Jan. 05, 2019 Rabi II 28, 1440 AH Volume 9, Issue 01

# 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



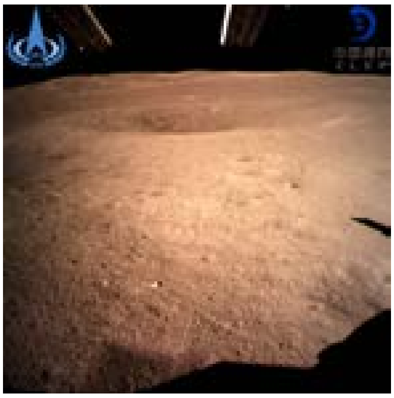
Stay Tuned for IAU100 Activities at SCASS

IAU 100 Years: Under One Sky

جامعة الشارقة
UNIVERSITY OF SHARJAH

IT Support Issam Jami
Design by Mohamed Bakir

# China lands spacecraft on 'dark' side of moon in world first



In this photo provided Jan. 3, 2019, by China National Space Administration via Xinhua News Agency, the first image of the moon's far side taken by China's Chang'e-4 probe. A Chinese spacecraft on Thursday, Jan. 3, made the first-ever landing on the far side of the moon, state media said. The lunar explorer Chang'e 4 touched down at 10:26 a.m., China Central Television said in a brief announcement at the top of its noon news broadcast.(China National Space Administration/Xinhua News Agency via AP)

China's burgeoning space program achieved a lunar milestone on Thursday: landing a probe on the mysterious and misnamed "dark" side of the moon.

Exploring the cosmos from that far side of the moon, which people can't see from Earth, could eventually help scientists learn more about the early days of the solar system and maybe even the birth of the universe's first stars.

Three nations—the United States, the former Soviet Union and more recently China—all have sent spacecraft to the side of the moon that faces Earth, but this landing is the first on the far side. That side has been observed many times from lunar orbit, but never up close.

The China National Space Administration said the 10:26 a.m. touchdown of the Chang'e 4 craft has "opened up a new chapter in human lunar exploration."

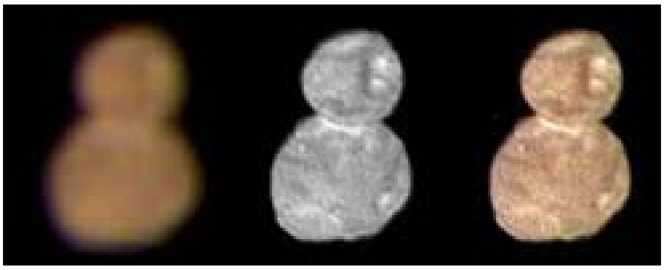
A photo taken at 11:40 a.m. and sent back by Chang'e 4 shows a small crater and a barren surface that appears to be illuminated by a light from the lunar explorer. Its name comes from that of a Chinese goddess who, according to legend, has lived on the moon for millennia.

One challenge of sending a probe to the moon's far side is communicating with it from Earth, so China launched a relay satellite in May to enable Chang'e 4 to send back information.

The mission highlights China's growing ambitions to rival the U.S., Russia and Europe in space, and more broadly, to cement its position as a regional and global power.

"The space dream is part of the dream to make China stronger," President Xi Jinping said after becoming the country's leader in 2013. ...Read More...

# NASA: Icy object past Pluto looks like reddish snowman



This image made available by NASA on Wednesday, Jan. 2, 2019 shows images with separate color and detail information, and a composited image of both, showing Ultima Thule, about 1 billion miles beyond Pluto. The New Horizons spacecraft encountered it on Tuesday, Jan. 1, 2019. (NASA via AP)

A NASA spacecraft 4 billion miles from Earth yielded its first close-up pictures Wednesday of the most distant celestial object ever explored, depicting what looks like a reddish snowman.

