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Astronomy & Physics Weekly News

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Top News

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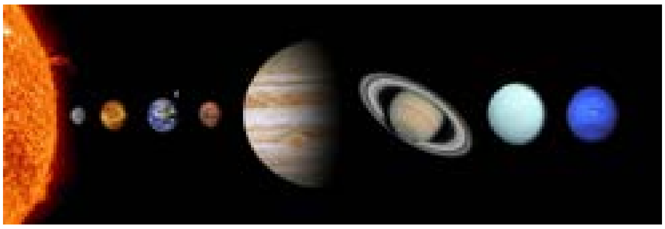
New theory to explain why planets in our solar system have different compositions



Credit: CCO Public Domain

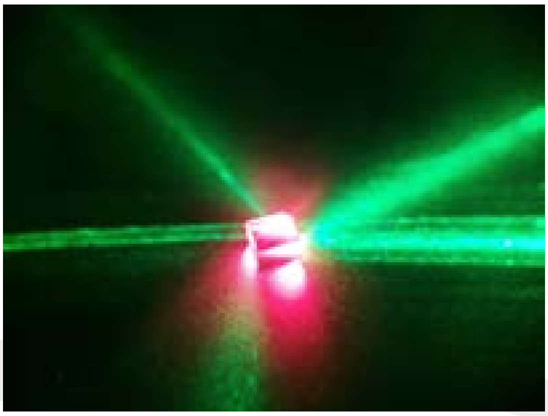
A team of researchers with the University of Copenhagen and the Museum für Naturkunde, Leibniz-Institut für Evolutions has come up with a new explanation regarding the difference in composition of the planets in our solar system. In their paper published in the journal Nature, they describe their study of the calcium-isotope composition of certain meteorites, Earth itself, and Mars, and use what they learned to explain how the planets could be so different. Alessandro Morbidelli with Observatoire de la Côte d'Azur in France offers a News & Views piece on the work done by the team in the same journal issue.

As Morbidelli notes, most planetary scientists agree that the planets in our solar system had similar origins as small rocks orbiting the sun, comprising the protoplanetary disk, which collided and fused, creating increasingly larger rocks that eventually became protoplanets. But from that point on, it is not clear why the planets turned out so differently. In this new effort, the researchers have come up with a new theory to explain how that happened.

The protoplanets all grew at the same rate, the group suggests, but stopped growing at different times. Those that were smaller, they continue, stopped growing sooner than those that were larger. During this time, they further suggest, material was constantly being added to the disk. Early on it, it appears that the composition of the material was different from the material that came later, which explains why the rocky planets we see today have such differences in composition.

The researchers developed their theory after studying the calcium-isotope composition of several meteorites called angrites and ureilites, as well as that of Mars and Earth, and also from the asteroid Vesta. Calcium isotopes, they note, are involved in the formation of rock, and because of that, offer clues about their origins. The researchers found that isotopic ratios in samples correlated with the masses of their parent planets and asteroids, which they claim provides a proxy for their accretion timeline. And that, they further claim, provides evidence of the different compositions of the planets, as the smaller ones ceased accreting material while the larger ones continued to add material that was different from what had come before. ...Read More...

Scientists use diamond in world's first continuous room-temperature solid-state maser



A diamond containing nitrogen-vacancy (NV) defects centres is illuminated by a 532-nm green laser. The red light because the NV centres fluoresce. Credit: Jonathan Breeze, Imperial College London

The maser (microwave amplification by stimulated emission of radiation), the older microwave frequency sibling of the laser, was invented in 1954. However unlike lasers, which have become widespread, masers are much less widely used because in order to function they must be cooled to temperatures close to absolute zero (-273°C).

However, this new study from Imperial College London and UCL, and published in Nature, reports for the first time a maser that can act continuously at room temperature.

