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SPACE BEACON

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The Exotic Stellar Population of Westerlund 1 (NIRCam)

The Latest Breakthroughs in Space Exploration

INDIAN TECHNOLOGY CONGRESS ASSOCIATION

Orbital

Lead with the most significant celestial events and discoveries

New Insights into the Milky Way's Magnetic Halo



Astronomers have discovered a vast magnetic halo surrounding the Milky Way, extending over 16,000 light-years beyond the Galactic plane. This groundbreaking finding, led by the National Institute for Astrophysics (INAF), challenges existing models of galactic structure and evolution and reveals that these magnetic structures are linked to the eROSITA Bubbles—massive regions of gas and energy outflows caused primarily by supernova explosions.

The research team utilized radio, optical, and X-ray observations to confirm the connection between these magnetic structures and galactic feedback processes. They identified that the star-forming ring at the end of the Galactic Bar plays a key role in driving powerful outflows, with magnetic fields in the halo organized into thin filaments interacting with hot winds from the Galactic Disc. This research sheds new light on the complex dynamics of the Milky Way and its magnetic fields.

Puzzling Planet: Webb Telescope Discovers lopsided Exoplanet



Astronomers using the James Webb Space Telescope (JWST) have discovered an intriguing asymmetry in the atmosphere of the giant exoplanet WASP-107 b, located 210 light-years away. This "puffy" planet shows a significant difference between its dayside and nightside, which current models do not predict.

As it is tidally locked, one side faces its star while the other remains in perpetual darkness, raising questions about the observed atmospheric variations. With JWST's high precision, researchers analyzed the light filtering through WASP-107 b's atmosphere during a transit, revealing its composition and the unexpected asymmetry. This finding challenges existing understandings of extreme exoplanets and may provide new insights into exoplanet atmospheres as further analysis of the data unfolds.

Chandrayaan-3 Reveals Moon's Ancient Crater



India's Chandrayaan-3 mission has made a groundbreaking discovery by landing its rover in the 3.85-billion-year-old Shiv Shakti Point crater, located in a previously unexplored region of the Moon. The rover's images reveal that the landing site is composed of material from various lunar regions, indicating a complex geological history shaped by numerous impacts over time.

These findings are expected to enhance our understanding of the Moon's formation and evolution. By studying the composition and geology of the landing site, scientists aim to piece together the Moon's past and gain valuable insights into the broader history of our solar system.

Stellar Spectacle: A Nova Erupts in Our Galaxy


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Astronomers worldwide are captivated by the imminent eruption of T Coronae Borealis, a recurrent nova in the Corona Borealis constellation. This long-dead star, affectionately called T Cor Bor, is set to explode in a brilliant display rivaling the North Star, making it a once-in-a-lifetime opportunity for observation since its last eruption nearly 80 years ago. Scientists have noticed a significant dimming in the star's brightness, signaling that the explosion is imminent.

The nova's eruption will be visible to the naked eye for several days, providing not just a stunning spectacle but also valuable scientific insights. Astronomers plan to utilize various telescopes to capture data across gamma rays, X-rays, and visible light, enhancing our understanding of nova dynamics and the behavior of stellar remnants. This remarkable event highlights the wonders of the universe and the ongoing quest for astronomical knowledge.

Webb Telescope Uncovers Secrets on Pluto's Moon Charon


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Astronomers using the James Webb Space Telescope (JWST) have detected carbon dioxide and hydrogen peroxide on Pluto's moon, Charon, revealing new details about its formation and surface processes.

This discovery suggests that carbon dioxide reflects ancient conditions, while hydrogen peroxide indicates ongoing interactions.

Charon’s surface, free from volatile ices, enables clearer geological analysis. This research, combined with data from NASA's New Horizons mission, enhances our understanding of Charon and other icy bodies in the outer solar system.

Comet C/2023 A3 (Tsuchinshan-ATLAS): A Stellar Challenge


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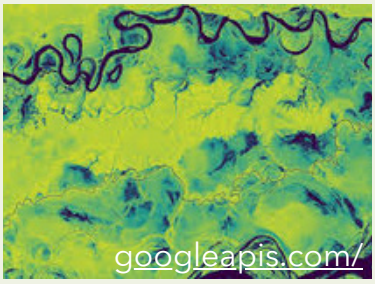
Comet C/2023 A3 (Tsuchinshan-ATLAS) is set to be a major celestial event this year, but its low position in the early morning sky poses a challenge for Northern Hemisphere observers. Currently at its perihelion, the comet is 36.4 million miles from the Sun and gradually approaching Earth. Its visibility is expected to improve significantly in mid-October when it will pass within 43.9 million miles of our planet.

