Sep. 22, 2018 Muharram 12, 1440 AH Volume 8, Issue 38

Astronomy & Physics Weekly News

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Top News

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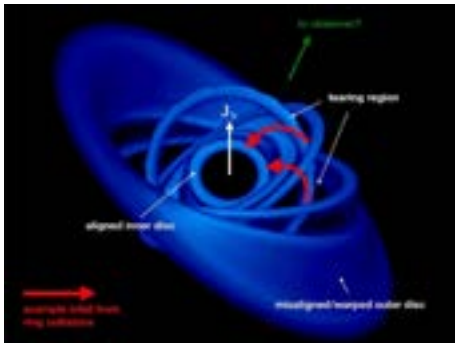
First detection of matter falling into a black hole at 30 percent of the speed of light



Characteristic disc structure from the simulation of a misaligned disc around a spinning black hole. Credit: K. Pounds et al. / University of Leicester

A UK team of astronomers report the first detection of matter falling into a black hole at 30 percent of the speed of light, located in the centre of the billion-light year distant galaxy PG211+143. The team, led by Professor Ken Pounds of the University of Leicester, used data from the European Space Agency's X-ray observatory XMM-Newton to observe the black hole. Their results appear in a new paper in Monthly Notices of the Royal Astronomical Society.

Black holes are objects with such strong gravitational fields that not even light travels quickly enough to escape their grasp, hence the description "black." They are hugely important in astronomy because they offer the most efficient way of extractingenergy from matter. As a direct result, gas in-fall – accretion – onto black holes mustbepowering the most energetic phenomena in the Universe.

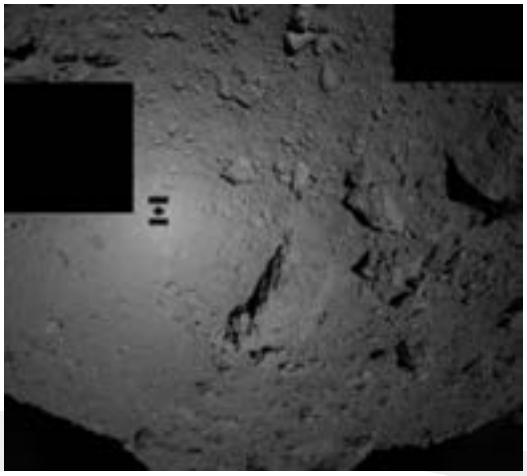
The centre of almost every galaxy – like our own Milky Way – contains a so-called supermassive black hole, with masses of millions to billions of times the mass of our Sun. With sufficient matter falling into the hole, these can become extremely luminous, and are seen as a quasar or active galactic nucleus (AGN).

However black holes are so compact that gas is almost always rotating too much to fall in directly. Instead it orbits the hole, approaching gradually through an accretion disc—a sequence of circular orbits of decreasing size. As gas spirals inwards, it moves faster and faster and becomes hot and luminous, turning gravitational energy into the radiation that astronomers observe.

The orbit of the gas around the black hole is often assumed to be aligned with the rotation of the black hole, but there is no compelling reason for this to be the case. In fact, the reason we have summer and winter is that the Earth's daily rotation does not line up with its yearly orbit around the Sun.

Until now it has been unclear how misaligned rotation might affect the in-fall of gas. This is particularly relevant to the feeding of supermassive black holes ...Read More...

Japanese Probe Drops Tiny Hopping Robots Toward Big Asteroid Ryugu



Japan's Hayabusa2 spacecraft snapped this photo at about midnight EDT on Sept. 21, 2018, around the time it deployed the two tiny MINERVA-II1 hoppers toward the surface of the asteroid Ryugu. Hayabusa2's shadow is clearly visible. Credit: JAXA

Japan's Hayabusa2 probe, which has been circling the 3,000-foot-wide (900 meters) asteroid Ryugu since late June, deployed two little "rovers" called MINERVA-II1A and MINERVA-II1B at 12:06 a.m. EDT (0406 GMT) today (Sept. 21). The event occurred when the mother ship was about 180 feet (55 meters) above Ryugu's pockmarked, boulder-strewn surface, mission team members said.

"The separation of MINERVA-II1 has been confirmed! The state of the spacecraft is normal," JAXA officials announced via Twitter just after the rovers deployed. That confirmation came after an apparently tense descent for Hayabusa2 flight controllers. "In the control room, you can hear the sound of deep breaths around the room," JAXA officials wrote just before the rovers were released.

