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Astronomy & Physics Weekly News

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

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

Top News

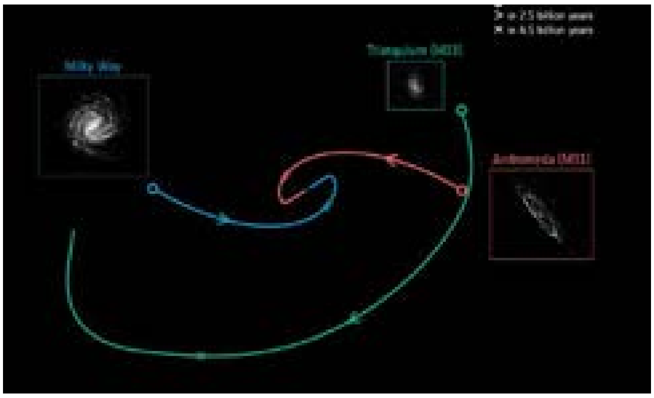
The Physical Properties of Luminous Infrared Galaxies
by Prof. Vassilis Charmandaris
(Univ. of Crete - Greece)

جامعة الشارقة
UNIVERSITY OF SHARJAH

IAU
100 Years: Under One Sky

IT Support Issam Jami Design by Mohamed Bakir

Gaia clocks new speeds for Milky Way-Andromeda collision



The future orbital trajectories of three spiral galaxies: our Milky Way (blue), Andromeda, also known as M31 (red), and Triangulum, also known as M33 (green). The circle indicates the current position of each galaxy, and their future trajectories have been calculated using data from the second release of ESA's Gaia mission. The Milky Way is shown as an artist's impression, while the images of Andromeda and Triangulum are based on Gaia data. Arrows along the trajectories indicate the estimated direction of each galaxy's motion and their positions, 2.5 billion years into the future, while crosses mark their estimated position in about 4.5 billion years. Approximately 4.5 billion years from now, the Milky Way and Andromeda will make their first close passage around one another at a distance of approximately 400 000 light-years. The galaxies will then continue to move closer to one another and eventually merge to form an elliptical galaxy. The linear scale of 1 million light years refers to the galaxy trajectories; the galaxy images are not to scale. Credit: Orbits: E. Patel, G. Besla (University of Arizona), R. van der Marel (STScI); Images: ESA (Milky Way); ESA/Gaia/DPAC (M31, M33)

ESA's Gaia satellite has looked beyond our Galaxy and explored two nearby galaxies to reveal the stellar motions within them and how they will one day interact and collide with the Milky Way – with surprising results.

Our Milky Way belongs to a large gathering of galaxies known as the Local Group and, along with the Andromeda and Triangulum galaxies – also referred to as M31 and M33, respectively – makes up the majority of the group's mass.

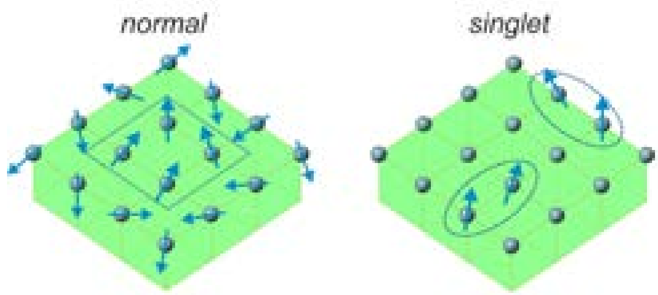
Astronomers have long suspected that Andromeda will one day collide with the Milky Way, completely reshaping our cosmic neighbourhood. However, the three-dimensional movements of the Local Group galaxies remained unclear, painting an uncertain picture of the Milky Way's future.

"We needed to explore the galaxies' motions in 3D to uncover how they have grown and evolved, and what creates and influences their features and behaviour," says lead author Roeland van der Marel of the Space Telescope Science Institute in Baltimore, USA.

"We were able to do this using the second package of high-quality data released by Gaia."

