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أكاديمية الشارقة لعلوم وتكنولوجيا الفضاء والفلك

IAU 100 YEARS: UNDER ONE SKY

Astronomy & Physics

Top News

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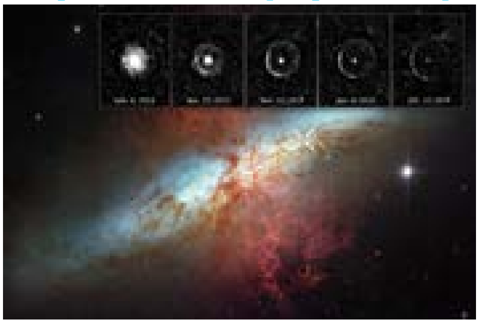
New study sheds light on conditions that trigger supernovae explosions (Update)



Light from a supernova explosion in the nearby starburst galaxy Messier 82 is reverberating off a huge dust cloud in interstellar space. The supernova, called SN 2014J, occurred at the upper right of Messier 82, and is marked by an "X." The supernova was discovered on 21 January 2014. The inset images at the top reveal an expanding shell of light from the stellar explosion sweeping through interstellar space, called a "light echo." The images were taken over 10 months to nearly two years after the violent event. Credit: NASA

Understanding the thermonuclear explosion of Type Ia supernovae—powerful and luminous stellar explosions—is only possible through theoretical models, which previously were not able to account for the mechanism that detonated the explosion.

One of the key pieces of this explosion, present virtually in all models, is the formation of a supersonic reaction wave called detonation, which can travel faster than the speed of sound and is capable of burning up all of the material of a star before it gets dispersed into the vacuum of space.

But, the physics of the mechanisms that create a detonation in a star has been elusive.

Now, a team of researchers from the University of Connecticut, Texas A&M University,University of Central Florida, Naval Research Laboratory, and Air Force Research Laboratory has developed a theory that sheds light on the enigmatic process of detonation formation at the heart of these remarkable astronomical events.

The research, published Nov. 1 in Science, offers a critical understanding of this physical process both in stars and also in chemical systems on Earth. It was led by Alexei Poludnenko, UConn School of Engineering and Texas A&M University; in collaboration with Jessica Chambers and Kareem Ahmed, the University of Central Florida; Vadim Gamezo, the Naval Research Laboratory; and Brian Taylor, the Air Force Research Laboratory.

For the first time, researchers were able to demonstrate the process of detonation formation from a slow subsonic flame using both experiments and numerical simulations carried out on some of the largest supercomputers in the nation. They also successfully applied the results to predict the conditions of detonation formation in one of the classical theoretical scenarios of Type Ia supernova explosion.
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Researchers uncover an anomaly in the electromagnetic duality of Maxwell Theory

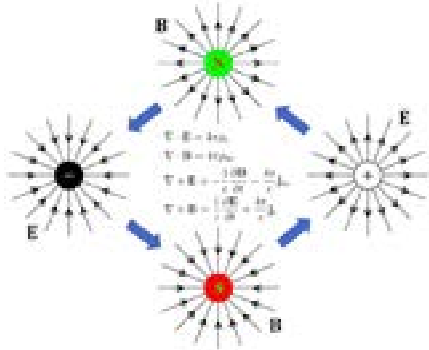


Figure showing the action of the duality of the Maxwell theory on electric and magnetic charges. Credit: Hsieh et al.

Researchers at the Kavli Institute for the Physics and Mathematics of the Universe (WPI) and Tohoku University in Japan have recently identified an anomaly in the electromagnetic duality of Maxwell Theory. This anomaly, outlined in a paper published in Physical Review Letters, could play an important role in the consistency of string theory.

The recent study is a collaboration between Yuji Tachikawa and Kazuya Yonekura, two string theorists, and Chang-Tse Hsieh, a condensed matter theorist. Although the study started off as an investigation into string theory, it also has implications for other areas of physics.

In current physics theory, classical electromagnetism is described by Maxwell's equations, which were first introduced by physicist James Clerk Maxwell around 1865. Objects governed by these equations include electric and magnetic fields, electrically charged particles (e.g., electrons and protons), and magnetic monopoles (i.e. hypothetical particles carrying single magnetic poles).