Early risers can try to spot the comet just before sunrise using binoculars or a telescope, near the constellation Sextans below Leo the Lion's front haunches. The comet’s approximately 1° long tail is best seen with long-exposure photography. Other notable sights include the waning crescent Moon in Cancer, the M44 (Beehive Cluster), and the shadow transit of Jupiter's moon Ganymede.

Genspace

Cover broader space news not fitting into other categories

Revolutionizing Forest Carbon Monitoring: Planet Labs' New Product



Planet Labs has introduced a Forest Carbon Monitoring product that provides high-resolution, quarterly measurements of forests worldwide. With 3-meter resolution data, it enables precise tracking of carbon stocks and deforestation rates. Generated through advanced AI processing of PlanetScope images, this tool offers reliable insights applicable at various scales, from individual trees to entire regions.

The product has significant implications for carbon markets, helping assess carbon sequestration project effectiveness, monitor deforestation for regulatory compliance, and track supply chain risks for companies. Overall, it plays a crucial role in combating climate change by supporting forest protection and promoting sustainable development.

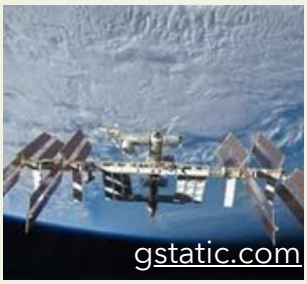
Europe's Lunar Ambitions Take Flight



Europe is preparing for a new era of lunar exploration with the launch of a lunar simulator in Germany, designed to replicate the Moon's surface. This facility will be essential for training astronauts and testing equipment in support of upcoming lunar missions, notably NASA's Artemis program, which aims to return astronauts to the Moon by 2026, and China's plans for a lunar base by 2030.

The European Space Agency (ESA) is a key player in these efforts, collaborating with NASA on Artemis and utilizing its LUNA facility for European astronaut training. While challenges such as the Moon's harsh environment and the need for advanced technologies remain, the potential for scientific discoveries and economic benefits makes the future of lunar exploration promising, fostering international cooperation as humanity prepares for its next giant leap into space.

NASA's Crew-9 Mission to the ISS



NASA's Crew-9 mission was launched to the International Space Station (ISS) on 28 September 2024, where the crew will spend five months conducting scientific investigations in areas such as gene editing, plant growth, and medical research. A notable highlight is a student-led project examining the effects of space radiation on gene editing, which could enhance astronaut safety and deepen our understanding of genetic risks in space.

In addition to biological research, Crew-9 will explore manufacturing in space, testing a new drug for neurodegenerative diseases and developing innovative cold-welding techniques for space repairs. This mission promises to enhance our knowledge of the challenges and opportunities associated with space exploration, paving the way for future advancements.

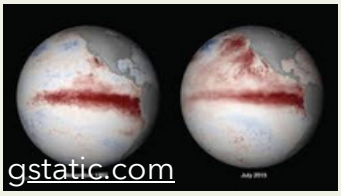
NaNotics Selected for SPACE-H Accelerator Program



NaNotics LLC, a biopharmaceutical company specializing in subtractive nanoparticles, has been selected for the prestigious SPACE-H Accelerator program, aimed at advancing space health innovations. NaNots, the company's novel therapeutic platform, can adsorb and remove disease-causing molecules from the bloodstream, offering potential solutions to space health challenges like accelerated aging and increased disease risk.

NaNots have shown promise in treating cancer and inflammatory diseases, making them ideal for space missions due to their simplicity and ease of administration. The SPACE-H program, supported by NASA and other key partners, highlights NaNotics' potential to enhance astronaut health during space exploration.

AI Revolutionizes Climate Modeling



A new approach using artificial intelligence (AI) is poised to significantly improve climate models. Led by Prof. Veronika Eyring, researchers from Germany, Spain, and the US have integrated AI into climate models, enhancing their accuracy and efficiency.

This innovative approach addresses the limitations of traditional climate models, which often struggle to accurately simulate complex processes. By combining AI with satellite data and climate modeling across different scales, the researchers have created a more accurate representation of the Earth's climate. These improved models can be used for various applications, such as projecting climate change, assessing technology impacts, and creating digital twins of the Earth system. By leveraging AI, climate scientists can gain a deeper understanding of the Earth's climate and develop more effective strategies to address climate change.