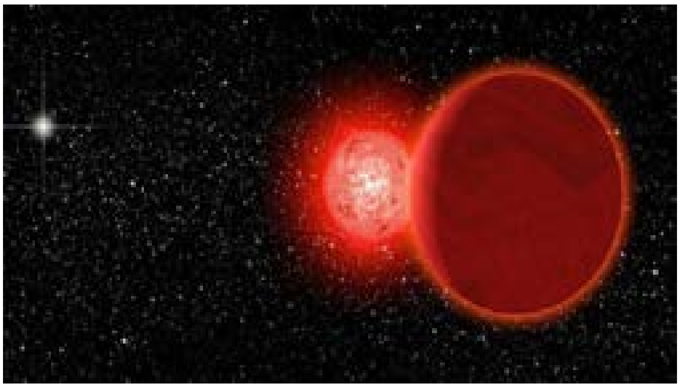
Lead researcher Dr Jonathan Breeze, from Imperial's Department of Materials, said: "This breakthrough paves the way for the widespread adoption of masers and opens the door for a wide array of applications that we are keen to explore. We hope the maser will now enjoy as much success as the laser."

In 2012, scientists demonstrated that a maser could operate at room temperature using the organic molecule pentacene. However, it only produced short bursts of maser radiation that lasted less than one thousandth of a second. In any case, had the maser operated continuously, the crystal would likely have melted.

Now, Dr Breeze and colleagues have used a synthetic diamond grown in a nitrogen-rich atmosphere to create a new maser that operates continuously.

Carbon atoms were 'knocked out' from the diamond using a high energy electron beam, creating spaces known as 'vacancies'. The diamond was then heated, which allowed nitrogen atoms and carbon vacancies to pair up, forming a type of defect known as a nitrogen-vacancy (NV) defect centre. The diamond was provided by Element Six. ..Read More...

Did Scholz's star invade the Oort Cloud?



Artist's concept of a the red dwarf star known as Scholz's star, a binary system formed by a small red dwarf, with about 9% of the mass of our sun, around which a much less bright and smaller brown dwarf orbits. According to astronomers, our ancestors saw the faint reddish light of this passing star system in the nights of prehistory. Image via Eric.

Astronomers announced new evidence on March 20, 2018, that the passage of Scholz´s star 70,000 years ago gravitationally disturbed our solar system's comets and asteroids. The evidence still exists, these researchers say, in the movements of some of these objects marked by that stellar encounter. Their study will appear in the May 1, 2018, issue of the peer-reviewed journal Monthly Notices of the Royal Astronomical Society.

Astronomers have wondered about Scholz's star at least since 2015, when a team of astronomers led by Eric Mamajek gave details of a possible stellar flyby, the closest documented so far, in a study in The Astrophysical Journal Letters.

The new study comes from the Complutense University of Madrid, from Carlos de la Fuente Marcos and Raúl de la Fuente Marcos (who are brothers), together with the researcher Sverre J. Aarseth of the University of Cambridge in the U.K. The researchers' statement explained:

At a time when modern humans were beginning to leave Africa and the Neanderthals were living on our planet, Scholz's star – named after the German astronomer who discovered it – approached less than a light-year from the sun. Nowadays it is almost 20 light-years away, but 70,000 years ago it entered the Oort Cloud, a reservoir of trans-Neptunian objects located at the confines of the solar system.

The de la Fuente Marcos brothers and Aarseth analyzed the nearly 340 objects of our solar system with hyperbolic orbits. Those are orbits that are very open and V-shaped.

In this way, these researchers determined that the trajectory of some of our solar system's smaller bodies must have been influenced by the passage of Scholz´s star. Carlos de la Fuente Marcos said:

Using numerical simulations, we have calculated the radiants or positions in the sky from which...Read More...

Feature: Every second counts to trace a gravitational wave

Scientists began to enhance LIGO's detectors since 2008. The Advanced LIGO finished its second run in August 2017, and is expected to start its third in the middle of this year. Scientists will further upgrade its detectors between the two runs to improve its sensitivity, which might greatly increase the odds of discovering gravitational waves.

When a gravitational wave reaches Earth, every second counts. The data processing speed will have a crucial impact on how much astronomers can learn from these space-time ripples, says computer scientist Cao Junwei.

"In an era of multi-messenger astronomy, we have to shorten the time as much as possible so as to trigger the alert quickly enough for follow-up observations," says Cao, who leads the Chinese team in the international Laser Interferometer Gravitational-wave Observatory (LIGO) Scientific Collaboration.

Last October, scientists from LIGO Scientific Collaboration, together with astronomers across the world, declared they had detected for the first time a gravitational wave from the collision of binary neutron stars and corresponding electromagnetic signals.