Ultima Thule, as the small, icy object has been dubbed, was found to consist of two fused-together spheres, one of them three times bigger than the other, extending about 21 miles (33 kilometers) in length.

NASA's New Horizons, the spacecraft that sent back pictures of Pluto 3½ years ago, swept past the ancient, mysterious object early on New Year's Day. It is 1 billion miles (1.6 billion kilometers) beyond Pluto.

On Tuesday, based on early, fuzzy images taken the day before, scientists said Ultima Thule resembled a bowling pin. But when better, closer pictures arrived, a new consensus emerged Wednesday.

"The bowling pin is gone. It's a snowman!" lead scientist Alan Stern informed the world from Johns Hopkins University's Applied Physics Laboratory , home to Mission Control in Laurel. The bowling pin image is "so 2018," joked Stern, who is with the Southwest Research Institute.

The celestial body was nicknamed Ultima Thule—meaning "beyond the known world"—before scientists could say for sure whether it was one object or two. With the arrival of the photos, they are now calling the bigger sphere Ultima and the smaller one Thule.

Thule is estimated to be 9 miles (14 kilometers) across, while Ultima is thought to be 12 miles (19 kilometers).

Scientist Jeff Moore of NASA's Ames Research Center said the two spheres formed when icy, pebble-size pieces coalesced in space billions of years ago. Then the spheres spiraled closer to each other until they gently touched—as slowly as parking a car here on Earth at just a mile or two per hour—and stuck together.

Despite the slender connection point, the two lobes are "soundly bound" together, according to Moore. ...Read More...

# Galaxy collision could send solar system flying

World's in collision

A nearby galaxy is hurtling towards the Milky Way on a collision course that could fling our solar system into interstellar space.

New research led by astrophysicists at Durham University, UK, predicts that the Large Magellanic Cloud (LMC) could hit the Milky Way in two billion years' time. The collision could occur much earlier than the predicted impact between the Milky Way and another neighbouring galaxy, Andromeda, which scientists say will hit our galaxy in eight billion years.

The catastrophic coming together with the Large Magellanic Cloud could wake up our galaxy's dormant black hole, which would begin devouring surrounding gas and increase in size by up to ten times.

As it feeds, the now-active black hole would throw out high-energy radiation and while these cosmic fireworks are unlikely to affect life on Earth, the scientists say there is a small chance that the initial collision could send our solar system hurtling into space.

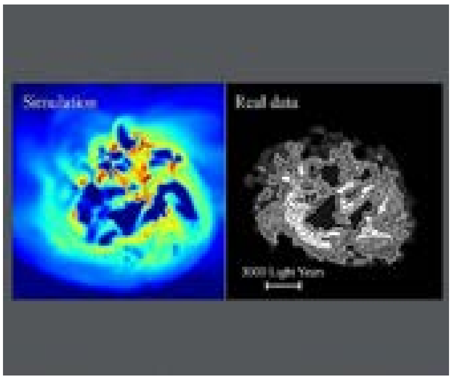
The findings are published Jan 4 in the journal Monthly Notices of the Royal Astronomical Society.

Galaxies like our own Milky Way are surrounded by a group of smaller satellite galaxies that orbit around them, in a similar way to how bees move around a hive. Typically, these satellite galaxies have a quiet life and orbit around their hosts for many billions of years. However, from time to time, they sink to the centre, collide and are devoured by their host galaxy.

The Large Magellanic Cloud is the brightest satellite galaxy of the Milky Way and only entered our neighbourhood about 1.5 billion years ago. It sits about 163,000 light-years from the Milky Way. Until recently astronomers thought that it would either orbit the Milky Way for many billions of years, or, since it moves so fast, escape from our galaxy's gravitational pull.

However, recent measurements indicate that the Large Magellanic Cloud has nearly twice as much dark matter than previously thought. The researchers ...Read More...

