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Astronomy & Physics Weekly News

Dept. of Applied Physics & Astronomy - University of Sharjah
Compiled by **Dr. Ilias Fernini**

مركز الشارقة لعلوم الفضاء والفلك
Sharjah Center for Astronomy & Space Sciences

Top News

Special SCASS Summer Students Research Seminar Oct. 28, 2018

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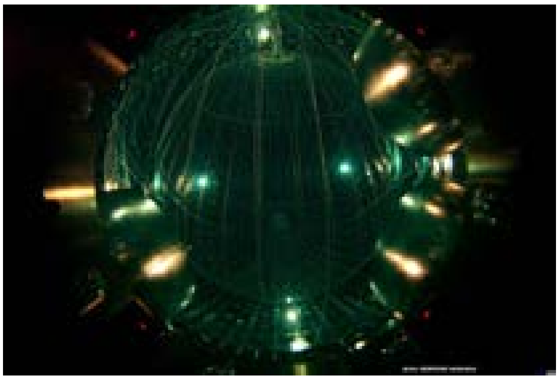
A first 'snapshot' of the complete spectrum of neutrinos emitted by the sun



The Borexino instrument located deep beneath Italy's Appenine Mountains detects neutrinos as they interact with the electrons of an ultra-pure organic liquid scintillator at the center of a large sphere surrounded by 1,000 tons of water. Credit: Borexino

About 99 percent of the Sun's energy emitted as neutrinos is produced through nuclear reaction sequences initiated by proton-proton (pp) fusion in which hydrogen is converted into helium, say scientists including physicist Andrea Pocar at the University of Massachusetts Amherst. Today they report new results from Borexino, one of the most sensitive neutrino detectors on the planet, located deep beneath Italy's Apennine Mountains.

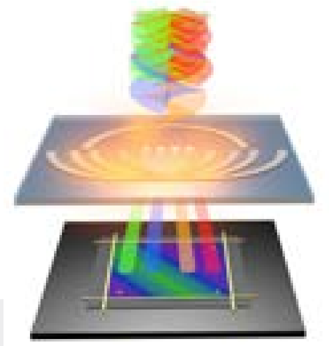
"Neutrinos emitted by this chain represent a unique tool for solar and neutrino physics," they explain. Their new paper in Nature reports on "the first complete study of all the components of the pp-chain performed by Borexino." These components include not only the pp neutrinos, but others called Beryllium-7 (7Be), pep and Boron-8 (8B) neutrinos. The pp fusion reaction of two protons to produce deuteron, nuclei of deuterium, is the first step of a reaction sequence responsible for about 99 percent of the Sun's energy output, Pocar says.

He adds, "What's new today is incremental, it's not a leap, but it is the crowning of more than 10 years of data-taking with the experiment to show the full energy spectrum of the Sun at once. Our results reduce uncertainty, which is perhaps not flashy but it's type of advance that is often not recognized enough in science. The value is that measurements get more precise because with more data and thanks to the work of dedicated young physicists, we have a better understanding of the experimental apparatus."

"Borexino offers the best measurement ever made for the pp, 7Be and pep neutrinos," he adds. "Other experiments measure the 8B neutrinos more precisely, but our measurement, with a lower threshold, is consistent with them."

Further, "Once you have more precise data, you can feed it back into the model of how the Sun is behaving, then the model can be refined even more. It all leads to understanding the Sun better. Neutrinos have told us how the Sun is burning and, in turn, the Sun has provided us with a unique source to study how neutrinos behave. ...Read More...

Groundbreaking new technology could allow 100-times-faster internet by harnessing twisted light beams



The miniature OAM nano-electronic detector decodes twisted light. Credit: RMIT Uinversity

Broadband fiber-optics carry information on pulses of light, at the speed of light, through optical fibers. But the way the light is encoded at one end and processed at the other affects data speeds.

This world-first nanophotonic device, just unveiled in Nature Communications, encodes more data and processes it much faster than conventional fiber optics by using a special form of 'twisted' light.