Gaia is currently building the most precise 3D map of the stars in the nearby Universe, and is releasing its data in stages. The data from the second ...Read More...

Scientists discover new type of magnet



In a normal magnetic material, dense magnetic moments try to align with their neighbors (left). By contrast, in a singlet-based material, unstable magnetic moments pop in and out of existence, and stick to one another in aligned clumps (right). Credit: Lin Miao, NYU's Department of Physics

A team of scientists has discovered the first robust example of a new type of magnet—one that holds promise for enhancing the performance of data storage technologies.

This "singlet-based" magnet differs from conventional magnets, in which small magnetic constituents align with one another to create a strong magnetic field. By contrast, the newly uncovered singlet-based magnet has fields that pop in and out of existence, resulting in an unstable force—but also one that potentially has more flexibility than conventional counterparts.

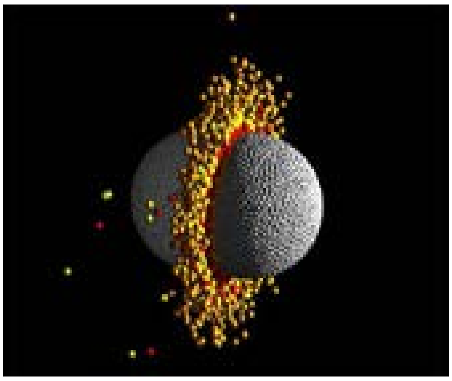
"There's a great deal of research these days into the use of magnets and magnetism to improve data storage technologies," explains Andrew Wray, an assistant professor of physics at New York University, who led the research team. "Singlet-based magnets should have a more sudden transition between magnetic and non-magnetic phases. You don't need to do as much to get the material to flip between non-magnetic and strongly magnetic states, which could be beneficial for power consumption and switching speed inside a computer.

"There's also a big difference in how this kind of magnetism couples with electric currents. Electrons coming into the material interact very strongly with the unstable magnetic moments, rather than simply passing through. Therefore, it's possible that these characteristics can help with performance bottlenecks and allow better control of magnetically stored information."

The work, published in the journal Nature Communications, also included researchers from Lawrence Berkeley National Laboratory, the National Institute of Standards and Technology, the University of Maryland, Rutgers University, the Brookhaven National Laboratory, Binghamton University, and the Lawrence Livermore National Laboratory.

The idea for this type of magnet dates back to the 1960s, based on a theory that stood in sharp contrast to what had long been known about conventional magnets. ..Read More...

Massive collision in the planetary system Kepler 107



The figure shows one frame from the middle of a hydrodynamical simulation of a high-speed head-on collision between two 10 Earth-mass planets. The temperature range of the material is represented by four colors grey, orange, yellow and red, where grey is the coolest and red is the hottest. Such collisions eject a large amount of the silicate mantle material leaving a high-iron content, high-density remnant planet similar to the observed characteristics of Kepler-107c.

Since, in 1995 the first extrasolar planet was discovered almost 4,000 planets have been found around the nearest stars. This allows us to study a large variety of configurations for these planetary systems. The evolution of the planets orbiting other stars can be affected, mainly, by two phenomena: the evaporation of the upper layers of the planet due to the effect of the X-rays and ultraviolet emitted by the central star, and by the impacts of other celestial bodies of the size of a planet.

The former effect has been observed a number of times in extrasolar systems, but until now there have been no proof of the existence of major impacts, as has apparently occurred in the Kepler 107 system.

The central star, Kepler 107, is a bit bigger than the Sun, and has four planets rotating around it; it was the two innermost planets which drew the interest of the astrophysicists. Using data from NASA's Kepler satellite and from the National Galileo Telescope (TNG) at the Roque de los Muchachos Observatory (Garafia, La Palma, Canary Islands), the team determined the parameters of the star, and measured the radii and masses of these planets. Although the innermost two have similar radii their masses are very different. In fact the second is three times denser than the first.