# Dark matter on the move




Star formation in tiny dwarf galaxies can slowly "heat up" the dark matter, pushing it outwards. The left image shows the hydrogen gas density of a simulated dwarf galaxy, viewed from above. The right image shows the same for a real dwarf galaxy, IC 1613. In the simulation, repeated gas inflow and outflow causes the gravitational field strength at the centre of the dwarf to fluctuate. The dark matter responds to this by migrating out from the centre of the galaxy, an effect known as 'dark matter heating'. Credit: J. Read et al.

Scientists have found evidence that dark matter can be heated up and moved around, as a result of star formation in galaxies. The findings provide the first observational evidence for the effect known as 'dark matter heating', and give new clues as to what makes up dark matter. The research was published in the journal Monthly Notices of the Royal Astronomical Society.

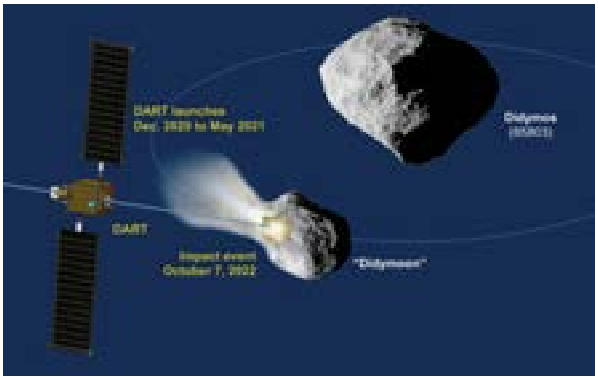
In the new work, scientists from the University of Surrey, Carnegie Mellon University and ETH Zurich set out to hunt for evidence for dark matter at the centres of nearby dwarf galaxies. Dwarf galaxies are small, faint galaxies that are typically found orbiting larger galaxies like our own Milky Way. They may hold clues that could help us to better understand the nature of dark matter.

Dark matter is thought to make up most of the mass of the universe. However since it doesn't interact with light in the same way as normal matter, it can only be observed through its gravitational effects. The key to studying it may however lie in how stars are formed in these galaxies.

When stars form, strong winds can push gas and dust away from the heart of the galaxy. As a result, the galaxy's centre has less mass, which affects how much gravity is felt by the remaining dark matter. With less gravitational attraction, the dark matter gains energy and migrates away from the centre, an effect called 'dark matter heating'.

The team of astrophysicists measured the amount of dark matter at the centres of 16 dwarf galaxies with very different star formation histories. They found that galaxies that stopped forming stars long ago had higher dark matter densities at their centres than those that are still forming stars today. This supports the theory that the older galaxies had less dark matter heating. ..Read More...

# Humanity Will Slam a Spacecraft into an Asteroid in a Few Years to Help Save Us All




This NASA graphic shows how the Double Asteroid Rendezvous Test (DART) will crash into a moonlet of the asteroid Didymos in 2022. Credit: NASA

Humans are preparing to punch the solar system — but in self-defense, not anger.

It's all part of a NASA mission in development called the Double Asteroid Redirection Test, or DART. Unlike most spacecraft the agency has launched to date, DART isn't about gathering scientific data and learning more about how the universe works. Instead, it's NASA's first planetary-defense mission.

"That's one of the big differences, is a lot of the science-driven missions seem to be focused on understanding the past of the solar system, the early solar system, how it all formed," Nancy Chabot, a planetary scientist at Johns Hopkins University's Applied Physics Laboratory and project scientist for DART, told Space.com earlier this month at the annual meeting of the American Geophysical Union. "Planetary defense is really about the present solar system and what are we going to do in the present."

Specifically, planetary defense is about largish asteroids that could theoretically collide with Earth, and what humans could do to protect ourselves. Slam into an asteroid hard enough while it's sufficiently far away from Earth, and you can bump it off course.