Shenzhou 19 crew to launch in late October



The China Manned Space Agency announced plans to launch the Shenzhou-19 mission later in October. This mission will transport a new set of astronauts to China's space station, taking over from the Shenzhou-18 crew, which has been in orbit for nearly six months. The current crew, including veteran astronaut Ye Guangfu, along with Li Cong and Li Guangsu, will soon conclude their time in space and return to Earth.

Ye expressed optimism about the future of Chinese astronauts, stating that more will leave their footprints in space. During their mission, the Shenzhou-18 crew conducted various experiments, including one involving fish in space. Li Guangsu noted that the team had made significant progress on over 90 planned projects. Li Cong mentioned that the crew is now preparing to welcome the Shenzhou-19 astronauts, ensuring the continuation of the "relay of the Shenzhou family" at the space station.

Satellogy

Focus on recent and upcoming satellites and launches

Satellite Altimetry: A New Perspective on Inland Waters



A recent study suggests that longer orbital repeats in satellite altimetry provide more valuable insights into inland waters than shorter, more frequent measurements.

Researchers found that geodetic missions (GMs) with longer repeats offer a more comprehensive understanding of lake variations and large hydrological patterns compared to exact repeat missions (ERMs).

These findings highlight the potential of GM data for advancing hydrological research, allowing for deeper exploration of inland water bodies and contributing to a better understanding of global freshwater systems.

Rocket Lab Completes Second Pioneer Spacecraft for Varda



Rocket Lab has successfully integrated and tested its second Pioneer spacecraft for Varda Space Industries, following Varda's first mission, which involved in-space crystallization of the HIV drug Ritonavir. The second mission will focus on in-space operations, re-entry maneuvers, and the retrieval of another capsule. Varda recently became the first company to secure a second reentry license from the FAA.

The Pioneer spacecraft is designed for complex missions, equipped with systems for power, propulsion, communication, and attitude control. This collaboration between Rocket Lab and Varda highlights the growing potential of space-based manufacturing and re-entry operations, paving the way for future advancements.

Morpheus Space: A Leader in Satellite Mobility



Morpheus Space is a leading company in the field of satellite propulsion. They are developing innovative technologies that enable satellites to move freely in orbit, addressing the growing need for agility and maneuverability in the crowded space environment. With their focus on satellite mobility, Morpheus Space is opening up new possibilities for various applications.

From deorbiting defunct satellites to optimizing communication networks, satellite mobility offers numerous advantages. Morpheus Space is committed to developing cutting-edge propulsion systems that meet the diverse needs of the smallsat industry. By enabling satellites to move freely in orbit, they are contributing to a more sustainable and efficient space environment.

Creating Eclipses on Demand: The Proba-3 Mission



The European Space Agency's (ESA) Proba-3 mission aims to create artificial solar eclipses using two satellites flying in formation. One satellite will block the sun's view while the other observes its corona, allowing for extended and detailed studies that are difficult during natural eclipses.

This mission will enable scientists to study the sun's outer atmosphere more frequently, offering valuable insights into solar physics. Proba-3's artificial eclipses will help scientists better understand the sun's corona and its role in space weather, which can affect technology on Earth. By providing new data on solar activity, the mission has the potential to advance our understanding of the sun and its influence on the solar system.

NASA Launches Rescue Mission for the Stranded Astronauts on the ISS



A SpaceX Crew Dragon capsule successfully docked at the International Space Station (ISS) on Sunday, marking the beginning of a rescue mission for two stranded Boeing astronauts. NASA astronaut Nick Hague and Roscosmos cosmonaut Aleksandr Gorbunov joined the ISS crew, including the stranded Boeing astronauts Butch Wilmore and Suni Williams.

The Crew Dragon will ferry Wilmore and Williams back to Earth in February 2025, concluding their months-long ordeal. The successful docking of the Crew Dragon capsule demonstrates the capabilities of commercial spaceflight and the importance of international cooperation in space exploration.

Hurricane Helene Disrupts NOAA's NCEI Operations



Hurricane Helene has significantly impacted the National Centers for Environmental Information (NCEI) in Asheville, North Carolina, causing internet disruptions and making its vast archive of oceanic, atmospheric, and geophysical data temporarily inaccessible.

Key services, including access to climate data and the State of the Climate reports, have been suspended, affecting sectors like agriculture, energy, and transportation. The September 2024 climate reports will be delayed, while NOAA works to restore operations and support recovery efforts in the Southern Appalachian region.