The extraordinarily high density of the planet Kepler 107c is more than double that of the Earth. This exceptional density for a planet has intrigued researchers, and suggests that its metallic core, its densest part, is anomalously big for a planet.

This would be still considered normal if it were not for the prediction that photo-evaporation causes the densest planet in a system to be the nearest to its star. To explain how it is possible that, in this case, the nearest has only half the density of the second, the hypothesis was proposed that the planet Kepler 107c was ...Read More...

Bubbles of brand new stars

This dazzling region of newly forming stars in the Large Magellanic Cloud (LMC) was captured by the Multi Unit Spectroscopic Explorer instrument on ESO's Very Large Telescope. The relatively small amount of dust in the LMC and MUSE's acute vision allowed intricate details of the region to be picked out in visible light.

This region of the Large Magellanic Cloud (LMC) glows in striking colours in this image captured by the Multi Unit Spectroscopic Explorer (MUSE) instrument on ESO's Very Large Telescope (VLT). The region, known as LHA 120-N 180B - N180 B for short - is a type of nebula known as an H II region (pronounced "H two"), and is a fertile source of new stars.

The LMC is a satellite galaxy of the Milky Way, visible mainly from the Southern Hemisphere. At only around 160 000 light-years away from the Earth, it is practically on our doorstep. As well as being close to home, the LMC's single spiral arm appears nearly face-on, allowing us to inspect regions such as N180 B with ease.

H II regions are interstellar clouds of ionised hydrogen - the bare nuclei of hydrogen atoms. These regions are stellar nurseries - and the newly formed massive stars are responsible for the ionisation of the surrounding gas, which makes for a spectacular sight. N180 B's distinctive shape is made up of a gargantuan bubble of ionised hydrogen surrounded by four smaller bubbles.

Deep within this glowing cloud, MUSE has spotted a jet emitted by a fledgling star - a massive young stellar object with a mass 12 times greater than our Sun. The jet - named Herbig-Haro 1177, or HH 1177 for short - is shown in detail in this accompanying image. This is the first time such a jet has been observed in visible light outside the Milky Way, as they are usually obscured by their dusty surroundings.

However, the relatively dust-free environment of the LMC allows HH 1177 to be observed at visible wavelengths. At nearly 33 light-years in length, it is one of the longest such jets ever observed.

HH 1177 tells us about the early lives of stars. The beam is highly collimated; it barely spreads out as it travels. Jets like this are associated with the accretion discs of their star, and can shed light on how fledgling stars gather matter....Read More...

Scientists simulate a black hole in a water tank

Scientists simulate a black hole in a water tank. A Brazilian researcher participated in the study, which reproduced the oscillation patterns of gravitational waves and has been published in Physical Review Letters.

Certain phenomena that occur in black holes but cannot be directly observed in astronomic investigations can be studied by means of a laboratory simulation. This is possible due to a peculiar analogy between processes that are characteristic of black holes and hydrodynamic processes. The common denominator is the similarity of wave propagation in both cases.

This possibility is explored in a new article published in Physical Review Letters. Physicist Mauricio Richartz, a professor at the Federal University of the ABC (UFABC) in Brazil, is one of the authors of the article, produced by Silke Weinfurtner's group at the University of Nottingham's School of Mathematical Sciences in the UK. The research was supported by FAPESP via the Thematic Project "Physics and geometry of spacetime", for which Alberto Vazquez Saa is the principal investigator.

"While this study is entirely theoretical, we've also performed experimental simulations at Weinfurtner's lab," Richartz told Agencia FAPESP. "The apparatus consists basically of a large water tank measuring 3 meters by 1.5 meter. The water flows out through a central drain and is pumped back in, so that the system reaches a point of equilibrium in which the quantity of inflow is equal to the quantity of outflow. We simulate a black hole in this way."

He provided further details to explain how this was done. "The water flow speeds up as it approaches the drain. When we produce waves on the surface of the water, we obtain two important velocities: the velocity of wave propagation and the velocity of the overall water flow," he said.