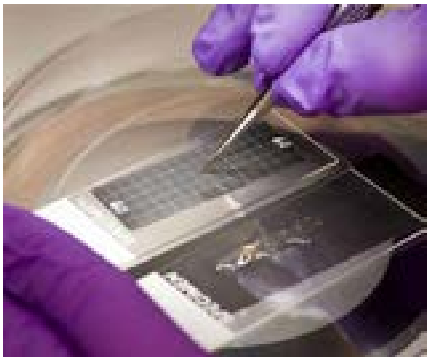
The discovery was achieved with high data processing speed. Just 1.7 seconds after the gravitational wave detection network received the signal, a gamma-ray burst was detected by the Fermi space telescope. LIGO and Fermi immediately triggered alerts around the astronomical community, bringing about 70 ground and space detectors into follow-up observations of electromagnetic signals with various wave lengths, which helped locate the source of the gravitational wave more precisely.

Cao joined the LIGO Lab at the Massachusetts Institute of Technology (MIT) as a computer scientist in 2004. On returning to China, he led a team from Tsinghua University's Research Institute of Information Technology (RIIT) in joining the LIGO Scientific Collaboration in 2009.

"We were the only Chinese group in the collaboration. None of us specialized in astrophysics, but we were accepted," says Cao, who is vice dean of RIIT.

In the first five years, the Tsinghua team mainly helped build the computing platform and analyze data. Then they began devoting most of their efforts to speeding up data processing. ..Read More...

Rooting for Answers: Simulating G-Force to Test Plant Gravity Perception in Mustard Seedlings



Seeds are aligned along a membrane within the cassette and germinated before their exposure to simulated gravity within the EMCS.

When plants on Earth search for nutrients and water, what drives their direction? Very simply, gravitational force helps them find the easiest path to the substances they need to grow and thrive. What happens if gravity is no longer part of the equation?

Botanists from Ohio Weslyan University leverage the microgravity environment of the International Space Station to study root growth behaviors and sensory systems in an investigation known as Gravity Perception Systems (Plant Gravity Perception). The researchers look for adaptability to microgravity and measure overall sensitivity to simulated gravity for two strains of mustard seedlings, including Arabidopsis thaliana Wild Type and a starchless genetic variant. Within the wild type, starch acts like a weight, falling within the root tips and driving them toward the Earth.

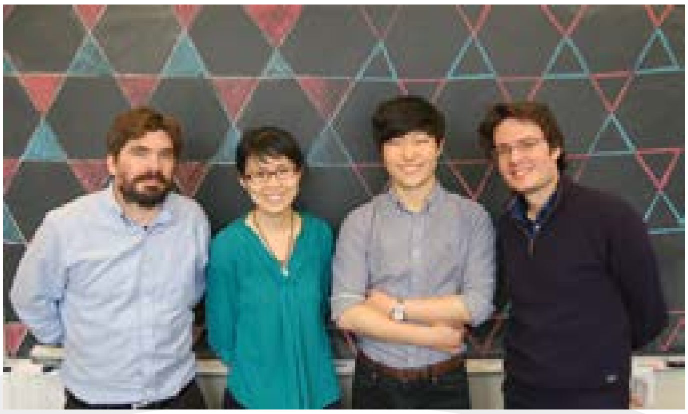
As the lead investigator for Plant Gravity Perception, botanist Chris Wolverton describes the investigation's central question: "We want to know - what's the least amount of gravity plants can detect to cause the falling of heavy [starchy] bodies in their cells?"

The study exposes both strains to incremental amounts of gravity ranging from four one thousandths or 0.004G - all the way up to one G. By comparison, gravitational force experienced on Earth is a constant one G.

Why include two types of seedlings? While exact thresholds for starchy strains are poorly understood, response mechanisms for starchless genetic variants are even more of a mystery.

Plant Gravity Perception uses acceleration from the European Modular Cultivation System (EMCS) to simulate gravity. Seedlings are first placed in seed cassettes, then aligned along radial blades of a centrifugal rotor. This lets investigators control the intensity of gravity experienced at any point along the rotational arms, testing hundreds of fractional degrees of gravity at a single time through controlled spins. ...Read More...