Dr. Haoran Ren from RMIT's School of Science, who was co-lead author of the paper, said the tiny nanophotonic device they have built for reading twisted light is the missing key required to unlock super-fast, ultra-broadband communications.

"Present-day optical communications are heading towards a 'capacity crunch' as they fail to keep up with the ever-increasing demands of Big Data," Ren said.

"What we've managed to do is accurately transmit data via light at its highest capacity in a way that will allow us to massively increase our bandwidth."

Current state-of-the-art fiber-optic communications, like those used in Australia's National Broadband Network (NBN), use only a fraction of light's actual capacity by carrying data on the colour spectrum.

New broadband technologies under development use the oscillation, or shape, of light waves to encode data, increasing bandwidth by also making use of the light we cannot see.

This latest technology, at the cutting edge of optical communications, carries data on light waves that have been twisted into a spiral to increase their capacity further still. This is known as light in a state of orbital angular momentum, or OAM. In 2016 the same group from RMIT's Laboratory of Artificial-Intelligence Nanophotonics (LAIN) published a disruptive research paper ...Read More...

Mars Express keeps an eye on curious cloud

Since 13 September 2018, the Visual Monitoring Camera (VMC) on board ESA's Mars Express has been observing the evolution of a curious cloud formation that appears regularly in the vicinity of the 20 km-high Arsia Mons volcano, close to the planet's equator. The cloud can be seen in this VMC image taken 10 October as the white, elongated feature extending 1500 km westward of the volcano.

Since 13 September, ESA's Mars Express has been observing the evolution of an elongated cloud formation hovering in the vicinity of the 20 km-high Arsia Mons volcano, close to the planet's equator.

In spite of its location, this atmospheric feature is not linked to volcanic activity but is rather a water ice cloud driven by the influence of the volcano's leeward slope on the air flow - something that scientists call an orographic or lee cloud - and a regular phenomenon in this region.

The cloud can be seen in this view taken on 10 October by the Visual Monitoring Camera (VMC) on Mars Express - which has imaged it hundreds of times over the past few weeks - as the white, elongated feature extending 1500 km westward of Arsia Mons. As a comparison, the cone-shaped volcano has a diameter of about 250 km; a view of the region with labels is provided here.

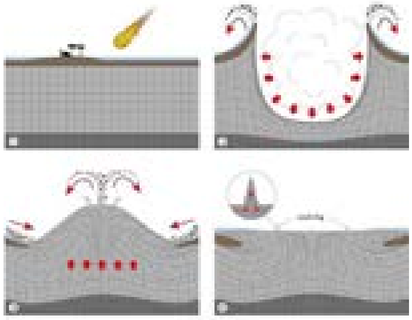
Mars just experienced its northern hemisphere winter solstice on 16 October. In the months leading up to the solstice, most cloud activity disappears over big volcanoes like Arsia Mons; its summit is covered with clouds throughout the rest of the martian year.

However, a seasonally recurrent water ice cloud, like the one shown in this image, is known to form along the southwest flank of this volcano - it was previously observed by Mars Express and other missions in 2009, 2012 and 2015.

The cloud's appearance varies throughout the martian day, growing in length during local morning downwind of the volcano, almost parallel to the equator, and reaching such an impressive size that could make it visible even to telescopes on Earth.

The formation of water ice clouds is sensitive to the amount of dust present in the atmosphere. These images, obtained after the major dust storm that engulfed the entire planet in June and July, will provide important information on the effect of dust on the cloud ...Read More...

The formation of large meteorite craters is unraveled



66 million years ago a meteorite of a diameter 14 km wide struck the Earth with an enormous speed of 20.000 kilometers per hour drilling itself 20 km into the Earth's crust (1). Due to the impact temperatures of 10.000C emerged temporarily, melting and evaporating the meteorite and parts of the Earth's crust. A shock wave arose molding a crater 30 km deep and 100 km wide (2). As the crater collapsed, the mass of rock behaved like a viscous mass, shooting up to form a 20 km high mountain (3). The liquid mass of the rocks of the collapsed mountain moved beyond the crater margins and solidified. This led both to the summit ring and to the flattening and widening of the crater (4).