But if you've never slammed into an asteroid before, it's difficult to know precisely the best way to do it. And that's where DART comes in. Its target isn't a threat to Earth, but by studying it carefully and then colliding with it, Chabot and the rest of the DART team will create the data humans will need if they ever want to redirect a truly threatening asteroid.

It's a very different type of mission from the other asteroid visits that have drawn headlines this year, such as those of NASA's OSIRIS-REx and Japan's Hayabusa2, which each made strides toward tapping near-Earth asteroids to collect samples to bring home. Scientists hope those samples will help them understand the solar system's earliest days. ...Read More...

# Tiny satellites could be 'guide stars' for huge next-generation telescopes

In the coming decades, massive segmented space telescopes may be launched to peer even closer in on far-out exoplanets and their atmospheres. To keep these mega-scopes stable, MIT researchers say that small satellites can follow along, and act as "guide stars," by pointing a laser back at a telescope to calibrate the system, to produce better, more accurate images of distant worlds. Credit: Christine Daniloff, MIT

There are more than 3,900 confirmed planets beyond our solar system. Most of them have been detected because of their "transits"—instances when a planet crosses its star, momentarily blocking its light. These dips in starlight can tell astronomers a bit about a planet's size and its distance from its star.

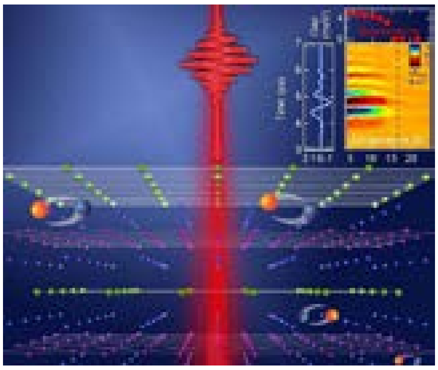
But knowing more about the planet, including whether it harbors oxygen, water, and other signs of life, requires far more powerful tools. Ideally, these would be much bigger telescopes in space, with light-gathering mirrors as wide as those of the largest ground observatories. NASA engineers are now developing designs for such next-generation space telescopes, including "segmented" telescopes with multiple small mirrors that could be assembled or unfurled to form one very large telescope once launched into space.

NASA's upcoming James Webb Space Telescope is an example of a segmented primary mirror, with a diameter of 6.5 meters and 18 hexagonal segments. Next-generation space telescopes are expected to be as large as 15 meters, with over 100 mirror segments.

One challenge for segmented space telescopes is how to keep the mirror segments stable and pointing collectively toward an exoplanetary system. Such telescopes would be equipped with coronagraphs—instruments that are sensitive enough to discern between the light given off by a star and the considerably weaker light emitted by an orbiting planet. But the slightest shift in any of the telescope's parts could throw off a coronagraph's measurements and disrupt measurements of oxygen, water, or other planetary features.

Now MIT engineers propose that a second, shoebox-sized spacecraft equipped with a simple laser could fly at a distance from the large space telescope and act as a "guide star," providing a steady, bright light near ...Read More...

# A competing state of matter in superconducting material uncovered



Ames Laboratory researchers used laser pulses of less than a trillionth of a second in much the same way as flash photography, in order to take a series of snapshots. Called terahertz spectroscopy, this technique can be thought of as "laser strobe photography" where many quick images reveal the subtle movement of electron pairings inside the materials using long wavelength far-infrared light.

A team of experimentalists at the U.S. Department of Energy's Ames Laboratory and theoreticians at University of Alabama Birmingham discovered a remarkably long-lived new state of matter in an iron pnictide superconductor, which reveals a laser-induced formation of collective behaviors that compete with superconductivity.

"Superconductivity is a strange state of matter, in which the pairing of electrons makes them move faster," said Jigang Wang, Ames Laboratory physicist and Iowa State University professor.

"One of the big problems we are trying to solve is how different states in a material compete for those electrons, and how to balance competition and cooperation to increase temperature at which a superconducting state emerges."