'Kagome metal': Physicists discover new quantum electronic material



(Left to right) Joe Checkelsky, Linda Ye, Min Gu Kang, and Riccardo Comin. Credit: Takehito Suzuki

A motif of Japanese basketweaving known as the kagome pattern has preoccupied physicists for decades. Kagome baskets are typically made from strips of bamboo woven into a highly symmetrical pattern of interlaced, corner-sharing triangles.

If a metal or other conductive material could be made to resemble such a kagome pattern at the atomic scale, with individual atoms arranged in similar triangular patterns, it should in theory exhibit exotic electronic properties.

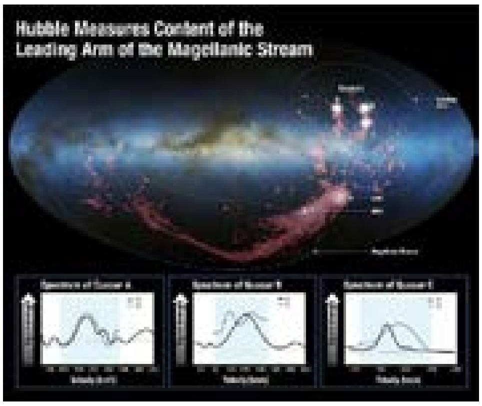
In a paper published today in Nature, physicists from MIT, Harvard University, and Lawrence Berkeley National Laboratory report that they have for the first time produced a kagome metal - an electrically conducting crystal, made from layers of iron and tin atoms, with each atomic layer arranged in the repeating pattern of a kagome lattice.

When they flowed a current across the kagome layers within the crystal, the researchers observed that the triangular arrangement of atoms induced strange, quantum-like behaviors in the passing current. Instead of flowing straight through the lattice, electrons instead veered, or bent back within the lattice.

This behavior is a three-dimensional cousin of the so-called Quantum Hall effect, in which electrons flowing through a two-dimensional material will exhibit a "chiral, topological state," in which they bend into tight, circular paths and flow along edges without losing energy.

"By constructing the kagome network of iron, which is inherently magnetic, this exotic behavior persists to room temperature and higher," says Joseph Checkelsky, assistant professor of physics at MIT. "The charges in the crystal feel not only the magnetic fields from these atoms, but also a purely quantum-mechanical magnetic force from the lattice. This could lead to perfect conduction, akin to superconductivity, in future generations of materials." To explore these findings, the team measured the energy spectrum within the crystal, using a ...Read More...

Hubble solves cosmic 'who-dunit' with interstellar forensics



The Large and Small Magellanic Clouds gravitationally tug at each other, and one of them has pulled out a huge amount of gas from its companion. This shredded and fragmented gas, called the Leading Arm, is being devoured by the Milky Way and is feeding new star birth in our galaxy. Using Hubble data, scientists have now solved which dwarf galaxy is doing the pulling.

On the outskirts of our galaxy, a cosmic tug-of-war is unfolding-and only NASA's Hubble Space Telescope can see who's winning.

The players are two dwarf galaxies, the Large Magellanic Cloud and the Small Magellanic Cloud, both of which orbit our own Milky Way Galaxy. But as they go around the Milky Way, they are also orbiting each other. Each one tugs at the other, and one of them has pulled out a huge cloud of gas from its companion.

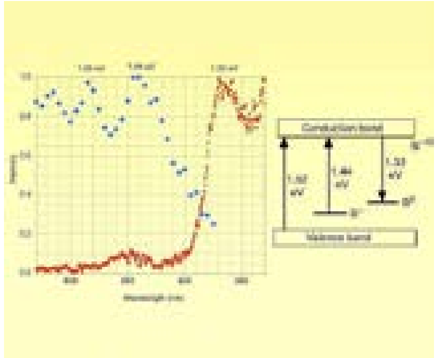
Called the Leading Arm, this arching collection of gas connects the Magellanic Clouds to the Milky Way. Roughly half the size of our galaxy, this structure is thought to be about 1 or 2 billion years old. Its name comes from the fact that it's leading the motion of the Magellanic Clouds.

The enormous concentration of gas is being devoured by the Milky Way and feeding new star birth in our galaxy. But which dwarf galaxy is doing the pulling, and whose gas is now being feasted upon? After years of debate, scientists now have the answer to this "whodunit" mystery.