"Far from the drain, wave velocity is much higher than fluid velocity, so waves can propagate in any direction. The situation is different near the drain, however. Fluid velocity is much higher than wave velocity, so the waves are dragged down by the water flow even when they're propagating in the opposite direction. This is how a black hole can be simulated in the lab."

In a real astrophysical black hole, its gravitational attraction captures matter and prevents waves of any kind from escaping, including light waves. ..Read More...

Galactic twist: The Milky Way's disk is warped

The Milky Way galaxy's new shape has a twist — exaggerated here for illustrative purposes. Chao Liu, National Astronomical Observatories, Chinese Academy of Sciences

By mapping the distances to over 1,000 pulsating stars, astronomers have discovered a distinct kink in the Milky Way's disk. The shape of the Milky Way, usually pictured as a flat spiral, may actually be more like a warped and twisted disk. That's according to a new study of 1,339 stars whose distances could be measured with great accuracy. The resulting map reveals a tipped, uneven disk of material different from our standard picture.

Mapping Pulsating Stars

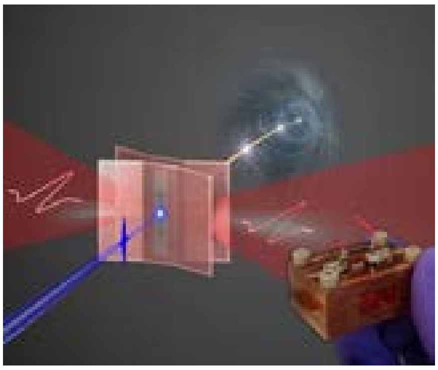
The 1,339 stars are all Cepheid variables, a type of pulsating star whose intrinsic brightness depends on how long it takes to vary from bright to dim and back again. Normally, it's difficult to tell if a star is truly bright or simply close, truly dim or simply very far away. Since a Cepheid's period tells astronomers how bright the star truly is, measuring how bright it appears lets astronomers draw an accurate distance map.

Astronomers looked at data from the WISE survey of infrared stars and noted that it contained a large sample of Cepheids. By measuring their distances and then plotting those stars in 3D, the team from Macquarie University in Australia and the Chinese Academy of Sciences have produced a new map of the Milky Way, one that shows a distinct twist. Their paper is published online today in Nature Astronomy.

Astronomers have known for decades that the gas disk in the Milky Way is warped. But the gas also extends nearly twice as far as the stars in the visible disk and it flares out, extending both higher and lower at the edges than the flat pancake of stars. So the stars don't necessarily follow the gas' shape. It took finding accurate distances to the Cepheid stars to make the stellar map clear. The new data also add a literal twist to the story, showing that the warp precesses, or turns. "The twisting of the warp is new," says astronomer and study co-author Richard deGrijs of Macquarie University in Australia. "It's been seen in a dozen other galaxies before, but not ours."

While the recent study focused on making the map, not explaining it, the authors hypothesize that as the Milky Way's inner disk of stars rotates, it drags ...Read More...

Electron-gun simulations explain the mechanisms of high-energy cosmic rays



File illustration only.

A new study published in EPJ D provides a rudimentary model for simulating cosmic rays' collisions with planets by looking at the model of electrons detached from a negative ion using photons. In this work, Chinese physicists have for the first time demonstrated that they can control the dynamics of negative ion detachment via photons, or photodetachment, on a moving surface.

When cosmic rays collide with planets or debris, they lose energy. Scientists use the collision of electrons with a moving surface to simulate this process. A new study published in EPJ D provides a rudimentary model for simulating cosmic rays' collisions with planets by looking at the model of electrons detached from a negative ion by photons.

In this work, Chinese physicists have for the first time demonstrated that they can control the dynamics of negative ion detachment via photons, or photodetachment, on a moving surface. De-hua Wang from Ludong University, Yantai, China, and colleagues have developed mathematical equations and computer simulations showing that the chance of such photodetachment occurring depends on the electron's energy and the speed of the moving surface.