About 66 million years ago, a meteorite hit the Earth of the Yucatan Peninsula in what is now Mexico. This event triggered a mass extinction that eradicated approximately 75 percent of all species and ended the era of dinosaurs.

Like Prof. Dr. Ulrich Riller of the Institute of Geology of the University of Hamburg and co-workers report in "Nature", the hitherto mysterious formation of the crater and its mountaneous peak ring. The peak rises in the middle of the crater above the otherwise flat crater floor. In the future, these findings can help to decipher the formation of the largest craters in our solar system.

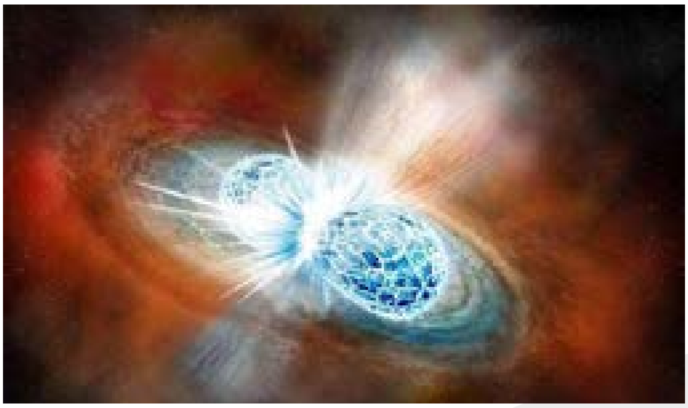
Much has been written and discussed about the gigantic crater with a diameter of about 200 kilometers, the center of which lies near the Mexican port city of Chicxulub. How the giant crater took its form has been a mystery until today.

In particular, the formation of a circular series of hills could not be explained in detail. This so-called peak ring rises in the crater several hundreds of meters above the shallow ground and can therefore be found in other large craters in our solar system.

The structural geologist Prof. Dr. Ulrich Riller and an international team of scientists have now succeeded in describing for the first time the extreme mechanical behavior of rocks in the event of a large meteorite impact.

The researchers found the evidence in the Chicxulub Crater as part of Expedition 364 of the International Ocean Discovery Program (IODP) and the International Continental Scientific Drilling Program (ICDP). Computer simulations have shown that craters this size form within a few minutes. This means that solid rock behaves like a fluid for a short time and solidifies very quickly ...Read More...

In five -10 years, gravitational waves could accurately measure universe's expansion



UChicago scientists estimate, based on LIGO's quick first detection of a first neutron star collision, that they could have an extremely precise measurement of the universe's rate of expansion within five to ten years.

Twenty years ago, scientists were shocked to realize that our universe is not only expanding, but that it's expanding fasterover time.

Pinning down the exact rate of expansion, called the Hubble constant after famed astronomer and UChicago alumnus Edwin Hubble, has been surprisingly difficult. Since then scientists have used two methods to calculate the value, and they spit out distressingly different results. But last year's surprising capture of gravitational waves radiating from a neutron star collision offered a third way to calculate the Hubble constant.

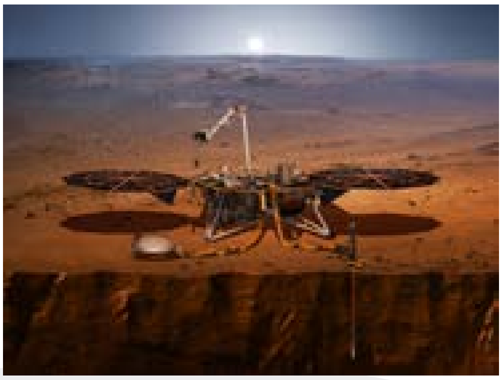
That was only a single data point from one collision, but in a new paper published Oct. 17 in Nature, three University of Chicago scientists estimate that given how quickly researchers saw the first neutron star collision, they could have a very accurate measurement of the Hubble constant within five to ten years.