"There's been a question: Did the gas come from the Large Magellanic Cloud or the Small Magellanic Cloud? At first glance, it looks like it tracks back to the Large Magellanic Cloud," explained lead researcher Andrew Fox of the Space Telescope Science Institute in Baltimore, Maryland. "But we've approached that question differently, by asking: What is the Leading Arm made of? Does it have the composition of the Large Magellanic Cloud or the composition of the Small Magellanic Cloud?"

Fox's research is a follow-up to his 2013 work, which focused on a trailing feature behind the Large and Small Magellanic Clouds. This gas in this ribbon-like structure, called the Magellanic Stream, was found to come from both dwarf galaxies. Now Fox wondered about ..Read More...

The search for dark matter widens



Left: Excitation curve (blue diamonds) and emission curve (red circles) showing that almost all of the emission spectrum of the GaAs scintillator is outside the absorption band. Right: Simplified diagram of excitation and emission processes. The silicon donor provides a population of conduction band electrons that recombine with holes trapped on the boron acceptors. Electron excitations as little as 1.44 eV can produce 1.33 eV photons.

Astronomers have observed that galaxies rotate with such great speed they should be torn apart, yet they are not. It is as if some hidden mass is holding the galaxies together by exerting a gravitational force on ordinary matter.

This unknown mass is known as dark matter. Ordinary matter makes up only 5 percent of all content in the universe, whereas dark matter constitutes more than 25 percent of everything. The remaining 70 percent is known as dark energy, but no one has ever directly observed dark matter or dark energy.

In this week's issue of Journal of Applied Physics, by AIP Publishing, investigators report the discovery of a new material that may be able to directly detect dark matter. The material, known as a scintillator, should be sensitive to dark matter that is lighter than a proton. This will allow the search for dark matter to enter a largely unexplored mass range, below that of the proton.

Dark matter particles heavier than protons are known as weakly interacting massive particles, or WIMPs. Researchers have tried to detect these in several ways, including in underground laboratories where a large amount of shielding can be used, but, so far, they have all failed. To date, nothing is actually known about dark matter's mass, and its detection would have huge implications for our understanding of the universe.

The scintillator material reported in this work operates near absolute zero, or nearly minus 460 degrees Fahrenheit. It detects electrons recoiling from collisions with dark matter particles and consists of a target of ordinary matter, in this case gallium arsenide, or GaAs, doped by a small amount of other elements.

The target emits a photon (a particle of light) after an electron in the target is excited to a high energy state through a collision with a dark matter particle. ...Read More...

Weird superconductor leads double life

One unusual property of superconducting materials is that they expel magnetic fields and thus cause magnets to levitate, as shown here. A study at SLAC and Stanford of a particularly odd superconductor, strontium titanate, will aid understanding and development of these materials. Credit: ViktorCap/iStock

Until about 50 years ago, all known superconductors were metals. This made sense, because metals have the largest number of loosely bound "carrier" electrons that are free to pair up and flow as electrical current with no resistance and 100 percent efficiency – the hallmark of superconductivity.

Then an odd one came along – strontium titanate, the first oxide material and first semiconductor found to be superconducting. Even though it doesn't fit the classic profile of a superconductor – it has very few free-to-roam electrons – it becomes superconducting when conditions are right, although no one could explain why.

Now scientists have probed the superconducting behavior of its electrons in detail for the first time. They discovered it's even weirder than they thought. Yet that's good news, they said, because it gives them a new angle for thinking about what's known as "high temperature" superconductivity, a phenomenon that could be harnessed for a future generation of perfectly efficient power lines, levitating trains and other revolutionary technologies.

The research team, led by scientists at the Department of Energy's SLAC National Accelerator Laboratory and Stanford University, described their study in a paper published Jan. 30 in the Proceedings of the National Academy of Sciences.

"If conventional metal superconductors are at one end of a spectrum, strontium titanate is all the way down at the other end. It has the lowest density of available electrons of any superconductor we know about," said Adrian Swartz, a postdoctoral researcher at the Stanford Institute for Materials and Energy Science (SIMES) who led the experimental part of the research with Hisashi Inoue, a Stanford graduate student at the time.