To get a closer look, Wang and his team used laser pulses of less than a trillionth of a second in much the same way as flash photography, in order to take a series of snapshots.

Called terahertz spectroscopy, this technique can be thought of as "laser strobe photography" where many quick images reveal the subtle movement of electron pairings inside the materials using long wavelength far-infrared light.

"The ability to see these real time dynamics and fluctuations is a way to understanding them better, so that we can create better superconducting electronics and energy-efficient devices," said Wang. ....Read More...

# Physicists record 'lifetime' of graphene qubits

Researchers from MIT and elsewhere have recorded the "temporal coherence" of a graphene qubit - how long it maintains a special state that lets it represent two logical states simultaneously - marking a critical step forward for practical quantum computing.

Researchers from MIT and elsewhere have recorded, for the first time, the "temporal coherence" of a graphene qubit - meaning how long it can maintain a special state that allows it to represent two logical states simultaneously. The demonstration, which used a new kind of graphene-based qubit, represents a critical step forward for practical quantum computing, the researchers say.

Superconducting quantum bits (simply, qubits) are artificial atoms that use various methods to produce bits of quantum information, the fundamental component of quantum computers. Similar to traditional binary circuits in computers, qubits can maintain one of two states corresponding to the classic binary bits, a 0 or 1. But these qubits can also be a superposition of both states simultaneously, which could allow quantum computers to solve complex problems that are practically impossible for traditional computers.

The amount of time that these qubits stay in this superposition state is referred to as their "coherence time." The longer the coherence time, the greater the ability for the qubit to compute complex problems.

Recently, researchers have been incorporating graphene-based materials into superconducting quantum computing devices, which promise faster, more efficient computing, among other perks. Until now, however, there's been no recorded coherence for these advanced qubits, so there's no knowing if they're feasible for practical quantum computing.

In a paper published Dec 31 in Nature Nanotechnology, the researchers demonstrate, for the first time, a coherent qubit made from graphene and exotic materials. These materials enable the qubit to change states through voltage, much like transistors in today's traditional computer chips - and unlike most other types of superconducting qubits. Moreover, the researchers put a number to that coherence, clocking it at 55 nanoseconds, before the qubit returns to its ground state. ...Read More...

# Quantum chemistry on quantum computers

file illustration only

Quantum computing and quantum information processing technology have attracted attention in recently emerging fields. Among many important and fundamental issues in nowadays science, solving Schroedinger Equation (SE) of atoms and molecules is one of the ultimate goals in chemistry, physics and their related fields. SE is "First Principle" of non-relativistic quantum mechanics, whose solutions termed wave-functions can afford any information of electrons within atoms and molecules, predicting their physicochemical properties and chemical reactions.

Researchers from Osaka City University (OCU) in Japan, Dr. K. Sugisaki, Profs. K. Sato and T. Takui and coworkers have found a novel quantum algorithm enabling us to perform full configuration interaction (Full-CI) calculations suitable for "chemical reactions" without exponential/combinatorial explosion. Full-CI gives the exact numerical solutions of SE, which are intractable problems with any supercomputers.

Such a quantum algorithm contributes to the acceleration of implementing practical quantum computers. Nowadays chemistry and physics have sought to predict complex chemical reactions by invoking Full-CI approaches since 1929, but never been successful until now. Now Full-CI calculations are potentially capable of predicting chemical reactions, and a new Full-CI approach suitable for the prediction is implemented on quantum computers, for the first time.

The paper will be published at 8:00 AM on Jan. 2, 2019 (US Eastern Time Zone) in ACS (American Chemical Society) Central Science.

They said, "As Dirac claimed in 1929 when quantum mechanics was established, the exact application of mathematical theories to solve SE leads to equations too complicated to be soluble. In fact, the number of variables to be determined in the Full-CI method grows exponentially against the system size, and it easily runs into astronomical figures such as exponential explosion.