For this purpose, negative ions, such as chloride (Cl-) or hydrogen (H-) ions, are considered a good source of electrons, as they are made up of one electron loosely bound by a short-ranged energy potential to the neutral atom. Such ions can be made into electron guns under a strong electric field capable of scraping electrons away--thus helping to model electrically charged cosmic rays.

These electron guns generate interference patterns. Indeed, this is triggered by the detached electron wave returning back to the ion's nucleus due to the effect of the external fields interfering with the new electron wave. As the speed of the moving surface reaches a certain threshold, its effect on the chances of photodetachment taking place becomes significant.

The authors also found that the moving surface's effect on the photodetachment of Chloride (Cl-) ..Read More...

Scientists just cleared up a mystery about aurorae

An aurora shimmers above a lake. Luke Stackpoole/Unsplash

Though you may assume the northern and southern lights should mirror each other, researchers have finally shown why this is not always the case.

Aurorae: They're colorful, mesmerizing and, most of all, mysterious. Scientists understand the basic physics behind how charged particles interact with our atmosphere to produce these dancing lights. But the larger mechanics of when, why and how auroras appear still isn't very well understood.

One particular mystery is that the northern and southern lights don't always match up like researchers would expect. For years, scientists assumed that aurora borealis and aurora australis would mirror each other. That is, people in the Arctic and Antarctic Circles would see a similar show if their positions were just right. But recent research has shown that's not the case. And now a team led by scientists from the University of Bergen in Norway thinks they have an answer.

Life in the bubble

If you simply imagine our planet's vast magnetic field like the classic bar magnet moving around iron filings, you'd expect Earth to have a series of symmetrical magnetic lines looping out from the surface and returning in the opposite hemisphere.

But this mental simulation leaves out one thing — the solar wind.

We don't often see it, but we're living inside a bubble. The ocean of molten metal in Earth's core makes our planet into a giant magnet, which powers a sea of magnetic energy extending invisibly far out into space. That's a good thing, too. Our Sun ejects a constant stream of charged particles that sweep past our planet. If we could see the magnetic fields, Earth would look like a tiny island in a torrent of magnetic energy. Our magnetic field pushes against the solar wind and channels it past the planet. That stops dangerous cosmic radiation from reaching the surface, and acts as a buffer against surges of electromagnetic energy from solar storms. ...Read More...

Global warming will cause the world's oceans to change color. Here's why.

A new study finds that in the coming decades, climate change will affect the ocean's color, intensifying regions that appear blue.NASA Earth Observatory

Declining populations of phytoplankton, the basis of the marine food chain, will alter the seawater hues, potentially decimating fisheries.

The world's oceans are warming and growing more acidic as a result of climate change, and a provocative new study suggests they'll be changing color too.

Within a few decades, the study showed, regions of the ocean that now look blue will look bluer. By 2100, the color shift could affect more than 50 percent of the oceans' collective 140 million square miles of surface area.

But it's not the color of the water itself that will change. Rather, it's that populations of marine phytoplankton will fall as seawater warms. Since these tiny organisms contain the green pigment chlorophyll, any change in their numbers affects the water's apparent color.

"These microscopic organisms live in the water and are the base of the marine food chain," said Stephanie Dutkiewicz, a marine ecologist at the Massachusetts Institute of Technology and the leader of the study, published Feb. 4 in the journal Nature Communications. "By being in the water, they change the color that we see by eye. If there are less of them in it, the water will be slightly bluer."

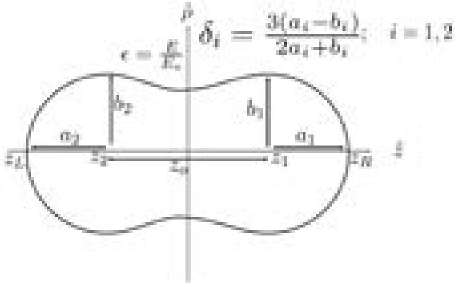
The color shift will likely be too subtle to be seen by the naked eye. But Earth-watching satellites will be able to spot the changes, giving scientists a heads-up that marine ecosystems have undergone a significant and potentially ominous shift.