"It's one of a large number of materials we call 'unconventional' superconductors because they can't be explained by current theories," Swartz said. "By studying its extreme behavior, we hope to gain insight into ...Read More...

Breakthrough in photonic biosensors could lead to super-accurate diagnostic and detectors

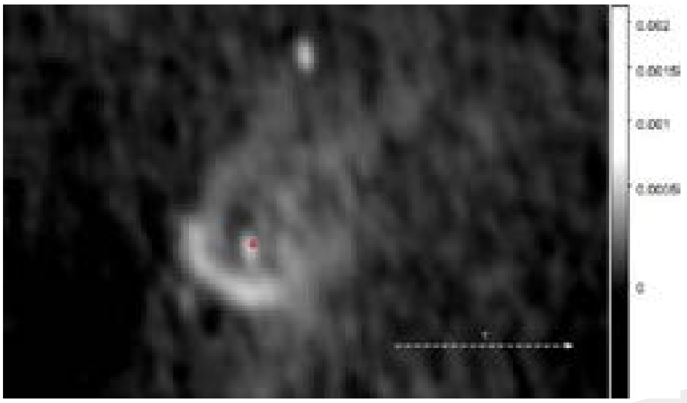
Researcher Steven Arnold observes a whispering gallery mode biosensor setup comprising a microchannel containing a fiber-optic filament, a silica microsphere, and a laser and detector within a small device. Credit: NYU Tandon School of Engineering

University Professor of Applied Physics Stephen Arnold and his team at the New York University Tandon School of Engineering have made a discovery that could lead to Star Trek-like biosensor devices capable of flagging the barest presence in blood of a specific virus or antibody, or protein marker for a specific cancer; or sniffing out airborne chemical warfare agents while they are still far below toxic levels.

The discovery follows years of groundbreaking work by Arnold, who in 1995 discovered that an optical fiber could excite what he termed Whispering Gallery Mode (WGM) in silicon micro-beads less than one-third the diameter of a human hair. Further discoveries and patents led to WGM biosensors capable of gauging the mass of viruses, proteins and other nanoparticles by sending them into spacecraft-like orbit around the micro-bead, thanks to a photonic "tractor beam" caused by the resonating light. Arnold and collaborators then devised a way to make these WGM biosensors sensitive enough to identify even the smallest individual bio-particles from the RNA virus MS2 to single molecules down to 6 zepto-grams (10?21 grams), below the mass of all known cancer markers. Many companies, including Genalyte, employ WGM biosensors in diagnostic products that can perform dozens of bioassays in minutes.

Now, Arnold and his team at NYU Tandon's MicroParticle PhotoPhysics Laboratory for BioPhotonics (MP3L) are the first to find a way to determine the density of charges on an area of a WGM micro-bead's surface, as well as the charge of an ensnared nanoparticle or virus, by measuring how light frequency fluctuates as the tiny particle follows its wobbly course around the sphere. This discovery could allow researchers and manufacturers not just to identify nanoparticles, but to manipulate them. Arnold, who also is a member of the Othmer-Jacobs Department of Chemical and Biomolecular Engineering at NYU, and his fellow researchers, including Jehovani Lopez, Eshan Treasurer, Kaitlynn Snyder, and David Keng, recently ...Read More...

Radio nebula discovered around the pulsar PSR J0855-4644



A zoomed in view showing the radio nebula and the shell structure. The red cross marks the position of the pulsar as reported in Kramer et al. 2003. Credit: Maitra et al., 2018.

Using the Giant Metrewave Radio Telescope (GMRT) in India, an international team of astronomers has detected a diffuse radio emission forming a nebula around the pulsar PSR J0855-4644. The finding is reported March 9 in a paper published on the arXiv pre-print repository.

Discovered in 2003, PSR J0855-46444 is a young and energetic pulsar located some 3,000 light years away in the Vela region. Although the presence of an X-ray nebula surrounding this pulsar was detected by previous observations using NASA's Chandra X-ray observatory and ESA's XMM Newton spacecraft, there is an ongoing search for its radio counterpart.