For example, the dimension of the Full-CI calculation for benzene molecule C6H6, in which only 42 electrons are involved, amounts to 1044, which are impossible to be dealt with by any supercomputers. What is worse, molecular systems during the dissociation process are characterized by extremely complex electronic structures (multiconfigurational nature), and relevant numerical ...Read More...

# Machine learning speeds up atomistic simulations of water and ice

Credit: pexels.com/pexels license)

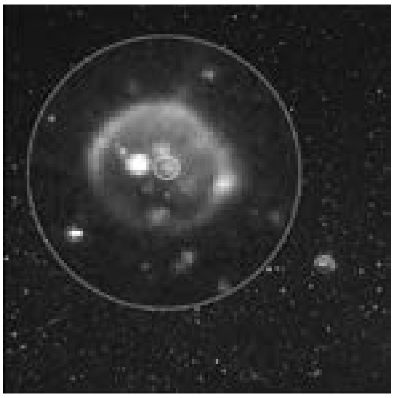
Why is water densest at around 4 degrees Celsius? Why does ice float? Why does heavy water have a different melting point compared to normal water? Why do snowflakes have a six-fold symmetry? A collaborative study of researchers from the École Polytechnique Fédérale de Lausanne, the University of Göttingen and the University of Vienna and just published in the Proceedings of the National Academy of Sciences of the USA, provides physical insights into these questions by marrying data-driven machine learning techniques and quantum mechanics.

The building blocks of most observable matters are electrons and nuclei. Following the laws of quantum mechanics, their behavior can be described in terms of their wave function, sort of a diffuse cloud that is related to the probability of observing them in a given point and time. By solving the Schrodinger equation, it is possible to make models and predictions of any material, including water. But there is a catch. As the number of electrons and nuclei increases, the complexity involved soon become intractable even with the fastest supercomputers, and even after a century of celebrated progress in optimizing such calculations. In fact, quantum mechanical calculations are still unaffordable for systems with more than a few hundred atoms, or for a time period longer than a nanosecond, which is 1/1,000,000,000th of a second.

To overcome these harsh limitations, the researchers exploited an artificial neural network (ANN) to learn the atomic interactions from quantum mechanics. The architecture of ANNs can be represented as several layers of interconnected nodes, which mimics the structure of the neurons in a human brain. The ANN first learns quantum mechanical interactions between atoms, and then make speedy predictions about the energy and forces for a system of atoms, bypassing the need to perform expensive quantum mechanical calculations.

So far, it all rather sounds like a typical success story of machine learning. However, there are subtleties. The ANN has a residual error compared to the actual quantum mechanical calculations: most of the times it introduces a small noise, and sometime it makes a wild guess if an input is very different from anything it has learned. How to avoid the pitfalls of the ANN? Instead of employing ANN on its own to make predictions about ...Read More...

# Juno mission captures images of volcanic plumes on Jupiter's moon Io



Juno's Radiation Monitoring Investigation collected this image of Jupiter's moon Io with Juno's Stellar Reference Unit (SRU) star camera shortly after Io was eclipsed by Jupiter at 12:40:29 (UTC) Dec. 21, 2018. Io is softly illuminated by moonlight from another of Jupiter's moons, Europa. The brightest feature on Io is suspected to be a penetrating radiation signature. The glow of activity from several of Io's volcanos is seen, including a plume circled in the image. Credit: NASA/JPL-Caltech/SwRI

A team of space scientists has captured new images of a volcanic plume on Jupiter's moon Io during the Juno mission's 17th flyby of the gas giant. On Dec. 21, during winter solstice, four of Juno's cameras captured images of the Jovian moon Io, the most volcanic body in our solar system. JunoCam, the Stellar Reference Unit (SRU), the Jovian Infrared Auroral Mapper (JIRAM) and the Ultraviolet Imaging Spectrograph (UVS) observed Io for over an hour, providing a glimpse of the moon's polar regions as well as evidence of an active eruption.