"The Hubble constant tells you the size and the age of the universe; it's been a holy grail since the birth of cosmology. Calculating this with gravitational waves could give us an entirely new perspective on the universe," said study author Daniel Holz, a UChicago professor in physics who co-authored the first such calculation from the 2017 discovery. "The question is: When does it become game-changing for cosmology?"

In 1929, Edwin Hubble announced that based on his observations of galaxies beyond the Milky Way, they seemed to be moving away from us - and the farther away the galaxy, the faster it was receding. This is a cornerstone of the Big Bang theory, and it kicked off a nearly century-long search for the exact rate at which this is occurring.

To calculate the rate at which the universe is expanding, scientists need two numbers. One is the distance to a faraway object; the other is how fast the ...Read More...

1 Month to Mars! NASA's InSight Lander Nearing Red Planet Touchdown



Artist's illustration of NASA's InSight lander at work on the Martian surface. Credit: NASA/JPL-Caltech

One month from today, Mars will welcome a new robotic resident that seeks to probe the planet's innards.

NASA's InSight lander is scheduled to touch down just north of the Martian equator on the afternoon of Nov. 26, bringing a nearly seven-month space trek to an end. InSight launched, along with the two tiny Mars Cube One (MarCO) cubesats, atop a United Launch Alliance Atlas V rocket from California's Vandenberg Air Force Base on May 5.

InSight's entry, descent and landing sequence will be harrowing, as all Red Planet touchdown attempts are.

The solar-powered spacecraft will barrel into the Martian atmosphere at 14,100 mph (22,700 km/h), then deploy a big parachute to slow its descent. As the lander nears the surface, it will pop free of its back shell and parachute, touching down softly with the aid of 12 descent engines about 6 minutes after getting its first taste of Mars' air.

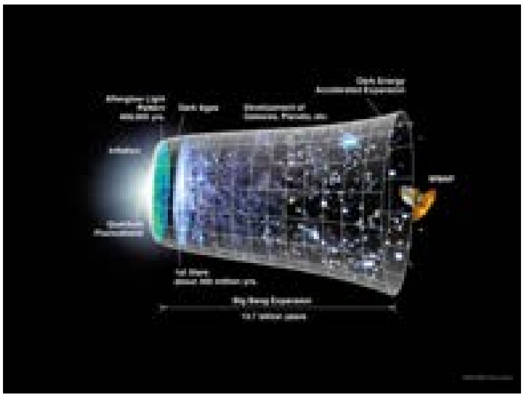
That touchdown will come on a high-elevation equatorial plain called Elysium Planitia, a mere 370 miles (600 kilometers) from Gale Crater, where NASA's car-size Curiosity rover landed in August 2012.

Elysium Planitia is "as flat and boring a spot as any on Mars," NASA officials wrote in a statement Wednesday (Oct. 24). And that's why the InSight team chose to land there – for safety's sake.

At Elysium, "there's less to crash into, fewer rocks to land on and lots of sunlight to power the spacecraft," NASA officials added. "The fact that InSight doesn't use much power and should have plenty of sunlight at Mars' equator means it can provide lots of data for scientists to study."

InSight won't be investigating surface features, so the "boring" part is no drawback. The lander totes a burrowing heat probe and a suite of superprecise seismometers; observations by both instruments should reveal a great deal about the Red Planet's internal structure ...Read More...

How Did Inflation Happen – and Why Do We Care?



This graphic shows a timeline of the universe based on the Big Bang theory and inflation models. Credit: NASA/WMAP

In 1980, physicist Alan Guth proposed a radical extension to the standard Big Bang model of the history of the universe. At the time, it was known that our cosmos is expanding – it's getting bigger and bigger single day – but the expansion rate is relatively mild. Guth hypothesized that in some of the very earliest moments of our universe (somewhere around the 10^-36 second mark), our universe underwent a period of exorbitant accelerated expansion. During this period, the universe inflated by a factor of 10^26 in a mere 10^-32 seconds – a lifetime compared to the then-age of the universe, but the tiniest sliver of a moment to our more mature eyes.