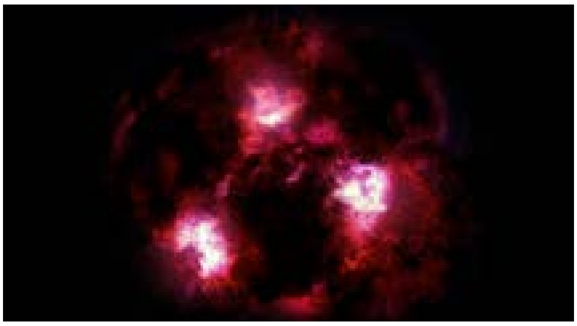
So far, researchers have been unable to observe magnetic monopoles, yet theoretical predictions have pointed to their existence for several decades. A key implication of the existence of magnetic monopoles is the quantization of all electric charges in the universe, originally introduced by Paul Dirac in 1931.

"In four spacetime dimensions, electric charges are always integer multiples of some minimum number, if there exists a magnetic monopole," Hsieh, Tachikawa and Yonekura told Phys.org via email. "This is called Dirac quantization of charges."

Assuming the presence of both electric and magnetic charges, the Maxwell equations respect a certain symmetry, which is known as electromagnetic duality. This symmetry is attained by exchanging the electric charge and the magnetic monopole.

What happens to this electromagnetic duality when the system is quantized? Although this may seem like a natural question, very few studies have tried to ...Read More...

This monster galaxy made stars hundreds of times faster than the Milky Way



artist's rendering shows an early galaxy surrounded by gas and forming new stars at a tremendous rate. James Josephides/Christina Williams/Ivo Labbe

Astronomers accidentally discovered a galaxy as it existed just 1 billion years after the Big Bang. It was already forming hundreds of stars each year.

Our universe's history began about 13.8 billion years ago with the Big Bang. When astronomers probe deep into space, they see parts of the universe as they were early in this history. That's because it takes light a long time to travel vast distances. To find out how galaxies formed and evolved over time, astronomers look for the oldest, most distant objects they can see.

These observations reveal that massive galaxies appeared in the universe as early as 1 billion or 2 billion years after the Big Bang. But how were there already enough stars to make such large galaxies? The findings imply that early massive galaxies must have formed stars at incredibly high rates.

Now, a team of astronomers has spotted one of these early galaxies in the act of churning out stars. Their observations capture the galaxy, which is about the size of the Milky Way, as it was about 1 billion years after the Big Bang. However, the galaxy is creating roughly 300 Suns' worth of stars per year, while the Milky Way forms just one or two solar masses of stars each year.

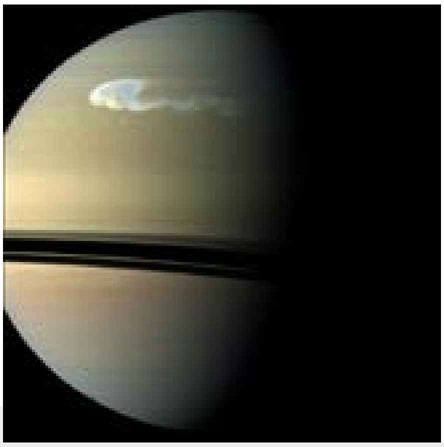
The team says their find is something of a "cosmic yeti" because astronomers previously dismissed the idea that such monster early galaxies ever existed.

The researchers reported their find Tuesday in The Astrophysical Journal.

A Serendipitous Find

Christina Williams, an astronomer at the University of Arizona, was using the Atacama Large Millimeter/submillimeter Array to study another galaxy when she noticed an unexpected little blob in her images. When she and her team investigated further, they realized the blob was an extremely distant galaxy more than 12 billion light-years away. The researchers looked at other images of this patch of sky and discovered faint traces of the galaxy in various wavelengths of light. Those traces ....Read More...