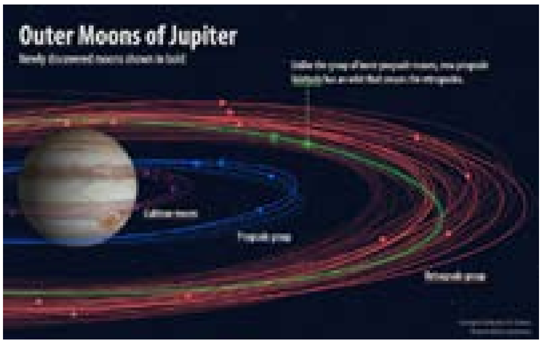
"We knew we were breaking new ground with a multi-spectral campaign to view Io's polar region, but no one expected we would get so lucky as to see an active volcanic plume shooting material off the moon's surface," said Scott Bolton, principal investigator of the Juno mission and an associate vice president of Southwest Research Institute's Space Science and Engineering Division. "This is quite a New Year's present showing us that Juno has the ability to clearly see plumes."

JunoCam acquired the first images on Dec. 21 at 12:00, 12:15 and 12:20 coordinated universal time (UTC) before Io entered Jupiter's shadow. The Images show the moon half-illuminated with a bright spot seen just beyond the terminator, the day-night boundary.

"The ground is already in shadow, but the height of the plume allows it to reflect sunlight, much like the way mountaintops or clouds on the Earth continue to be lit after the sun has set," explained Candice Hansen-Koharcheck, the JunoCam lead from the Planetary Science Institute.

At 12:40 UTC, after Io had passed into the darkness of total eclipse behind Jupiter, sunlight reflecting off nearby moon Europa helped to illuminate Io and its plume. SRU images released by SwRI depict Io softly illuminated by moonlight from Europa. The brightest feature on Io in the image is thought to be a penetrating ...Read More...

# How we found Jupiter's 79 (at least) moons




One of Jupiter's newest moons orbits prograde (normally), but since it's among the retrograde (backwards) moon group, it's probably marked for a deadly collision before too long.
Roberto Molar-Candanosa/Carnegie Institution for Science)

Jupiter is king of the planets. It's huge, it's bright in our night skies, and even four of its comparatively tiny moons are bright enough to see with the most basic of telescopes. We've sent nine probes either into orbit or on a close flyby of the planet. And yet, as recently as this past year, we discovered not one, but twelve new moons around Jupiter, bringing the total to 79. How haven't we exhausted this particular moon mine yet?

**The easy targets first**

The answer is that most of Jupiter's moons aren't the grand companion that our own moon is to Earth, at nearly a quarter as wide as its host planet. The four moons first spotted by Galileo in 1610 – Io, Europa, Ganymede and Callisto – are big enough compared to our moon, but absolutely puny when compared to Jupiter, the planet they circle. And those are the easy targets. It makes discovering new moons against its bulk difficult.

It took the advent of photography before astronomers discovered any more moons around Jupiter, and the work over the next century or so was painstaking. By the time Voyager cruised by in 1979, the giant was up to 13 moons. Voyager added three to the count: Metis, Adrastea, and Thebe.

All three of these plus Amalthea (discovered in 1892 by famed astronomer E.E. Barnard) and the original Galilean moons comprise Jupiter's regular moon group. This means they're more or less spherical, orbit in the same direction that Jupiter spins and do so on well-behaved, near-circular orbits that don't tip much out of the plane of Jupiter's equator. In other words, what you probably imagine a moon to be.

The rest are the irregular moons, and these make up the vast majority of Jupiter's satellites. These tend more toward potato shapes, and their orbits are often eccentric, tilted, or even retrograde, meaning they fly backwards to Jupiter's spin. Most are probably captured asteroids or the results of long-ago collisions of larger bodies – perhaps past moons of Jupiter. They're tiny and tend to orbit farther out from Jupiter than the ...Read More...