This transformative event, known as cosmic inflation, handily explains some perplexing features found in astronomical observations. These include the universe's peculiar geometric flatness at large scales, the apparent connection between far-flung corners of the universe and the absolute lack of exotic monopoles – particles with just one magnetic pole, instead of the usual two – that should have formed in abundance back in the cosmic day.

In the decades since Guth's initial, tentative proposal, the concept of inflation has remained frustratingly mysterious, but it still stands as our leading theory of what went down when our universe was young and exotic.

In our modern conception of cosmic inflation, that period of rapid, accelerated expansion is driven by a new character to join the cosmological cast: something called the inflaton. Get it? The inflaton inflates. Not the most creative name, but there you go.

In this picture, the inflaton is a quantum field that permeates all of space and time. It's the same as any of the other quantum fields out there – the electromagnetic field responsible for photons, the Dirac field responsible for electrons and so on. Quantum fields are our theory explaining the underlying structure for all of matter and radiation, and they are kind of a big deal.

So, it's not entirely ridiculous to propose a new kind of quantum field that majorly affected the ..Read More...

NASA's Juno Mission Detects Jupiter Wave Trains

Three waves can be seen in this excerpt of a JunoCam image taken on Feb. 2, 2017, during Juno's fourth flyby of Jupiter. The region imaged in this picture is part of the visibly dark band just north of Jupiter's equator known as the North Equatorial Belt. Image credit: NASA/JPL-Caltech/SwRI/MSSS/JunoCam

Massive structures of moving air that appear like waves in Jupiter's atmosphere were first detected by NASA's Voyager missions during their flybys of the gas-giant world in 1979. The JunoCam camera aboard NASA's Juno mission to Jupiter has also imaged the atmosphere.

JunoCam data has detected atmospheric wave trains, towering atmospheric structures that trail one after the other as they roam the planet, with most concentrated near Jupiter's equator.

The JunoCam imager has resolved smaller distances between individual wave crests in these trains than ever seen before. This research provides valuable information on both the dynamics of Jupiter's atmosphere and its structure in the regions underneath the waves.

"JunoCam has counted more distinct wave trains than any other spacecraft mission since Voyager," said Glenn Orton, a Juno scientist from NASA's Jet Propulsion Laboratory in Pasadena, California.

"The trains, which consist of as few as two waves and as many as several dozen, can have a distance between crests as small as about 40 miles (65 kilometers) and as large as about 760 miles (1,200 kilometers). The shadow of the wave structure in one image allowed us to estimate the height of one wave to be about 6 miles (10 kilometers) high."

Most of the waves are seen in elongated wave trains, spread out in an east-west direction, with wave crests that are perpendicular to the orientation of the train. Other fronts in similar wave trains tilt significantly with respect to the orientation of the wave train, and still other wave trains follow slanted or meandering paths.

"The waves can appear close to other Jovian atmospheric features, near vortices or along flow lines, and others exhibit no relationship with anything ...Read More...

Physicists demonstrate magnetometer that uses quantum effects and machine learning

Credit: Lion_on_helium/MIPT

Researchers from the Moscow Institute of Physics and Technology (MIPT), Aalto University in Finland, and ETH Zurich have demonstrated a prototype device that uses quantum effects and machine learning to measure magnetic fields more accurately than its classical analogues. Such measurements are needed to seek mineral deposits, discover distant astronomical objects, diagnose brain disorders, and create better radars.

"When you study nature, whether you investigate the human brain or a supernova explosion, you always deal with some sort of electromagnetic signals," explains Andrey Lebedev, a co-author of the paper describing the new device in npj Quantum Information. "So measuring magnetic fields is necessary across diverse areas of science and technology, and one would want to do this as accurately as possible."

