HE Prof. Hamid Al-Naimiy, the Chancellor of the University of Sharjah. The main aim of the visit was to sign an MoU between the joint-stock Company "National Company "Kazakhstan Gharysh Sapary" and the University of Sharjah on the cooperation in the Earth remote sensing sphere. The purpose of the agreement is cooperation in the field of the exchange of space images and collaboration in the implementation of joint projects. Attending the ceremonial signature were Prof. Maamar Bettayeb, the Vice-Chancellor for Graduate Studies and Research, Prof. Madjid Merabti, the Deam of the College of Sciences, Prof. Abdul Kadir Hamid, the Acting Dean of the College of Engineering, Dr. Tarek Merabtene, the Director of the Office of International Relations, Dr. Ilias Fernini, the SCASS Deputy General for the Research Laboratories and Observatory, and Mr. Marwan Shwaiki, the SCASS Deputy General Director for the Planetarium, and Mr. Khaled Al-Raboy, the SCASS Acting Deputy General Director for Administration and Public Relations.

Cosmonaut Aimbetov was selected in June 2015 to fly on the Soyuz TMA-18M to the International Space Station (ISS). The mission was projected to launch to the ISS on 1 September 2015. Aimbetov became the third Kazakh-born cosmonaut to fly since Kazakhstan's independence in 1991 and the first to fly under the Kazakh flag, and as part of KazCosmos. On 2 September 2015, Aimbetov launched from Baikonur, Kazakhstan. On 11 September 2015, Aimbetov returned from his 10-day mission to the International Space Station, and touched down on the Kazakhstan Steppe, aboard Soyuz TMA-16M.

During his visit to SCASS, Mr. Aimbetov was met by Mr. Marwan Shwaiki and Dr. Ilias Fernini. A tour of the space exhibitions and the planetarium were given to Mr. Aimbetov. This was followed by a roundtable discussion will all of the SCASS research assistants and students. Dr. Fernini emphasized the different areas of cooperation with the National Space Agency of the Republic of Kazakhstan, also known as KazCosmos that are in line with the different SCASS research laboratories especially the "CubeSat laboratory," the future "Ballon and Rockets Propulsion Laboratory" and the "GIS and RS Center."