A new kind of storm appears on Saturn, puzzling astronomers



A large storm on Saturn, commonly referred to as a Great White Spot. NASA/JPL-Caltech/SSI

The new addition doesn't fit into the two known kinds of tempests that regularly sweep through the ringed planet's atmosphere.

As serene as it appears in photographs, the gas giant Saturn is not a peaceful place. Its golden gases whiz around the planet at up to a thousand miles per hour. At times, massive storms thousands of miles wide break out in its upper atmosphere.

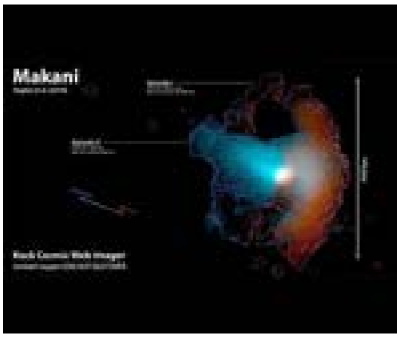
In 2018, astronomers spotted a new kind of storm on Saturn. Four large tempests formed one after another, passing by each other and further disturbing the atmosphere to create a complex storm system that lasted months. Computer models let the researchers estimate the energy behind the event and compare it to other storms on Saturn. Studying these phenomena in more detail may let astronomers better understand the complex behaviors of the giant planet's atmosphere. A team of scientists from Spain, Australia, the U.S. and France presented the research Monday in Nature Astronomy.

A New Kind of Storm

The researchers first noticed the new storms in photographs that amateur astronomers had taken and uploaded to a public online repository. They spotted the first of the four storms in March 2018, visible as a distinct white spot near Saturn's north pole. The following three storms popped up in the months after. With several months of follow-up study, the researchers realized that this series of storms was different from those seen before.

"This is a new type of storm that is telling us something about the unknown formation mechanisms," of these storms, said Enrique García-Melendo, an astronomer at Universitat Politècnica de Catalunya and one of the leading authors of the study, in an email. The way these storms form likely depends on not-fully-understood interactions between water vapor, seasonal differences in exposure to sunlight and the complicated, multi-layered atmosphere.
..Read More...

Astronomers catch wind rushing out of galaxy



A volume rendering of the ionized gas wind in Makani. Two of the dimensions are spatial, and the third is velocity. The colors trace the velocity axis, shown by the arrow at center. The approximate locations of the two proposed outflow episodes are labeled.

Exploring the influence of galactic winds from a distant galaxy called Makani, UC San Diego's Alison Coil, Rhodes College's David Rupke and a group of collaborators from around the world made a novel discovery.

Published in Nature, their study's findings provide direct evidence for the first time of the role of galactic winds - ejections of gas from galaxies - in creating the circumgalactic medium (CGM). It exists in the regions around galaxies, and it plays an active role in their cosmic evolution. The unique composition of Makani - meaning wind in Hawaiian - uniquely lent itself to the breakthrough findings.

"Makani is not a typical galaxy," noted Coil, a physics professor at UC San Diego. "It's what's known as a late-stage major merger - two recently combined similarly massive galaxies, which came together because of the gravitational pull each felt from the other as they drew nearer. Galaxy mergers often lead to starburst events, when a substantial amount of gas present in the merging galaxies is compressed, resulting in a burst of new star births. Those new stars, in the case of Makani, likely caused the huge outflows - either in stellar winds or at the end of their lives when they exploded as supernovae."

Coil explained that most of the gas in the universe inexplicably appears in the regions surrounding galaxies - not in the galaxies. Typically, when astronomers observe a galaxy, they are not witnessing it undergoing dramatic events - big mergers, the rearrangement of stars, the creation of multiple stars or driving huge, fast winds.

"While these events may occur at some point in a galaxy's life, they'd be relatively brief," noted Coil. "Here, we're actually catching it all right as it's happening through these huge outflows of gas and dust."

Coil and Rupke, the paper's first author, used data collected from the W. M. Keck Observatory's new Keck Cosmic Web Imager (KCWI) instrument, combined with images from the Hubble Space Telescope and the Atacama Large Millimeter Array (ALMA), to draw their conclusions. ..Read More...