Quantum magnetometer offers more precision

A magnetometer is an instrument that measures magnetic fields. A compass is an example of a primitive magnetometer. In an electronics store, one can find more advanced devices of this kind used by archaeologists. Military mine detectors and metal detectors at airports are also magnetometers.

There is a fundamental limitation on the accuracy of such instruments, known as the standard quantum limit. Basically, it says that to double the precision, a measurement has to last four times as long. This rule applies to any classical device, which is to say one that does not utilize the bizarre effects of quantum physics.

"It may seem insignificant, but to gain 1,000 times in precision, you would have to run the experiment 1 million times longer. Considering that some measurements take weeks to begin with, chances are you will experience a power cut or run out of funds before the experiment is over," says Lebedev, who is a leading researcher at the Laboratory of the Physics of Quantum Information Technology, MIPT.

Achieving a higher accuracy, and therefore shorter measurement times, is crucial when fragile samples or living tissue is examined. For example, when a patient undergoes positron emission tomography, ...Read More...

Astronomers confirm collision between two Milky Way satellite galaxies

This image shows an overview of the full Small Magellanic Cloud and was composed from two images from the Digitized Sky Survey 2, which digitized photographic surveys of the night sky. Credit: Davide De Martin (ESA/Hubble)

If you're standing in the Southern Hemisphere on a clear night, you can see two luminous clouds offset from the Milky Way.

These clouds of stars are satellite galaxies of the Milky Way, called the Small Magellanic Cloud and the Large Magellanic Cloud, or SMC and LMC.

Using the newly released data from a new, powerful space telescope, University of Michigan astronomers have discovered that the southeast region, or "Wing," of the Small Magellanic Cloud is moving away from the main body of that dwarf galaxy, providing the first unambiguous evidence that the Small and Large Magellanic Clouds recently collided.

"This is really one of our exciting results," said U-M professor of astronomy Sally Oey, lead author of the study. "You can actually see that the Wing is its own separate region that's moving away from the rest of the SMC."

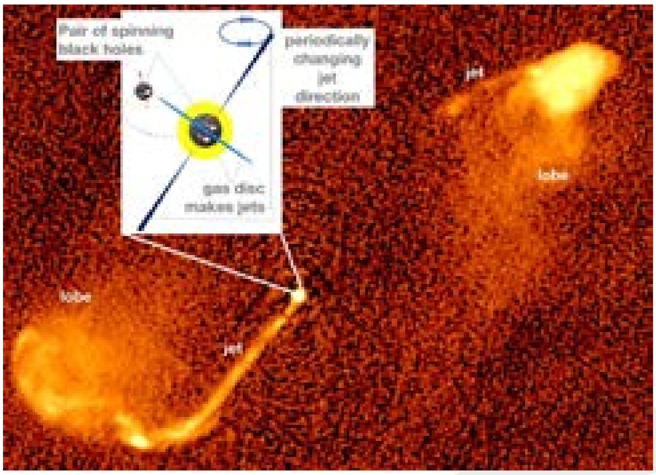
Their results are published in The Astrophysical Journal Letters.

Together with an international team, Oey and undergraduate researcher Johnny Dorigo Jones were examining the SMC for "runaway" stars, or stars that have been ejected from clusters within the SMC. To observe this galaxy they were using a recent data release from Gaia, a new, orbiting telescope launched by the European Space Agency.

Gaia is designed to image stars again and again over a period of several years in order to plot their movement in real time. That way, scientists can measure how stars move across the sky.

"We've been looking at very massive, hot young stars—the hottest, most luminous stars, which are fairly rare," Oey said. "The beauty of the Small Magellanic Cloud and the Large Magellanic Cloud is that they're their own galaxies, so we're looking at all of the massive stars in a single galaxy." ...Read More...