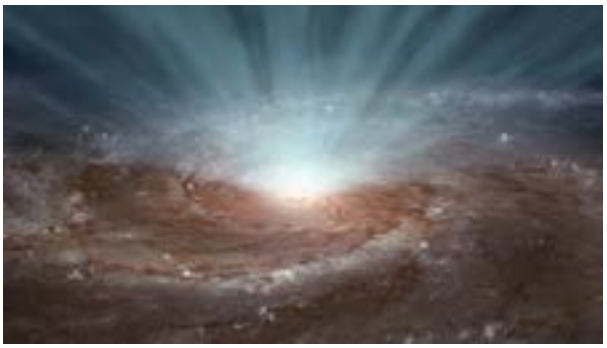
JAXA officials confirmed a clear signal from the MINERVA-II1 rovers after they were deployed, but did lose contact due to asteroid Ryugu's rotation before they could confirm any images from the landing itself.

"This is probably due to the rotation to Ryugu, and MINERVA-II1 is now on the far side of the asteroid," JAXA officials said. "We are currently working to confirm if there are images capturing the MINERVA-II1 landing."

If everything goes according to plan, the 2.4-lb. (1.1 kilograms) robots will soon join a very select club. To date, the only craft to pull off a soft touchdown on an asteroid are NASA's Near Earth Asteroid Rendezvous-Shoemaker spacecraft, which landed on Eros in 2001, and the original Hayabusa probe, which stayed for a brief spell on the surface of Itokawa in 2005. (Only one mission has ever executed a soft landing on a comet: In November 2014, the European Space Agency's Rosetta orbiter dropped a lander called Philae onto 67P/Churyumov-Gerasimenko.)

MINERVA-II1A and MINERVA-II1B are 7 inches wide by 2.8 inches tall (18 by 7 centimeters) and ...Read More...

Thousands of black holes form disks in the centers of galaxies



In this artistic visualization, a supermassive black hole at a galaxy's center shoots out radiation and high-speed winds. According to a new study, supermassive black holes at a galaxy's center are surrounded by a disk of black holes and massive stars. NASA/JPL-Caltech

The region around a galaxy's supermassive black hole may harbor thousands of stellar-sized black holes, orbiting in a disk.

At the center of most galaxies lie supermassive black holes. Their exceptional gravity pulls in thousands of stars and stellar mass black holes, or black holes formed when a massive star collapses due to gravity.

By simulating how objects interact near the supermassive black holes in the center of galaxies, astrophysicists from Eötvös University in Hungary have shown, in a new study, that these black holes form a thick disk around a galaxy's supermassive black hole.

"Previously it was thought that the orbits of both light and massive stellar objects are distributed [uniformly] around the supermassive black hole," Ákos Szölgyén, a researcher at Eötvös University who led the study, said in a statement, "we now understand that massive stars and black holes typically segregate into a disk."

Swarm of Black Holes

In their simulation, Szölgyén and his Ph.D. advisor, Bence Kocsis, incorporated something called vector resonant relaxation. It's an effect that gravity has on objects orbiting a supermassive black hole. This effect grows over millions of years, making the orbital planes of these objects turn.

Kocsis compared the effect and the behavior of the objects to the movement of bees, "Unlike a swarm of bees around a beehive, stars fly around in the galactic center in a more ordered way: along precessing elliptical trajectories, each confined to a plane, respectively," he said in the statement. Kocsis continued, describing how the objects shift their orbits slowly over millions of years.

This effect helped the astronomers see that while black holes orbit in a disk, less massive objects like stars form a more spherical distribution ...Read More...

Pigeon poop and strange static: How we proved the Big Bang

Our universe was born in the Big Bang. But confirmation of this incredible theory came as a surprise to its discoverers. Astronomy: Roen Kelly

Sometimes scientific discoveries are made in world-class laboratories, when brilliant scientists come together to prove a wonderful idea true with fresh experiments. And sometimes, the secrets of the universe are hidden under a pile of pigeon poop.

And so it happened that the first observation of the crackle of nascent energy left over from the Big Bang was not some long-sought holy grail of science. Instead, it was an annoying bit of static mistaken for bird droppings. Such is the lofty origin of the Cosmic Microwave Background energy, the Big Bang's still-reverberating echo.