CubeTech

Showcase innovative CubeSat missions and unique payloads

Sunstorm CubeSat Mission: A Success in Space Weather Research


ieee.org

The Sunstorm CubeSat mission has successfully completed its mission to monitor X-ray pulses from solar flares. The satellite's data will contribute to a better understanding of space weather and improve forecasting capabilities. The mission successfully collected high-resolution X-ray measurements using its XFM-CS instrument.

This data will be used to study the dynamics and composition of plasma involved in solar flares. The research will contribute to developing more accurate space weather forecasts. The Sunstorm mission was a valuable contribution to space weather research. By providing high-quality data and insights, the mission will help scientists better understand and predict the effects of solar storms on Earth.

AI Drives Innovation in the Small Satellite Industry


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Artificial intelligence (AI) is transforming the small satellite industry by improving satellite design, operations, and data analysis.

AI-powered algorithms optimize satellite designs, making them more efficient and cost-effective, while automating tasks like orbit determination and collision avoidance, reducing human error and enhancing operations.

AI also helps analyze vast amounts of satellite data, identifying trends, patterns, and anomalies to improve decision-making and develop new applications. As AI advances, it continues to drive innovation and open new opportunities in the small satellite industry.

Optical Satellite Market Booming


i0.wp.com

The optical satellite market is projected to reach $8.0 billion by 2033, driven by demand for high-resolution imagery, global coverage, and advanced imaging systems. Key sectors like urban planning, infrastructure, defense, and telecommunications are fueling growth, with large satellites and MEO/GEO orbits gaining popularity.

Rising demand for broadband and secure data transmission is boosting the communication segment, while defense agencies seek high-resolution surveillance. North America, especially the U.S., is expected to lead the market, supported by major players like Airbus, Lockheed Martin, and Maxar.

Beetle Tech: Revolutionizing Navigation for Drones and Satellites



Inspired by the dung beetle's navigation method, researchers from the University of South Australia are developing an AI sensor that measures the Milky Way's orientation in low-light conditions. This builds on a 2013 discovery that dung beetles use the Milky Way as a reference while rolling dung in a straight line.

Their experiments involved using a camera to create a computer vision system capable of reliably tracking the Milky Way's orientation. Published in **Biomimetics**, the study suggests that this technology could enhance navigation for satellites, drones, and robots, especially in challenging low-light environments, highlighting the potential of biomimetic innovations in engineering.

Sateliot Expands 5G NB-IoT Constellation with Four New Nanosatellites



On 16 August 2024, Sateliot, a Barcelona-based startup, launched four additional nanosatellites to expand its 5G NB-IoT constellation, aimed at extending cellular and IoT coverage globally. This move supports Sateliot's goal of operating a constellation of over 100 satellites by 2028. The company's 5G NB-IoT nanosatellite stack is integrated with Leaf Space's Ground Segment as a Service (GSaaS) network, which has 16 stations globally, leveraging Leaf's Network Cloud Engine (NCE) to connect satellites in low Earth orbit with terrestrial hardware.

Sateliot's nanosatellites are the first to fully implement GSMA and 3GPP standards, enabling connection with any 3GPP Rel.17-compliant narrowband IoT device without gateways. Their technology is already set to connect over 8 million devices across industries like agriculture, logistics, and infrastructure management. However, Sateliot faces competition from SpaceX's StarLink constellation, which operates 6,646 nanosatellites—two-thirds of the 10,019 active satellites in orbit.

These tiny satellites are changing space exploration



CubeSats, small and affordable satellites, are transforming space exploration by offering cost-effective, targeted missions like detecting exoplanets or mapping asteroids. Accessible to startups and universities, they are cheaper and quicker to develop than larger satellites, allowing for more frequent launches.

CubeSats have already been used in NASA's Artemis I and Mars missions, proving their versatility in space research. With upcoming missions to study asteroids and interplanetary space, CubeSats are driving discoveries and could play a key role in humanity's future in space exploration.