Even 'goldilocks' exoplanets need a well-behaved star

illustration only

An exoplanet may seem like the perfect spot to set up housekeeping, but before you go there, take a closer look at its star. Rice University astrophysicists are doing just that, building a computer model to help judge how a star's own atmosphere impacts its planets, for better or worse. By narrowing the conditions for habitability, they hope to refine the search for potentially habitable planets. Astronomers now suspect that most of the billions of stars in the sky have at least one planet. To date, Earth-bound observers have spotted nearly 4,000 of them.

Lead author and Rice graduate student Alison Farrish and her research adviser, solar physicist David Alexander, led their group's first study to characterize the "space weather" environment of stars other than our own to see how it would affect the magnetic activity around an exoplanet. It's the first step in a National Science Foundation-funded project to explore the magnetic fields around the planets themselves.

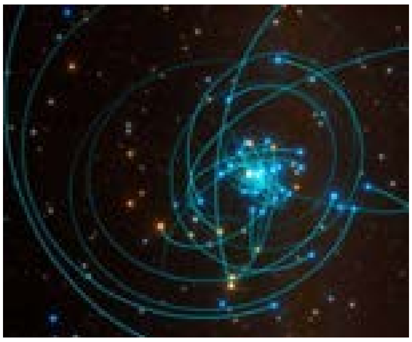
"It's impossible with current technology to determine whether an exoplanet has a protective magnetic field or not, so this paper focuses on what is known as the asterospheric magnetic field," Farrish said. "This is the interplanetary extension of the stellar magnetic field with which the exoplanet would interact."

In the study published in The Astrophysical Journal, the researchers expand a magnetic field model that combines what is known about solar magnetic flux transport - the movement of magnetic fields around, through and emanating from the surface of the Sun - to a wide range of stars with different levels of magnetic activity. The model is then used to create a simulation of the interplanetary magnetic field surrounding these simulated stars.

In this way they were able to hypothesize the potential environment experienced by such "popular" exoplanet systems as Ross 128, Proxima Centauri and TRAPPIST 1, all dwarf stars with known exoplanets.

No star is ever still. The plasma at its surface is constantly churning, creating disturbances that send strong magnetic fields (like those embedded in the Sun's solar wind) far into space. Earth's own magnetosphere helps make it a safe harbor for life, but whether that is ...Read More...

Scientists may have discovered whole new class of black holes



file illustration only

Black holes are an important part of how astrophysicists make sense of the universe - so important that scientists have been trying to build a census of all the black holes in the Milky Way galaxy.

But new research shows that their search might have been missing an entire class of black holes that they didn't know existed.

In a study published in the journal Science, astronomers offer a new way to search for black holes, and show that it is possible there is a class of black holes smaller than the smallest known black holes in the universe.

"We're showing this hint that there is another population out there that we have yet to really probe in the search for black holes," said Todd Thompson, a professor of astronomy at The Ohio State University and lead author of the study.

"People are trying to understand supernova explosions, how supermassive black stars explode, how the elements were formed in supermassive stars. So if we could reveal a new population of black holes, it would tell us more about which stars explode, which don't, which form black holes, which form neutron stars. It opens up a new area of study."

Imagine a census of a city that only counted people 5'9" and taller - and imagine that the census takers didn't even know that people shorter than 5'9" existed. Data from that census would be incomplete, providing an inaccurate picture of the population. That is essentially what has been happening in the search for black holes, Thompson said.

Astronomers have long been searching for black holes, which have gravitational pulls so fierce that nothing - not matter, not radiation - can escape. Black holes form when some stars die, shrink into themselves, and explode. Astronomers have also been looking for neutron stars - small, dense stars that form when some stars die and collapse.

Both could hold interesting information about the elements on Earth and about how stars live and die. But in order to uncover that information, astronomers first have to figure out where the black holes are. And to figure out where the black holes are, they need to ..Read More...

WFIRST will add pieces to the dark matter puzzle

This Hubble Space Telescope mosaic shows a portion of the immense Coma galaxy cluster - containing more than 1,000 galaxies - located 300 million light-years away. The rapid motion of its galaxies was the first clue that dark matter existed.