Finding such X-ray and radio emission could be key for our understanding of the so-called pulsar wind nebulae (PWNe). Astronomers believe that pulsars lose a significant part of their energy via relativistic winds which, upon interactions with the ambient medium, produce a synchrotron powered nebula emitting from radio to beyond the X-ray bands.

In January 2017, a group of researchers led by Chandreyee Maitra of the Max Planck Institute for Extraterrestrial Physics in Germany, conducted observations of PSR J0855–46444 with the upgraded GMRT (uGMRT). In result, they found a radio counterpart of the PWN surrounding this pulsar.

"We report the discovery of a diffuse radio emission around PSR J0855-4644 using an upgraded GMRT (uGMRT) observation at 1.35 GHz. The radio emission is spatially coincident with the diffuse X-ray pulsar wind nebula (PWN) seen with XMM-Newton but is much larger in extent compared to the compact axisymmetric PWN seen with Chandra," the researchers wrote in the paper.

The astronomers noted that the spatial coincidence of the radio emission with the diffuse X-ray emission suggests that it is the radio counterpart of the PWN. ...Read More...

Scientists detect radio echoes of a black hole feeding on a star

Artist's impression of an inner accretion flow and a jet from a supermassive black hole when it is actively feeding, for example, from a star that it recent tore apart. Credit: ESO/L. Calçada

On Nov. 11, 2014, a global network of telescopes picked up signals from 300 million light years away that were created by a tidal disruption flare—an explosion of electromagnetic energy that occurs when a black hole rips apart a passing star. Since this discovery, astronomers have trained other telescopes on this very rare event to learn more about how black holes devour matter and regulate the growth of galaxies.

Scientists from MIT and Johns Hopkins University have now detected radio signals from the event that match very closely with X-ray emissions produced from the same flare 13 days earlier. They believe these radio "echoes," which are more than 90 percent similar to the event's X-ray emissions, are more than a passing coincidence. Instead, they appear to be evidence of a giant jet of highly energetic particles streaming out from the black hole as stellar material is falling in.

Dheeraj Pasham, a postdoc in MIT's Kavli Institute for Astrophysics and Space Research, says the highly similar patterns suggest that the power of the jet shooting out from the black hole is somehow controlled by the rate at which the black hole is feeding on the obliterated star.

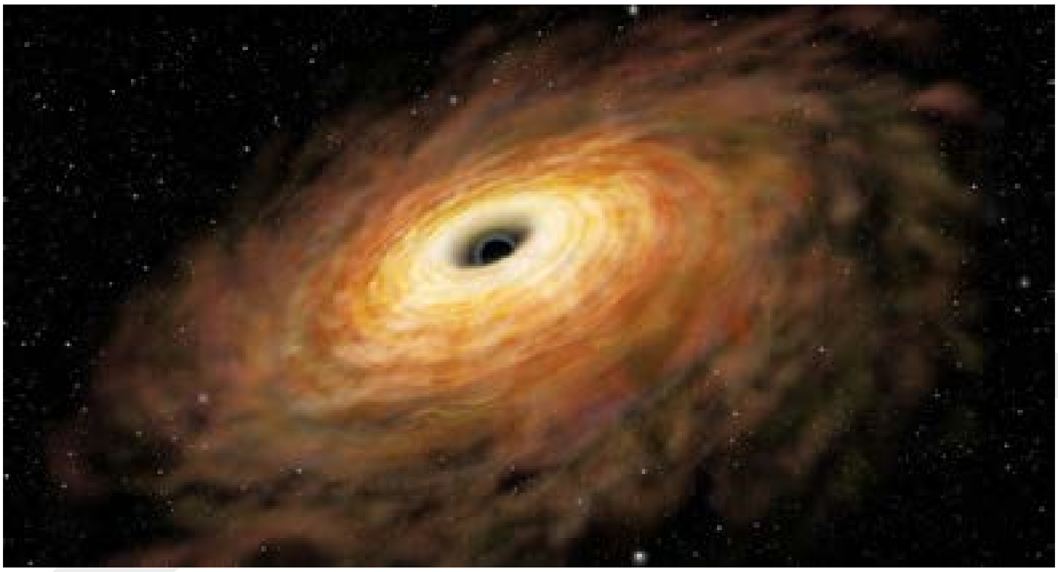
"This is telling us the black hole feeding rate is controlling the strength of the jet it produces," Pasham says. "A well-fed black hole produces a strong jet, while a malnourished black hole produces a weak jet or no jet at all. This is the first time we've seen a jet that's controlled by a feeding supermassive black hole."