# Special Read:

## The Exotic Sources of the Universe's Most Extreme Light

Cosmic radiation can come from clusters of huge, hot stars like NGC 3603, found surrounded by this colorful nebula 20,000 light-years away in the constellation Carina. Credit: NASA/U. Virginia/INAF, Bologna, Italy/USRA/Ames/STScI/AURA

We're all familiar with light, in some form or another. Some light we can see, like the relatively narrow visible spectrum incorporating the colors of the rainbow. Other light we can't see but we can feel: For instance, the heat we sense from the sun on a warm summer day is from the invisible infrared radiation pouring out from our parent star. And there's even light we can only detect through extreme doses: the ultraviolet burn from a long day at the beach or the hazardous effects of gamma-rays from a radioactive object.

It's this extreme light that has the most exotic sources in the universe. While most forms of radiation come from the trillions upon trillions of relatively serene stars or the ultracool background of leftover light from the Big Bang itself (the cosmic microwave background), the cosmos is full of some fantastically energetic events. And in those events we find some truly out-this-world methods of manufacturing radiation.

**Round and round we go**

Imagine a typical radio antenna, which generates radiation (in the form of radio waves for you to tune into on your car stereo) by waving electrons up and down its length. Back-and-forth, forth-and-back, those accelerating, charged particles send out sloshing radio signals from the antenna.

Imagine cranking up the speed of the bouncing electrons, sending them frantically traveling up and down the antenna, in the process generating stronger radio waves. That would quickly get exhausting, so to make things more efficient, you bend the antenna into the path of a circle and use something like superpowerful magnets to send those charges screaming along at close to the speed of light.

Now, "acceleration" can mean stopping and starting, as in the case of a linear radio antenna, but it can also mean changing direction, like following the path of a circle, as in the case of our new contraption. So those whirling electrons still manage to send out radiation and are now capable of emitting high-energy ultraviolet and X-rays. And instead of spreading that radiation around in a broad splash, it's concentrated into a narrow beam, looking more like the headlights of a car turning a fast corner.

This radiation was first observed in a synchrotron (a device for doing exactly as described above), hence the name synchrotron radiation, but nature is able to make this in abundance: Anytime strong magnetic fields get together with electrons, like the jets blasting out of active galactic nuclei, the synchrotron party can get started.

**Warp speed**

We all know that the speed of light is the speed of light – the fastest speed of all. Nothing can ever beat a beam of light in a one-on-one drag race ... in pure vacuum. But when traveling through a material, the speed of light can slow down considerably. In water, for example, radiation travels at only three-quarters of its usual blistering pace.

..Read More...

## This Week's Sky at a Glance - Jan. 05-11, 2019

| | | | |
|---|---|---|---|
| **Jan. 06** | Su | 05:28 | New Moon |
| | | 05:41 | Partial Solar Eclipse (Not Visible) |
| | | 08:59 | Venus Elongation: 47° W |
| **Jan. 07** | Mo | 04:08 | Moon Descending Node |
| **Jan. 09** | We | 08:29 | Moon Apogee: 406100 km |

## Stay Tuned for IAU100 Activities at SCASS

Being the UAE National Coordinator of IAU 100, the Sharjah Center for Astronomy and Space Sciences is setting a rich program of activities during 2019 to mark the centennial of the International Astronomical Union.. This program will fit all categories: general public, students, and professionals as well. More than 100 activities are planned. Among them, we have special astronomy road shows (school visits), extra Wednesday monthly lectures (2nd and 4th Wednesday), extra open observatory house (SCASS and outside), space camps, astronomy photo exhibitions, special laboratories visits, i.e., open house to the research laboratories, TV and radio programs, Thursdays Planetarium shows, Mall participation in space exhibition, astrophotography workshops, Astronomy Teachers Workshops, telescope Workshops, etc.

IAU

100 YEARS: UNDER ONE SKY