In the middle of the 20th century, two theories competed to explain the creation of the universe. In one corner, advocates of the Steady State Theory argued that the universe was eternal, looking the same at all times and in all places, as long as you zoomed out far enough.

But the stronger case was for the Big Bang, which at the time specified a finite universe, expanding from a single point in space. Much of the support for the theory came from Edwin Hubble, who had already observed that the universe was expanding. His observations fit the Big Bang model well, painting the picture of a balloon expanded from nothing and still inflating. But hard evidence for the Big Bang remained lacking.

Then, in 1964, a trio of researchers at Princeton – Robert Dicke, Jim Peebles and David Wilkinson – hypothesized that if the Big Bang theory was correct, it should have produced an amazing burst of radiation still be visible today. After traveling for 13 billion plus years, it would be red-shifted to very long wavelengths, probably appearing as radio waves. They busied themselves collecting instrumentation and an observing plan to capture this tireless signal. They also doubtlessly thought about what a coup it would be to prove the origin of the universe – big enough to win them fame and very probably the small fortune due a Nobel Prize winner. ...Read More...

Trojan asteroids reveal evidence of early skirmish between gas giants

Jupiter's Trojan asteroids are shown in this artist's concept as they orbit in harmony with the gas giant – one group ahead of Jupiter, and one group behind. NASA/JPL-Caltech

The existence of an odd pair of asteroids points to an early period of chaos in the young solar system. One that ended 600 million years earlier than previously thought.

Much like the famed Trojan horse, Jupiter's Trojan asteroids are hiding a secret.

According to a new study published in the journal Nature Astronomy, the existence of a bound pair of "Trojan asteroids" trapped in a stable orbit near Jupiter suggests the early solar system was shaken up by a battle between the giant planets much earlier than astronomers previously thought.

"The Trojans were likely captured during a dramatic period of dynamic instability when a skirmish between the solar system's giant planets – Jupiter, Saturn, Uranus, and Neptune – occurred," said lead author David Nesvorny of the Southwest Research Institute (SwRI) in a press release.

According to the study, within just 100 million years of the solar system's formation, the giant planets had already jostled for position. During the fray, Jupiter jumped inward a hair, while Uranus and Neptune were pushed away from the Sun toward an ancient collection of small bodies located on the outskirts of the solar system. These small bodies are known as Kuiper Belt objects, and can include comets, asteroids, and everything between.

With the new addition of Uranus and Neptune, the still-forming outer solar system got thrown out of whack. "Many small bodies of this primordial Kuiper Belt were scattered inwards," said Nesvorny. "And a few of those became trapped as Trojan asteroids."

The leading camp of Trojan asteroids, known as the "Greek Camp," is located at Jupiter's L4 Lagrangian point (think "L4 for forward"), which is a special point in a planet's orbit where competing gravitational forces from the Sun and the planet perfectly balance each other. Among the trailing population of Trojans – located at L5 and ..Read More...

TESS planet-hunter achieves 1st light

The Transiting Exoplanet Survey Satellite (TESS) took this snapshot of the Large Magellanic Cloud (r) and bright star R Doradus (l) with a single detector of one of its cameras on August 7, 2018. The frame is part of a swath of the southern sky TESS captured in its "1st light" science image as part of its initial round of data collection. View the full 1st light image below. Image via NASA/MIT/TESS.

Launched last April, TESS is successor to the Kepler mission, which discovered a substantial fraction of all known exoplanets orbiting distant suns. This 1st-light image from TESS is cause for celebration. Ahoy! New worlds ahead!

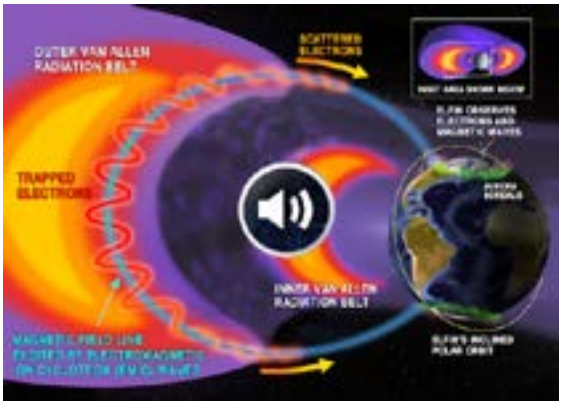
For any new telescope or astronomical camera, first light is a cause for celebration. On September 17, 2018, NASA released the official first-light images from its newest planet-hunter, called the Transiting Exoplanet Survey Satellite, or TESS. Launched last April, TESS is successor to the highly successful Kepler mission, which discovered some 2,300 exoplanets over the course of its lifetime. The image above is a piece of TESS' first-light capture; you can see the entire image below. TESS, which orbits Earth in a highly elliptical and very stable orbit (more about that below, too), captured a slice of the southern sky for its first-light image. NASA said:

This first-light science image captures a wealth of stars and other objects, including systems previously known to have exoplanets.