The true nature of dark matter is one of the biggest mysteries in the universe. Scientists are trying to determine what exactly dark matter is made of so they can detect it directly, but our current understanding has so many gaps, it's difficult to know just what we're looking for.

WFIRST's ability to survey wide swaths of the universe will help us figure out what dark matter could be made of by exploring the structure and distribution of both matter and dark matter across space and time.

Why is dark matter such a perplexing topic? Scientists first suspected its existence over 80 years ago when Swiss-American astronomer Fritz Zwicky observed that galaxies in the Coma cluster were moving so quickly they should have been flung away into space - yet they remained gravitationally bound to the cluster by unseen matter.

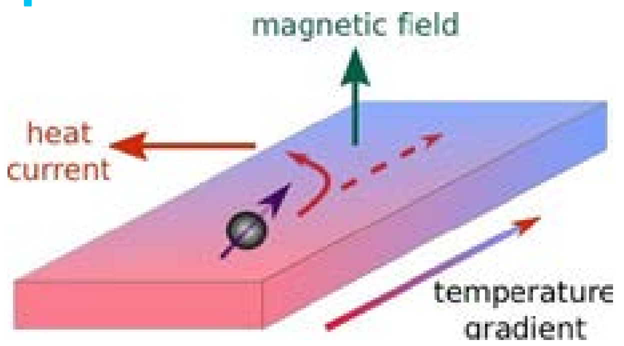
Then in the 1970s, American astronomer Vera Rubin discovered the same type of problem in individual spiral galaxies. Stars toward the edge of the galaxy move too fast to be held in by the galaxy's luminous matter - there must be much more matter than we can see in these galaxies to hold the stars in orbit. Ever since these discoveries, scientists have been trying to piece together the puzzle using sparse clues.

There is currently a wide range of dark matter candidates. We don't even have a very good idea what the mass of dark matter particles might be, which makes it difficult to work out how best to search for them.

WFIRST's wide-field surveys will provide a comprehensive look at the distribution of galaxies and galaxy clusters across the universe in the most detailed dark matter studies ever undertaken, thanks to dark matter's gravitational effects. These surveys will yield new insight into the fundamental nature of dark matter, which will enable scientists to hone their searching techniques.

Most theories of the nature of dark matter particles suggest they almost never interact with normal matter. Even if someone dropped a huge chunk of dark matter on your head, you would probably perceive nothing. You wouldn't have any means of detecting its presence ...Read More...

A theoretical explanation for an enhanced thermal Hall response in high-temperature superconductors



Thermal Hall effect. The thermal Hall conductivity relates the heat current resulting from a perpendicular temperature gradient in the presence of a magnetic field along the third perpendicular direction. It is a powerful experimental tool as it provides access to charge-neutral carriers in the system. Credit: Samajdar et al. Figure adapted from Phys. Rev. B 99, 165126 (2019).

A few months ago, a team of researchers led by Louis Taillefer at the University of Sherbrooke measured the thermal Hall conductivity in several compounds of copper, oxygen and other elements that are also high-temperature superconductors known as 'cuprates.' In physics, the thermal Hall effect describes heat flow in a direction transverse to a temperature gradient.

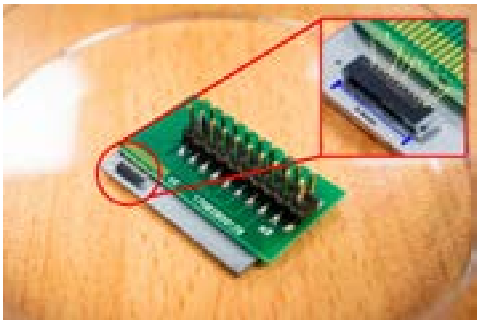
Generally, heat flows in the same direction as the temperature gradient, but in the presence of a magnetic field, some flows in the transverse direction, too; this is known as the thermal Hall effect. In their study, Taillefer and his collaborators observed that in the cuprates, this transverse flow can sometimes be very large, which was surprising for many physicists worldwide.