Dutkiewicz said the North Atlantic Ocean and Southern Ocean appear to be especially vulnerable.

The shift could be ominous because phytoplankton serve as a food source for small sea creatures that, in turn, are eaten by fish, squid and shellfish. If phytoplankton populations dip too low, vital fisheries in certain areas could be decimated.

"Altering our environment is dangerous," Dutkiewicz said. "A lot of people get a lot of their protein from fisheries, so a decline in fisheries could be quite ...Read More...

Solving a mystery: A new model for understanding how certain nuclei split



As the nucleus beings to split into two fragments, it undergoes deformations that have to be precisely accounted in models to be able to accurately make predictions. Credit: Scientific Reports

Scientists at Tokyo Institute of Technology have extended an existing mathematical model so that it can be used to more accurately predict the products of fission reactions.

Nuclear fission is a process by which the nucleus of an atom is split, generally resulting in the formation of two smaller and not necessarily equal atoms (this is called binary fission because there are two fission products). Although fission has been exploited for decades to generate energy in nuclear plants globally, our understanding and models of fission reactions still have many gaps.

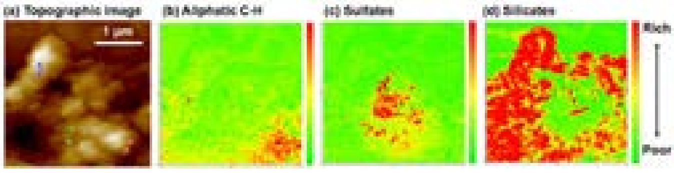
Scientists have observed that there are four distinct fission modes that broadly indicate what type of nuclear species will be generated by a fission event. These modes are related to the shape of the two nuclei right before the nucleus splits completely (scission). Two of them are called standard modes and are asymmetric; they produce a lighter nucleus and a heavier one. The other two are called super-long and super-short fission modes, and both produce two almost identical nuclei.

One model that has been used for predicting the fission products (and their kinetic energy) for various heavy elements involves the 3-D Langevin equations. These 3-D equations are based on three variables that are defined for an atomic nucleus that is about to undergo binary fission: the distance between the centers of the left and right fragments, the deformation of their tips, and their difference in mass or volume, called mass asymmetry.

lthough this model has been successfully used for many heavy nuclei, its predictions failed to match the experimental data for some fermium (256Fm and 258Fm) and mendelevium (260Md) isotopes.

In an attempt to enhance this model and use it to understand what's going on for those isotopes, a team of scientists at Tokyo Institute of Technology (Tokyo Tech), including Prof. Satoshi Chiba, used 4-D Langevin equations. The equations for this new model, which is shown in Fig. "Model for a nucleus about to undergo fission", swapped the variable that indicated the deformation of the fragment's tips for two independent variables that allowed for these deformations to be different instead ...Read More...

The composition of ancient meteorites



Scientists use more powerful imaging techniques to visualize distributions of organic matter (aliphatic C-H) and minerals (sulfates and silicates) in ancient meteorite. Credit: Yokohama National University

A team of Japanese and American scientists has visualized meteorite components at higher resolution than ever before. Their efforts have resulted in an enhanced understanding of substances inside carbonaceous chondrites, the organic-compound-containing meteorites that land on Earth. These substances include hydrogen, carbon, nitrogen and water, all of which are needed for life.

The study was published online on January 2, 2019 in Proceedings of the National Academy of Sciences (PNAS).