TESS acquired the full image, below, using all four cameras during a 30-minute period on Tuesday, August 7, 2018. NASA explained:

The black lines in the image are gaps between the camera detectors. The images include parts of a dozen constellations, from Capricornus to Pictor, and both the Large and Small Magellanic Clouds, the galaxies nearest to our own. The small bright dot above the Small Magellanic Cloud is a globular cluster – a spherical collection of hundreds of thousands of stars – called NGC 104, also known as 47 Tucanae because of its location in the southern constellation Tucana, the Toucan. Two stars, Beta Gruis and R Doradus, are so bright they saturate an entire column of pixels on the detectors of TESS's second and fourth cameras, creating long spikes of light. ..Read More...

Student-built satellites track killer electrons



Click on the picture to hear these killer electrons.

Last Saturday, a Delta II rocket blasted off at dawn from Vandenberg AFB in California. Soon thereafter NASA reported the successful deployment of the ICESat-2 satellite, designed to make 3D laser images of Earth's surface. Here's what most news stations did not report: A pair of tiny satellites were tucked inside the rocket, and they were successfully deployed as well. Built by students at UCLA, ELFIN-A and ELFIN-B are now orbiting Earth, monitoring the ebb and flow of "killer electrons" around our planet.

"We've just received our first downlink of data from ELFIN-A," reports Ryan Caron, Development Engineer at UCLA's Department of Earth, Planetary, and Space Sciences.

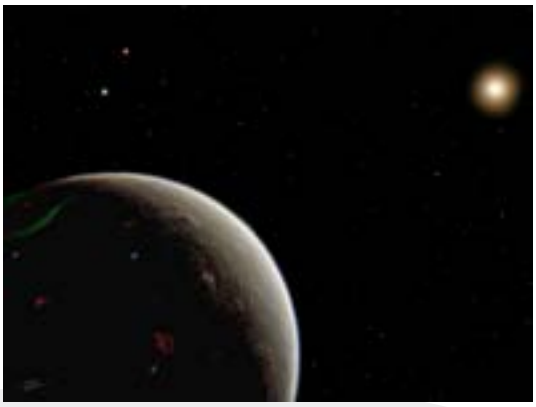
That may sound like ordinary static, but the signal is full of meaning. As mission controllers turn on ELFIN's science instruments, the static-y waveforms will carry unique information about particles raining down on Earth from the inner Van Allen Radiation Belt.

"Sensors onboard our two cubesats detect electrons in the energy range 50 keV to 4.5 MeV," says Caron. "These are the so-called 'killer electrons,' which can damage spacecraft and cause electrical disruptions on the ground. They also give rise to the majestic aurora borealis."

"ELFIN is doing something new," says Vassilis Angelopoulos, a UCLA space physicist who got his doctorate at UCLA and serves as ELFIN's principal investigator. "No previous mission was able to measure the angle and energy of killer electrons as they rain down on Earth's atmosphere. ELFIN will help us investigate how disturbances called 'Electromagnetic Ion Cyclotron waves' knock these electrons out of the Van Allen Belts and scatter them down toward Earth."

ELFIN-A and ELFIN-B are cubesats, each weighing about eight pounds and roughly the size of a loaf of bread. They are remarkable not only for their cutting edge sensors, but also for their origin. The two satellites were almost completely designed and built by undergraduate students at UCLA. Working for more than 5 years, a succession of 250 students created the two Electron Losses ..Read More...

Astronomers just discovered Spock's home planet, Vulcan



Artist's concept of a "super-Earth" orbiting the star HD 26965. Don Davis / University of Florida

Newfound exoplanet orbits a star identified with the famed science officer from "Star Trek."

No one is saying that any pointy-eared aliens live there, but astronomers have discovered an exoplanet orbiting 40 Eridani A, a star known to "Star Trek" fans as the host star of Spock's home planet, Vulcan.