Pasham says scientists have suspected that black hole jets are powered by their accretion rate, but they have never been able to observe this relationship from a single event.

"You can do this only with these special events where the black hole is just sitting there doing nothing, and then suddenly along comes a star, giving ..Read More...

Special Read:

Astronomers can't figure out why some black holes got so big so fast



Mark and Scott Kelly. in this artist's rendition, have been spotted in the early universe — before they should have had time to grow.

The existence of supermassive black holes in the early universe has never made much sense to astronomers. Sightings since 2006 have shown that gargantuan monsters with masses of at least a billion suns were already in place when the universe was less than a billion years old - far too early for them to have formed by conventional means.

One or two of these old massive objects could be dismissed as freaks, says theoretical astrophysicist Priyamvada Natarajan of Yale University. But to date, astronomers have spotted more than 100 supermassive black holes that existed before the universe was 950 million years old. "They're too numerous to be freaks now," she says. "You have to have a natural explanation for how these things came to be."

The usual hypotheses are that these black holes were either born unexpectedly big, or grew up fast. But recent finds are challenging even those theories and may force astronomers to rethink how these black holes grow.

In the modern universe, black holes typically form from massive stars that collapse under their own gravity at the ends of their lives. They usually start out smaller than 100 solar masses and can grow either by merging with another black hole (SN: 3/19/16, p. 10) or by accreting gas from their environment (SN Online: 12/6/17).

That gas often organizes itself into a disk that spirals into the black hole, with friction heating the disk to white-hot temperatures that create a brilliant glow visible across billions of light-years. These black holes feeding on gas are called quasars. The faster a quasar eats, the brighter its disk glows.

But the glow from that gas also limits the black hole's growth: The bright disk's photons push away fresh material. That sets a physical limit on how fast black holes of a given mass can grow. Astronomers express how fast a black hole is eating with a term called the Eddington ratio, measuring the black hole's actual brightness in relation to the brightness it would have if it were eating as fast as it possibly could.

Finicky feeders

Astronomers have measured Eddington ratios for only about 20 supermassive black holes in the early universe. Most seem to be eating at the limit, in contrast to quasars in the present-day universe that feed at about a tenth that speed. Those furious feeding rates still seem to defy the black holes' supermassive size: A 100-solar-mass black hole accreting at the limit should take about 800 million years to reach a billion solar masses, even taking into account that it would eat faster as it grew. And that 800 million years doesn't include the time it took the initial black hole seed to form.
...Read More...

This Week's Sky at a Glance
Mar. 24-30, 2018

Mar 24	Sa	19:35	First Quarter
Mar 25	Su	06:04	Moon North Dec.: 20.2° N
Mar 26	Mo	21:17	Moon Perigee: 369100 km
Mar 27	Tu	04:52	Moon-Beehive: 2.2° N
		14:56	Moon Ascending Node
Mar 28	We	17:38	Moon-Regulus: 1° S

SCASS Participation at the UAEU SpaceConnect Day
March 19, 2018

The Sharjah Center for Astronomy and Space Sciences (SCASS) at the University of Sharjah (UoS) participated in the "SpaceConnect" Exhibition organized by the United Arab Emirates University, Al Ain. Space centers and institutions from the UAE, as well as students and space enthusiasts, joined the exhibition by showcasing their space sciences research and projects. The show aims to shed light on the significance of space education and technology and the nature of working in the space sciences and research field. It also works to showcase the broad scope of space sciences and research to the students and attendees and encourage them to work on developing the field and space exploration technologies.

During the exhibition, SCASS displayed the research projects the center and the UoS students are working on as well as the services it offers such as educational shows and exhibitions that inform the visitors about astronomy and space sciences. By participating in the "SpaceConnect" exhibition, SCASS aims to encourage students, faculty members, and space enthusiasts to join the center's research projects with the objective of advancing space sciences and technologies. It also aims to encourage them to visit the Sharjah Center for Astronomy and Space Sciences to learn about the history and theories of the creation of the universe.