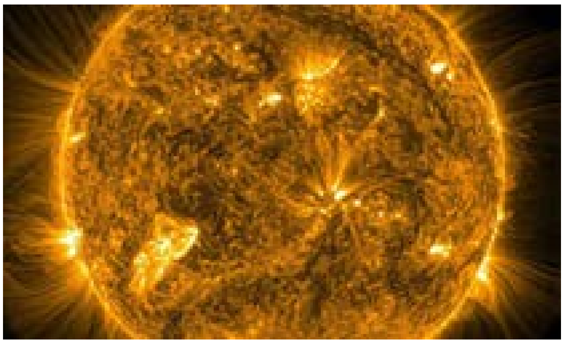
Carbonaceous chondrites are made of materials such as rocks, organics, ice and fine grain dust, most of which were formed in the solar system. The origin of organic matter that is found in meteorites dates back to the formation of the solar system, or approximately 4.5 billion years ago. Therefore, when found on Earth and analyzed in detail, these carbonaceous chondrites are helpful for understanding the history of the solar system, the formation of organic compounds, the presence of water on Earth, and ultimately, the origin of life.

Being able to visualize organic and inorganic components of meteorites that have landed on Earth is important because it enables researchers to understand the effects of external factors such as water and temperature. More specifically, a method that enables researchers to better see and analyze the molecular structures ultimately helps them understand the spatial relationships between organic matter and minerals. This is vital for tracing the formation as well as the evolution of organic matter and ultimately understanding the history of the formation of the solar system. Also, understanding the origin of meteorites is crucial for determining the origins of both water and life on the planet.

However, studies to date have been limited with methods and microscopy that provided images at much lower resolutions. Therefore, formations and evolutions of extraterrestrial organic matter have thus far remained fairly unknown and have only been analyzed after extraction, which is a complicated multi-step process that is prone to many types of methodological errors.

"Researchers have recently mostly conducted analysis for organic matter to see the distributions and associations with inorganic compounds that may help us understand chemistry such as mineral catalyzed synthesis of organic matter, during alteration processes in ..Read More...

Researchers find evidence for a new fundamental constant of the Sun



The Sun's corona - its outermost layer of atmosphere. Credit: Northumbria University, Newcastle

New research undertaken at Northumbria University, Newcastle shows that the sun's magnetic waves behave differently than currently believed.

Their findings have been reported in Nature Astronomy.

After examining data gathered over a 10-year period, the team from Northumbria's Department of Mathematics, Physics and Electrical Engineering found that magnetic waves in the sun's corona – its outermost layer of atmosphere – react to sound waves escaping from the inside of the sun.

These magnetic waves, known as Alfvénic waves, play a crucial role in transporting energy around the sun and the solar system. The waves were previously thought to originate at the sun's surface, where boiling hydrogen reaches temperatures of 6,000 degrees and churns the sun's magnetic field.

However, the researchers have found evidence that the magnetic waves also react – or are excited – higher in the atmosphere by sound waves leaking out from the inside of the sun.

The team discovered that the sound waves leave a distinctive marker on the magnetic waves. The presence of this marker means that the sun's entire corona is shaking in a collective manner in response to the sound waves. This is causing it to vibrate over a very clear range of frequencies.

This newly-discovered marker is found throughout the corona and was consistently present over the 10-year time-span examined. This suggests that it is a fundamental constant of the sun – and could potentially be a fundamental constant of other stars.

The findings could therefore have significant implications for our current ideas about how magnetic energy is transferred and used in stellar atmospheres.

Dr. Richard Morton, the lead author of the report and a senior lecturer at Northumbria ...Read More...

Special Read:

New technology helps address big problems for small satellites

This rendering depicts a device that electromagnetically accelerates plasma to produce thrust - contrasting typical chemical thrusters. In order to create the propellant plasma, a low energy surface flashover (LESF) technique is employed at the beginning of the channel.

CubeSats have become big players in space exploration. Their small size and relatively low cost have made them popular choices for commercial launches in recent years, but the process to propel such satellites in space comes with a number of problems.