The newfound exoplanet is 16 light-years from Earth in the Constellation Eridanus. It orbits its host star — a sunlike star with the formal designation of HD 26965 — just inside the habitable zone, where water could exist in liquid form and where life as we know it could be possible.

"It came as a total surprise to us," Jian Ge, a professor of astronomy at the University of Florida and co-author of a new paper about the discovery, told NBC News MACH in an email. "We did not have an intention to look for Vulcan orbiting HD 26965."

The exoplanet is about twice the size of Earth and is considered the closest "super-Earth" orbiting a sunlike star. For now, it's known as HD 26965b, in keeping with naming guidelines set forth by the International Astronomical Union. But Ge said he planned to contact the Union to ask that the exoplanet be named Vulcan.

It might be fun to name a real-life planet after a fictional world, but is it — as Spock might ask — logical? "Absolutely yes!" Sara Seager, an astrophysicist and planetary scientist at MIT, said in an email. "'Star Trek' (and other science fiction) paved the way for people to get excited about real exoplanets."

Ge said the exoplanet is likely to have an atmosphere and to be tidally locked to its host star. That means one side perpetually faces the star while the other side points away. If this is the case, the side facing the host star would likely be very hot — "probably too hot to be habitable," Seager said. But Ge said the surface of the dark, cooler side could be habitable, adding, "On the other hand, life can also survive underground. Like what Star Trek ...Read More...

Simulation shows nuclear pasta 10 billion times harder to break than steel

Neutron star. Credit: NASA

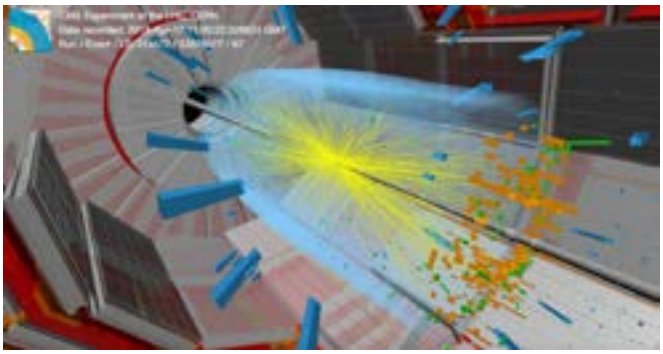
A trio of researchers affiliated with several institutions in the U.S. and Canada has found evidence that suggests nuclear material beneath the surface of neutron stars may be the strongest material in the universe. In their paper published in the journal Physical Review Letters, M. E. Caplan, A. S. Schneider, and C. J. Horowitz describe their neutron star simulation and what it showed.

Prior research has shown that when stars reach a certain age, they explode and collapse into a mass of neutrons; hence the name neutron star. And because they lose their neutrinos, neutron stars become extremely densely packed. Prior research has also found evidence that suggests the surface of such stars is so dense that the material would be incredibly strong. In this new effort, the researchers report evidence suggesting that the material just below the surface is even stronger.

Astrophysicists have theorized that as a neutron star settles into its new configuration, densely packed neutrons are pushed and pulled in different ways, resulting in formation of various shapes below the surface. Many of the theorized shapes take on the names of pasta, because of the similarities. Some have been named gnocchi, for example, others spaghetti or lasagna. Caplan, Schneider and Horowitz wondered about the density of these formations—would they be denser and thus stronger even than material on the crust? To find out, they created some computer simulations.

The simulations showed that the nuclear pasta was, indeed, stronger than the material on the crust. The simulations also showed that such formations are likely the strongest material in the entire universe. They showed, for example, that they are 10 billion times stronger than steel. But that is not the end of the story. The simulations also backed up another theory that suggests neutron stars could be generating ripples in the fabric of spacetime due to their strong gravitational pull. The theorized rippling effect is due to the irregular formation of the nuclear pasta. This means that neutron stars could be emitting gravitational waves that could someday be observed by super-sensitive equipment here on Earth. ...Read More...

The hunt for leptoquarks is on



A collision event recorded by CMS at the start of the data-taking run of 2018. CMS sifts through such collisions up to 40 million times per second looking for signs of hypothetical particles like leptoquarks. Credit: Thomas McCauley/Tai Sakuma/CMS/CERN

Matter is made of elementary particles, and the Standard Model of particle physics states that these particles occur in two families: leptons (such as electrons and neutrinos) and quarks (which make up protons and neutrons). Under the Standard Model, these two families are totally distinct, with different electric charges and quantum numbers, but have the same number of generations (see image below).