Astronomers spot signs of supermassive black hole mergers



Jets from double black holes change direction continuously. The effect can explain features in this 5 GHz radio map of 3C 334 and many powerful radio sources in the sky. The jet emanates from the nucleus of a galaxy (its stars are not visible at radio frequencies) about 10 billion light years from our own. The image spans five million light years from left to right. The peculiar structure of the jets signifies a periodic change of the direction of the jet (precession), an effect that is predicted for jets from black hole pairs. The inset diagram schematically illustrates the physical processes in the black hole pair. Jets may form in gas discs around black holes. The direction of the jets is tied to the spin of the black hole. The spin axis is shown as a red arrow. The latter changes direction periodically due to the presence of the second black hole. Credit: M. Krause / University of Hertfordshire

New research, published today in the journal Monthly Notices of the Royal Astronomical Society, has found evidence for a large number of double supermassive black holes, likely precursors of gigantic black hole merging events. This confirms the current understanding of cosmological evolution—that galaxies and their associated black holes merge over time, forming bigger and bigger galaxies and black holes.

Astronomers from the University of Hertfordshire, together with an international team of scientists, have looked at radio maps of powerful jet sources and found signs that would usually be present when looking at black holes that are closely orbiting each other.

Before black holes merge they form a binary black hole, where the two black holes orbit around each other. Gravitational wave telescopes have been able to evidence the merging of smaller black holes since 2015, by measuring the strong bursts of gravitational waves that are emitted when binary black holes merge, but current technology cannot be used to demonstrate the presence of supermassive binary black holes.

Supermassive black holes emit powerful jets. When supermassive binary black holes orbit it causes the jet emanating from the nucleus of a galaxy to periodically change its direction. Astronomers from the University of Hertfordshire studied the direction that these jets are emitted in, and variances in these directions; they ...Read More...

Mars could have enough molecular oxygen to support life, and scientists figured out where to find it

The new research was made possible by the discovery by NASA's Curiosity Mars rover of manganese oxides

Modern-day Mars may be more hospitable to oxygen-breathing life than previously thought.

A new study suggests that salty water at or near the surface of the red planet could contain enough dissolved O_2 to support oxygen-breathing microbes, and even more complex organisms such as sponges.

"Nobody thought of Mars as a place where aerobic respiration would work because there is so little oxygen in the atmosphere," said Vlada Stamenkovic an Earth and planetary scientist at the Jet Propulsion Laboratory who led the work. "What we're saying is it is possible that this planet that is so different from Earth could have given aerobic life a chance."

As part of the report, Stamenkovic and his coauthors also identified which regions of Mars are most likely to contain brines with the greatest amounts of dissolved oxygen. This could help NASA and other space agencies plan where to send landers on future missions, they said.

The work was published Monday in Nature Geoscience.

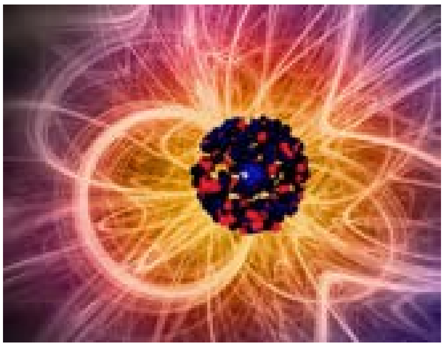
On its surface, the planet Mars is not what you would consider a hospitable place for most Earthlings.

Here on Earth, 21 percent of our atmosphere is made up of oxygen—thanks to the abundance of plants and other organisms that create oxygen as a byproduct of photosynthesis.

The Martian atmosphere, on the other hand, is made up of just .145 percent oxygen, according to data collected by the Mars rovers. With no plants to make O_2, the minuscule amount of oxygen on Mars is created when radiation from the sun interacts with CO_2 in the planet's atmosphere. In addition, Mars' atmosphere is extremely thin—160 times thinner than Earth's atmosphere. In addition, the temperature at the surface frequently drops to minus 100, making it extremely ...Read More...

Special Read:

Ask a Spaceman: The Quirks of Quark Star Physics



Credit - Image File

Can a quark star exist? It's an open question in the astronomy community, but there appears to be an argument for quark stars if we examine the physics of dying stars in more detail, argues astrophysicist and Space.com columnist Paul Sutter. He goes deep into the details in this week's episode of "Ask a Spaceman."