Now, Purdue University researchers have developed a technology to address one of those key problems - the uncertainty of the ignition system that initiates the propulsion system of the CubeSats. Current ignition systems are unreliable and can be subject to significant and irreversible damage during the lifespan of the satellite.

“We have created a lower energy triggering technology that uses nanosecond-long pulses, that allows the ignition and propulsion systems to function reliably for a very long time,” said Alexey Shashurin, an assistant professor of aeronautics and astronautics in Purdue’s College of Engineering.

“Specifically, we have successfully tested the ignition system for greater than 1.5 million pulses and it remained operational and almost intact after the test. This is a giant leap for extending the lifetime of electric propulsion systems for CubeSats.”

Their work aligns with Purdue’s Giant Leaps celebration, celebrating the university’s global advancements in space exploration as part of Purdue’s 150th anniversary. This is one of the four themes of the yearlong celebration’s Ideas Festival, designed to showcase Purdue as an intellectual center solving real-world issues.

Overall popularity of the CubeSats is heavily driven by the great advancement in miniaturization of electronic components and sensors that allows for new kinds of space missions and measurements using a CubeSat.

“It is exciting to tackle these new challenges presented on spacecraft of a much smaller scale than in previous years,” Shashurin said. “The next step for the CubeSats is to have a robust propulsion system for necessary maneuvering and station-keeping duties.”

Shashurin and his team worked with the Purdue Office of Technology Commercialization to file a provisional patent on the technology.

The work was published in the Jan. 10 edition of Plasma Research Express. It was also presented during the American Institute of Aeronautics and Astronautics SciTech Forum last month in San Diego.

The team is planning to participate in the National Science Foundation’s I-Corps program, which provides support for conducting extensive customer discovery with an ultimate goal to find industrial partners and commercialize the technology. ..Read More...

This Week's Sky at a Glance - Feb. 09-15, 2019

Feb. 13	We	02:26	First Quarter
Feb. 14	Th	07:29	Moon-Aldebaran: 1.7° S

The Physical Properties of Luminous Infrared Galaxies by Prof. Vassilis Charmandaris (Univ. of Crete - Greece)

Prof. Vassilis Charmandaris (University of Crete, Greece) gave a special lecture at SCASS on Feb. 07, 2019. The lecture was about the "Physical Properties of Luminous Infrared Galaxies." Prof. Vassilis explained that luminous infrared galaxies or LIRGs are galaxies with luminosities, the measurement of brightness, above 1011 that of the Sun. They are also referred to as submillimeter galaxies (SMGs) through their normal method of detection. LIRGs are more abundant than starburst galaxies, Seyfert galaxies and quasi-stellar objects at comparable luminosity. Infrared galaxies emit more energy in the infrared than at all other wavelengths combined. A LIRG's luminosity is 100 billion times that of our Sun.

SCASS's research assistants, as well as students from the University of Sharjah, attended the lecture. Prof. Vassilis also visited the main components of SCASS, i.e., the planetarium, space exhibitions, and the research laboratories. Discussion was conducted to strengthen collaboration with the University of Crete in the domain of astrophysics.

Dr. Charmandaris completed his undergraduate studies in Physics at the University of Thessaloniki. He continued his graduate studies in the US and obtained his Ph.D. in Astrophysics at Iowa State University. After a postdoctoral fellowship with the ISO/CAM group at the Astrophysics section of CEA/Saclay (France), he was awarded a Marie Curie fellowship at the millimeter and infrared department (DEMIRM) at the Observatoire de Paris, in Paris (France). In 1999 he moved back to the US and spent 6 years at the Astronomy Department of Cornell University. There he worked with the group who developed the Infrared Spectrograph of the Spitzer Space Telescope, which was launched by NASA in August 2003. In February 2005, Dr. Charmandaris joined the faculty of the Department of Physics of the University of Crete, and he is currently a Professor of Observational Astrophysics. In September 2013 he commenced his appointment as the Director of the Institute for Astronomy, Astrophysics, Space Applications and Remote Sensing (IAASARS) of the National Observatory of Athens.