However, some theories that go beyond the Standard Model, including certain "grand unified theories," predict that leptons and quarks merge at high energies to become leptoquarks. These leptoquarks are proposed in theories attempting to unify the strong, weak and electromagnetic forces.

Such "unifications" are not unusual in physics. Electricity and magnetism were famously unified in the 19th century into a single force known as electromagnetism, via Maxwell's elegant mathematical formulae. In the case of leptoquarks, these hybrid particles are thought to have the properties of both leptons and quarks, as well as the same number of generations. This would not only allow them to "split" into the two types of particles but would also allow leptons to change into quarks and vice versa. Indeed, anomalies detected by the LHCb experiment as well as by Belle and Babar in measurements of the properties of B mesons could be also explained by the existence of these hypothesised particles.

If leptoquarks exist, they would be very heavy and quickly transform, or "decay," into more stable leptons or quarks. Previous experiments at the SPS and LEP at CERN, HERA at DESY and the Tevatron at Fermilab have looked at decays to first- and second-generation particles. Searches for third-generation leptoquarks (LQ3) were first performed at the Tevatron, and are now being explored at the Large Hadron Collider (LHC).

Since leptoquarks would transform into a lepton and a quark, LHC searchers look for telltale signatures in the distributions of these "decay products." In the case of third-generation leptoquarks, the lepton could be a tau or a tau neutrino while the quark could be a top ...Read More...

After Pluto, New Horizons Probe Draws Near to Its Next Target: Ultima Thule

An artist's illustration of NASA's New Horizons spacecraft flying by the small object 2014 MU69, also known as Ultima Thule, on Jan. 1, 2019. Recent observations suggest that Ultima Thule may actually be two co-orbiting bodies. Credit: Steve Gribben/JHUAPL/SwRI

Don't sleep on NASA's New Horizons spacecraft.

The history-making probe, which famously zoomed past Pluto in July 2015, is closing in on its next flyby target, a frigid chunk of ice and rock about 4 billion miles (6.4 billion kilometers) from Earth dubbed Ultima Thule.

New Horizons is now just 80 million miles (130 million km) from Ultima Thule, mission members said Wednesday (Sept. 19). That's less than the distance from Earth to the sun (about 93 million miles, or 150 million km).

The spacecraft has already begun photographing Ultima Thule for navigation purposes and remains on track to cruise within a mere 2,200 miles (3,540 km) of Ultima in the wee hours of Jan. 1, 2019. The data New Horizons gathers during that encounter hshould shed considerable light on the solar system's early days, said mission principal investigator Alan Stern.

"Ultima Thule was formed at the origin of our solar system, and it's been in this deep freeze ever since," Stern, of the Southwest Research Institute in Boulder, Colorado, said during a webcast event Wednesday.

"Going to it is like making an archaeological dig into the history of our solar system," he added. "We've never been to anything like this."

Ultima Thule was discovered in 2014 (and is formally known as 2014 MU69). The object's surface is reddish and dark — about as reflective as potting soil, Stern said. And Ultima Thule appears to be about 23 miles (37 km) wide.

But the object remains shrouded in mystery. Its composition and shape are unknown, for example, as is its precise orbit. Researchers don't know for sure if Ultima Thule has any moons or debris rings or even if it's a single object. Indeed, Ultima may well consist of a pair of close-orbiting bodies, New Horizons team members ..Read More...

Astrophysicists measure precise rotation pattern of sun-like stars for the first time

Sun-like stars rotate differentially, with the equator rotating faster than the higher latitudes. The blue arrows in the figure represent rotation speed. Differential rotation is thought to be an essential ingredient for generating magnetic activity and starspots. Credit: MPI for Solar System Research/MarkGarlick.com

Sun-like stars rotate up to two and a half times faster at the equator than at higher latitudes, a finding by researchers at NYU Abu Dhabi that challenges current science on how stars rotate.

Until now, little was known about the precise rotational patterns of Sun-like stars, only that the equator spins faster than at higher latitudes, similar to the Sun.

Scientists at the NYU Abu Dhabi Center for Space Science used observations from NASA's Kepler mission and asteroseismology—the study of sound waves traveling inside stars—to determine with precision how Sun-like stars rotate, which no other scientific method has been able to achieve.