In Episode 11 of the Facebook Watch series, Sutter continues the topic of quark stars, which he first began last week in Episode 10. It's best to watch last week's episode to get the full story, as Sutter touches upon a critical concept called degeneracy pressure in great detail. For a quick, one-sentence recap: Degeneracy pressure stops the collapse of an object (such as a white dwarf, which we'll get into in a moment) from collapsing because the fundamental particles within the object are crammed into a tiny space.

Sutter goes deep into physics in this week's episode, but he says it's necessary – the topic of quark stars is so complicated that it needs three parts to explain. "That's how intense it is," he says in the video. Here, he traces stellar evolution from a dying star through to smaller and smaller star variants: white dwarfs, neutron stars and the theoretical quark stars.

First, let's briefly talk about what happens when a star similar in mass to our sun reaches the end of its life. It sloughs off layers of gas and leaves behind a cooling white dwarf star. These are Earth-size objects with immensely strong gravity, some 350,000 times the gravity of Earth. White dwarfs hold off collapse through degeneracy pressure. The star's electrons – negatively charged particles – will cram into a small space and resist being squashed further, which stops the collapse.

But what if the genesis star was much larger than our sun? As Sutter explains, astrophysicist Subrahmanyan Chandrasekhar theorized that after a star is roughly 1.4 times the mass of our sun, this electron degeneracy pressure can be overridden. So the star will keep shrinking into something called a neutron star, which is about the size of a city. (Chandrasekhar's theories took a while to be accepted, but he eventually co-won the 1983 Nobel Prize. Also, NASA's Chandra X-Ray Telescope is named after him.)

In a neutron star, the degeneracy pressure acts a little differently. Some of the electrons are pushed against another fundamental particle, called a proton (which has a positive charge, and is found in atoms' centers). The electron and the proton pushed together – a negative and a positive charge – end up combining and creating a neutral particle called a neutron. Neutrons can be "crammed much more tightly than electrons" Sutter explains. That's why a neutron star is so small.

So what if you override the neutrons' degeneracy pressure? In most cases, the star would collapse into a singularity – a stellar-mass black hole. That's an accepted path in stellar evolution for stars that are at least three times the mass of our sun. Black holes pull in gas, dust and any other objects nearby and have such a strong gravitational well that even light cannot escape.

But can you make a quark star? Well, neutrons are not the smallest fundamental particle. Each neutron is made up of even smaller particles called quarks. Quarks (and their antimatter counterparts) come in six types, or "flavors": up, down, top, bottom, strange and charm.

A quark star – if it actually exists – would happen if somehow you could collapse the neutron star even further. Not so far that it becomes a black hole, but into an intermediary stage. In this stage, the neutrons ...Read More...

This Week's Sky at a Glance - Oct. 27 - Nov. 02, 2018

Oct 27	Sa	17:04	Moon-Aldebaran: 1.6° S
Oct 29	Mo	10:28	Mercury-Jupiter: 3.1° N
		22:34	Moon North Dec.: 21.3° N
Oct 31	We	07:46	Moon Ascending Node
		19:24	Moon-Beehive: 1° N
		20:40	Last Quarter
Nov 01	Th	00:05	Moon Perigee: 370200 km
Nov 02	Fr	08:16	Moon-Regulus: 2.1° S

Special SCASS Summer Students Research Seminar
Oct. 28, 2018

Abstract

During more than three months (June - August 2018), SCASS hosted 21 UoS students to do their summer internships. Students were able to tackle several projects as related to the main five research laboratories at the center: Meteorite Center, Space Weather and Ionospheric Center, Radio Astronomy Laboratory, Martian Atmospheric Laboratory, and the CubeSat Laboratory. This special seminar will expose all the research done and the main results obtained by the students. These projects are funded by the UAE Space Agency, the Mohmaed Bin Rashed Space Center, and the University of Sharjah through the CASTO program.