Inspired by this observation, a team of researchers at Harvard University and the University of California recently set out to investigate it further. In their paper, published in Nature Physics, they were able to explain these striking findings by taking into account the possibility that the applied magnetic field in the experiment could bring the material close to an exotic phase with a large thermal Hall conductivity.

Essentially, the large signal observed by Taillefer and his colleagues indicates the presence of other mobile degrees of freedom that, unlike usual electrons, do not carry an electric charge, but contribute to the thermal Hall conductivity. These additional degrees of freedom only appear to be present in the Néel state and in the so-called 'pseudogap' state.

The Néel state is a state in which there is one electron per square lattice site and electron spins are arranged in opposite directions like black and white squares on a chess board. The pseudogap state, on the other hand, one of the most mysterious states in the phase diagram of high-temperature superconductors, emerges when the Néel order is destroyed by doping the system with ...Read More...

Researchers create quantum chip 1,000 times smaller than current setups



Roughly about 3mm in size, tiny chip developed by NTU scientists uses quantum communication algorithms to provide enhanced security compared to existing industry standards. It also needs 1,000 times less space than current quantum communication setups, opening doors for more secure communication technologies that can be deployed in compact devices such as smartphones, tablets and smart watches. Credit: NTU Singapore

Researchers at Nanyang Technological University, Singapore (NTU Singapore) have developed a quantum communication chip that is 1,000 times smaller than current quantum setups, but offers the same superior security quantum technology is known for.

Most leading security standards used in secure communication methods—from withdrawing cash from the ATM to purchasing goods online on the smartphone—does not leverage quantum technology. The electronic transmission of the personal identification number (PIN) or password can be intercepted, posing a security risk.

Roughly three millimeters in size, the tiny chip uses quantum communication algorithms to provide enhanced security compared to existing standards. It does this by integrating passwords within the information that is being delivered, forming a secure quantum key. After the information is received, it is destroyed along with the key, making it an extremely secure form of communication.

It also needs 1,000 times less space than current quantum communication setups that can be as big as a refrigerator or even take up the space of an entire room or office floor. This opens doors for more secure communication technologies that can be deployed in compact devices such as smartphones, tablets and smart watches. It also lays the foundation for better encryption methods for online transactions and electronic communication.

Led by NTU Professor Liu Ai Qun, and Associate Professor Kwek Leong Chuan, the team's findings were published in a leading peer-reviewed journal, Nature Photonics.

Prof Liu, who is from NTU's School of Electrical and Electronic Engineering, said, "In today's world, cyber security is very important as so much of our data are stored and communicated digitally. Almost all digital platforms and repositories require users to input their passwords and biometric data, and as long as this is the case, it could be eavesdropped on or deciphered. Quantum technology eliminates this as both the password and information .Read More..

New research on giant radio galaxies defies conventional wisdom

Credit: CCO Public Domain

Conventional wisdom tells us that large objects appear smaller as they get farther from us, but this fundamental law of classical physics is reversed when we observe the distant universe.

Astrophysicists at the University of Kent simulated the development of the biggest objects in the universe to help explain how galaxies and other cosmic bodies were formed. By looking at the distant universe, it is possible to observe it in a past state, when it was still at a formative stage. At that time, galaxies were growing and supermassive black holes were violently expelling enormous amounts of gas and energy. This matter accumulated into pairs of reservoirs, which formed the biggest objects in the universe, so-called giant radio galaxies. These giant radio galaxies stretch across a large part of the Universe. Even moving at the speed of light, it would take several million years to cross one.

Professor Michael D. Smith of the Centre for Astrophysics and Planetary Science, and student Justin Donohoe collaborated on the research. They expected to find that as they simulated objects farther into the distant universe, they would appear smaller, but in fact they found the opposite.

Professor Smith said: "When we look far into the distant universe, we are observing objects way in the past—when they were young. We expected to find that these distant giants would appear as a comparatively small pair of vague lobes. To our surprise, we found that these giants still appear enormous even though they are so far away."