Their study found that Sun-like stars, characterized as being like the Sun in mass and age, do indeed rotate in a similar manner as the Sun in that their equatorial regions rotate more rapidly than at mid- to high latitudes. But there's a key difference.

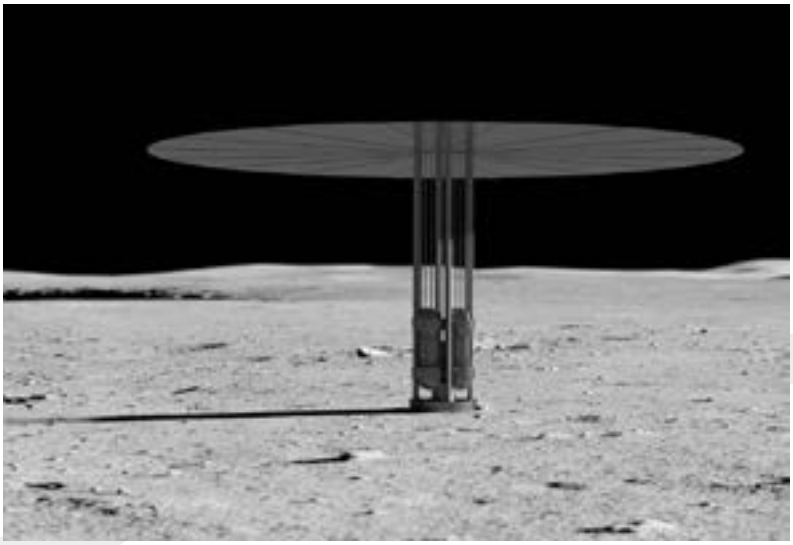
The equator of the Sun rotates about 10 percent faster than its mid latitudes, while equators of Sun-like stars spin up to two and a half times faster than their mid latitudes.

"This is very unexpected, and challenges current numerical simulations, which suggest that stars like these should not be able to sustain differential rotation of this magnitude," said Othman Benomar, research associate at the NYU Abu Dhabi Center for Space Science and lead author of the study published in Science.

"Understanding differential rotation—how fast one part of a star spins compared to the rest—is not only important for a complete understanding of how a star works, it will help us gain deeper insights about their magnetic fields," explained Katepalli Sreenivasan, principal investigator of the NYU Abu Dhabi Center ...Read More...

Special Read:

NASA targets next-gen nuclear reactors for spacecraft, space colonies



The Kilopower small nuclear reactor could be tested on the moon in the coming years. NASA

A new nuclear fission project, called Kilopower, could fuel the future of spaceflight, manifesting a dream that's been around since the beginning of the Space Age.

The future of space exploration may rest in the hands of a group of Los Alamos National Laboratory researchers. They've built the first of a new generation of small nuclear reactors intended to power missions to deep space and even future astronaut bases on the moon and Mars.

Called Kilopower, their project aims to achieve a longstanding dream of the space community: a safe, effective, and powerful nuclear power reactor that can power spacecraft for years.

"I don't think we can expand into deep space without nuclear power, which is what's made me so passionate about developing the technology," says David Poston, who leads the Kilopower team.

NASA already uses small nuclear devices called radiothermal gradients (RTG) on-board deep space missions and the Mars Curiosity rover, but these typically run low power instruments. For example, NASA's New Horizons probe that flew past Pluto in 2015 and is heading to another Kuiper Belt Object later this year, runs on just 228 watts of power. The Curiosity rover uses around 110 watts. And the long-running Cassini probe that plummeted into Saturn last year, used three RTGs to run 885 watts at the beginning of its mission and around 660 by the end.

Nuclear space colony

Kilopower, on the other hand, will be able to achieve kilowatts of power — that's enough to run more advanced space-craft or entire settlements.

The device would also run on uranium isotopes, which are abundant, rather than Plutonium-238, the nuclear fuel used in weapons that needs to be cultivated carefully in a lab. And beyond simply bigger space missions, the tech could also enable spacecraft with longer lifespans and a greater array of instruments. And those same qualities make Kilopower ideal for the upcoming moon bases proposed by the Trump administration, the team believes.

"NASA's been looking for a technology demonstration mission," says Patrick McClure, co-lead of the Kilopower team. "Currently, because of the administration's interest in the moon, it looks like the test would be landing this on the moon as part of a mission."