Radio galaxies have long been known to be powered by twin jets which inflate their lobes and create giant cavities. The team performed simulations using the Forge supercomputer, generating three-dimensional hydrodynamics that recreated the effects of these jets. They then compared the resulting images to observations of the distant galaxies. Differences were assessed using a new classification index, the Limb Brightening Index (LB Index), which measures changes to the orientation and size of the objects.

Professor Smith said: "We already know that once you are far enough away, the Universe acts like a magnifying glass and objects start to increase in size in the ...Read More...

Stars pollute, but galaxies recycle

Animation of a gigantic star exploding in a "core collapse" supernova. Supernovae are one way that galaxies eject metal-enriched gases into the circumgalactic medium. Credit: NASA/JPL-Caltech

Galaxies were once thought of as lonely islands in the universe: clumps of matter floating through otherwise empty space. We now know they are surrounded by a much larger, yet nearly invisible cloud of dust and gas. Astronomers call it the circumgalactic medium, or CGM. The CGM acts as a giant recycling plant, absorbing matter ejected by the galaxy and later pushing it right back in.

NASA's Far-ultraviolet Off Rowland-circle Telescope for Imaging and Spectroscopy, or FORTIS, mission will study this recycling process to help settle several unsolved mysteries. Launching on a sounding rocket from the White Sands Missile Range in New Mexico, FORTIS will observe a nearby galaxy to measure the gases its stars and supernova pump into the surrounding CGM. These observations will shed light on how material circulates in and out of galaxies, fueling star formation and galactic evolution. FORTIS's launch window opens on Oct. 27.

A case of missing matter

Astronomers who study the life cycle of galaxies have struggled with two major mysteries.

First, to build new stars, galaxies need fuel—gases like hydrogen, helium, and sometimes heavier elements. But many galaxies continue making stars long after astronomers predict their fuel should have been exhausted. Where was the extra gas coming from?

Second, the byproducts of existing stars seemed to be missing. "As stars age, they pollute their surroundings," said Stephan McCandliss, an astrophysicist at Johns Hopkins University and principal investigator for FORTIS. "They take in material around them and blow it right out."

But scientists found that star-filled galaxies weren't as polluted with metals—the heavy elements forged as stars burn—as they should have been. Metal-enriched gas was both entering and exiting galaxies, but no one knew how.

The galactical recycling center

Astronomers knew about the existence of CGMs, but most were too dim and spread out to be ..Read More...

Special Read:

NASA Is Getting Serious About an Interstellar Mission

Photograph: NASA

Only two spacecraft have ever escaped our solar system to dip into interstellar space. Now NASA wants to go back—and soon.

Interstellar space exploration has long been the stuff of science fiction, a technological challenge that many engineers believe humans just aren't up to yet. But an ongoing study by a group of NASA-affiliated researchers is challenging this assumption. The researchers have a vision for a mission that could be built with existing technology. Indeed, the group says that if their mission is selected by NASA it could fly as soon as 2030.

"This is humanity's first explicit step into interstellar space," says Pontus Brandt, a physicist at the Johns Hopkins Applied Physics Laboratory who is working on the interstellar probe study.

The lab kicked off its Interstellar Probe study last summer at the behest of NASA's Heliophysics division. A year in, they are now hashing out the nitty-gritty engineering details of such a mission. At the end of 2021, Brandt and his colleagues will submit it for inclusion in the National Academies of Sciences, Engineering, and Medicine's Heliophysics decadal survey, which determines sun-related mission priorities for the next 10 years.

The basic idea for the interstellar mission is to launch a spacecraft weighing less than 1,700 pounds on NASA's massive Space Launch System rocket, which is expected to be ready by 2021. That will get it traveling across our solar system like any other probe. To give it another boost, it will then use a gravity assist to sling the craft to speeds well over 100,000 miles per hour. The team at the Applied Physics Lab is currently considering two types of gravity assists—a "plain vanilla" assist that swings the probe around Jupiter and another that swings it around the sun.

Using the sun is advantageous, because the spacecraft can reach far higher speeds than it can from a Jupiter assist. But the spacecraft would have to pass several times closer to the sun than the Parker Solar Probe, which recently became the closest human-made object to pass by the star. This requires some serious heat shielding, but at a certain point the heat shield becomes so bulky that it reduces the spacecraft's speed the closer it gets to the sun. The task for Brandt and his colleagues will be to find the sweet spot that takes the craft to interstellar space as fast as possible.

"It's time we have a vision we can actually execute," says Ralph McNutt, a physicist at the Applied Physics Laboratory. "Up to now, people haven't thought about this as an engineering problem. They kick the can down the road, saying, 'Well, we just need a little bit more new technology.'"

NASA's interstellar probe has a more modest goal compared to other interstellar mission proposals, like Breakthrough Starshot, which aims to send a thumbnail-sized craft to another star. Instead, NASA wants to launch a probe that will last for 50 years and travel 92 billion miles—about 1,000 times the distance from Earth to the sun. To put this in perspective, Voyager 1 and Voyager 2, the only spacecraft to make it to interstellar space, are currently around 13 billion miles away from Earth. It took those spacecraft nearly four decades to cover this distance, but NASA's new interstellar probe could make it there in less than 15 years.

Voyager 1 entered interstellar space in 2012 and Voyager 2 left the solar system last year. ..Read More...

This Week's Sky at a Glance - Nov. 02-08, 2019

Nov. 02	Sa	01:40	Moon Descending Node
		04:33	Moon South Dec.: 23° S
		11:31	Moon-Saturn: 0.6° N
Nov. 04	Mo	14:23	First Quarter
Nov. 06	We	03:41	South Taurid Shower: ZHR = 10
Nov. 07	Th	12:37	Moon Apogee: 405100 km

Report on the Astronomy Education Research Workshop Oct. 28-29, 2019 (1)

The Sharjah Academy for Astronomy, Space Sciences, and Technology (SAASST) has organized a special "Astronomy Education Research Workshop" during the period Oct. 28-29, 2019. This workshop was under the theme of the International Astronomical Union (IAU) Commission C1 Astronomy Education and Development. C1 is a Commission within Division C of the IAU. This Commission seeks to further the development and improvement of astronomical education at all levels throughout the world through various projects developed and maintained by the Commission and by disseminating information concerning astronomy education. Prof. Paulo Bretones (Brazil), the IAU Commission C1 President, along with Prof. Michael Fitzgerald (Australia), attended the workshop with space educators from the UAE and Turkey.

HE Prof. Hamid Al-Naimiy, the Chancellor of the University of Sharjah, and the General Director of SAASST gave the opening speech in which he emphasized the role of the academy in promoting astronomy education in the UAE. Prof. Hamid mentioned the different astronomy courses offered at the university along with the coming MSc. in Astronomy and Space Sciences. The participants discussed the various programs to promote astronomy education research in the Gulf region. A proposition to conduct the ASTROedu and CAP workshops here in the UAE to advertise further astronomy education was considered by the participants.

Report on Astronomy Education Research Workshop Oct. 28-29, 2019 (2)

Mercury Transit of Nov. 11, 2019

A transit of Mercury – the innermost planet of our solar system – is coming up on November 11, 2019! A transit occurs when Mercury passes directly in front of the Sun. At such times, Mercury can be seen through telescopes with solar filters as a small black dot crossing the Sun's face. Mercury's diameter is only 1/194th of that of the Sun, as seen from Earth.

Mercury will come into view on the Sun's face around 16:36, which is late afternoon. It'll make a leisurely journey across the Sun's face, reaching greatest transit (closest to Sun's center) at approximately 19:20 and finally exiting 22:04. The entire 5 1/2 hour path across the Sun will not be fully visible from the UAE since sunset will be around 17:31.

The Sharjah Academy for Astronomy, Space Sciences, and Technology will be conducting a special Mercury Transit observation starting from 4 pm on Nov. 11, 2019.

November 11 transit times in UAE Time:

- First contact (ingress, exterior): 16:35:27
- Second contact (ingress, interior): 16:37:08
- Greatest transit: 19:19:48
- Third contact (egress, interior): 22:02:33
- Fourth contact (egress, exterior): 22:04:14