One drawback of the reactor, like any nuclear reactor, is that it would need a little time to power up to full capacity, so many missions might need a complimentary power source at the beginning, like solar. But once the reactors are online, the team says they can run near full capacity for at least 15 years. And while there's a little ...Read More...

All you need to know: September equinox

The September equinox arrives on September 23, 2018, at 1:54 UTC. Although the equinox happens at the same moment worldwide, your clock times will depend on your time zone. For the UAE, it will be Sep. 23 at 05:54.

At the equinox, days and nights are approximately equal in length. For us in the Northern Hemisphere, the sun is rising later now, and nightfall comes sooner. We're enjoying the cooler days of autumn (more or less). Meanwhile, south of the equator, spring is about to begin.

What is an equinox?

The earliest humans spent more time outside than we do. They used the sky as both a clock and a calendar. They could easily see that the sun's path across the sky, the length of daylight, and the location of the sunrise and sunset all shift in a regular way throughout the year.

Our ancestors built the first observatories to track the sun's progress. One example is at Machu Picchu in Peru, where the Intihuatana stone, has been shown to be a precise indicator of the date of the two equinoxes and other significant celestial periods. The word Intihuatana, by the way, literally means for tying the sun.

Today, we know each equinox and solstice is an astronomical event, caused by Earth's tilt on its axis and ceaseless orbit around the sun.

Because Earth doesn't orbit upright, but is instead tilted on its axis by 23 1/2 degrees, Earth's Northern and Southern Hemispheres trade places throughout the year in receiving the sun's light and warmth most directly.

We have an equinox twice a year – spring and fall – when the tilt of the Earth's axis and Earth's orbit around the sun combine in such a way that the axis is inclined neither away from nor toward the sun.

Earth's two hemispheres are receiving the sun's rays about equally around equinox-time. The sun is overhead at noon as seen from the equator. Night and day are approximately equal in length.

The name equinox comes from the Latin aequus (equal) and nox (night).

Of course, Earth never stops moving around the sun. So these days of approximately equal sunlight and night will change quickly.

Does the sun rise due east and set due west at the equinox?

Generally speaking, yes, it does. And that's true no matter where you live on Earth, because we all see the same sky.

Everywhere on Earth, except at the North and South Poles, you have a due east and due west point on your horizon. That point marks the intersection of your horizon with the celestial equator – the imaginary line above the true equator of the Earth.

At the equinoxes, the sun appears overhead at noon as seen from Earth's equator. That's why the sun rises due east and sets due west for all of us. The sun is on the celestial equator, and the celestial equator intersects all of our horizons at points due east and due west.

This fact makes the day of an equinox a good day for finding due east and due west from your yard or other favorite site for watching the sky. Just go outside around sunset or sunrise and notice the location of the sun on the horizon with respect to familiar landmarks.

If you do this, you'll be able to use those landmarks to find those cardinal directions in the weeks and months ahead, long after Earth has moved on in its orbit around the sun, carrying the sunrise and sunset points southward. ...Read More....

SCASS Launches its Program of Lectures for 2018/2019

The Sharjah Center for Astronomy and Space Sciences has started its annual program of lectures for 2018/2019. Two types of lectures are organized, the Wednesday and Saturday's lectures. Every third Wednesday of the month (2-3 pm), a lecture is given to all SCASS staff on different astronomical subjects. These lectures are intended to enrich the knowledge of all the employees. Usually, a SCASS staff member will volunteer to give such a lecture. Students and faculty members as well the general public are also invited to attend. The second type of lecture is organized the first Saturday of every month (6- 7 pm). It is a general lecture open to the public/students/faculty members. Usually, SCASS invites speakers from outside the UAE as well as from the local scientific community. In the previous years, SCASS was able to invite Prof. John Ellis (London College), Prof. Fernando Quevedo (ICTP Director), and Prof. Piero Benvenuti (IAU General Secretary) among others.

For more information on these lectures, please check SCASS website (scass.ae). If you would like to participate as a lecturer, please contact Dr. Ilias Fernini (ifernini@sharjah.ac.ae) for further information.

Wednesday's lecture (The Parker Solar Probe) on Sep. 19 given by Dr. Ilias Fernini.

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

Sep 23	Su	05:54	Autumnal Equinox
Sep 25	Tu	06:53	Full Moon
Sep 30	Su	11:06	Moon-Aldebaran: 1.4° S