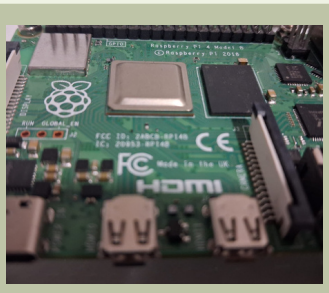
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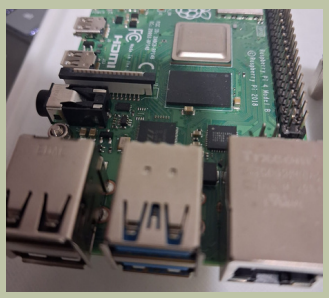
SSM: Students' Satellites Mission

Update readers on our ITCA internal space-based innovations

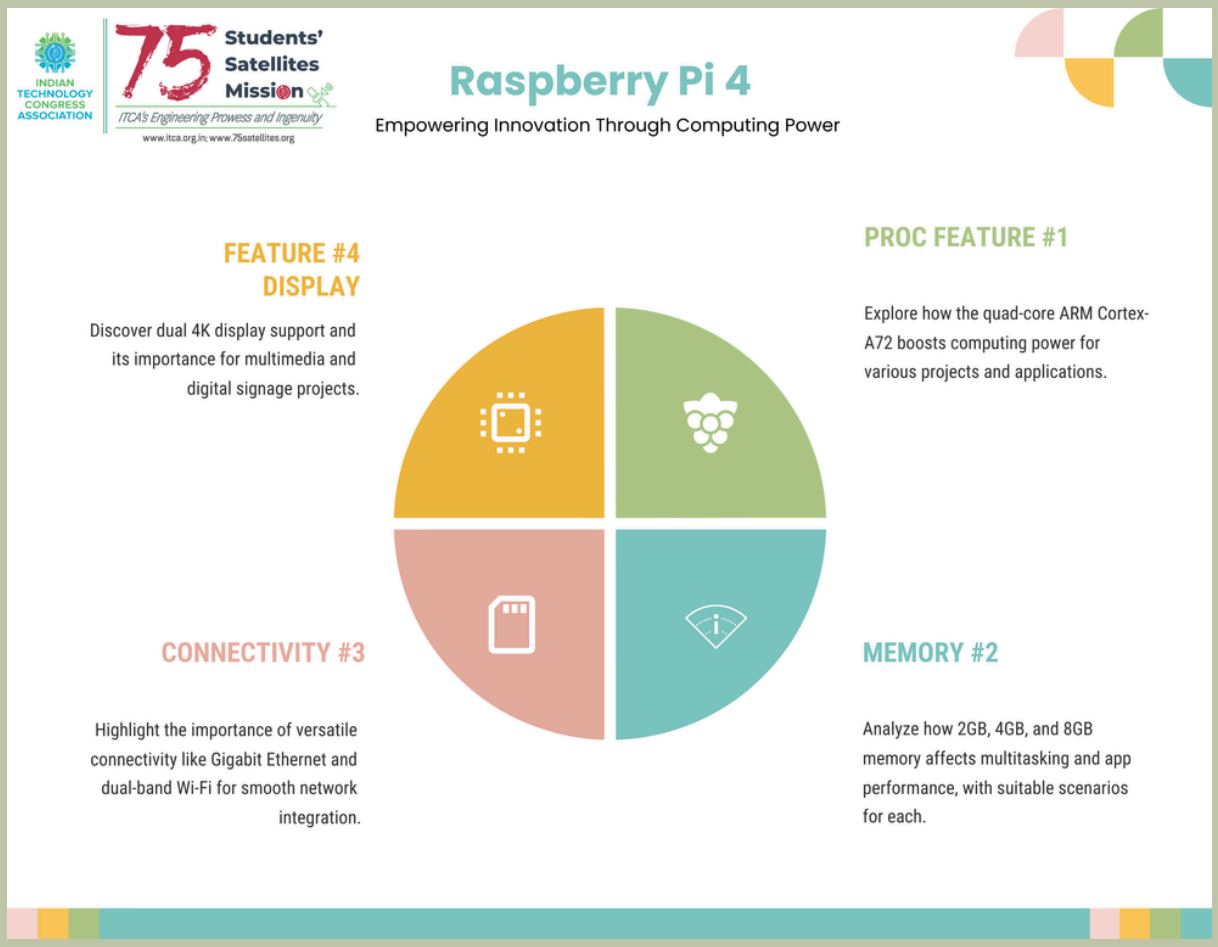
Raspberry Pi 4

The Raspberry Pi 4 is a powerful and versatile single-board computer, ideal for educational purposes, DIY projects, and even more advanced applications. It features a quad-core ARM Cortex-A72 processor running at 1.5GHz, offering significantly improved performance over previous models. Available in memory configurations of 2GB, 4GB, and 8GB of LPDDR4 RAM, the Raspberry Pi 4 can handle a range of tasks from simple programming to more demanding applications like media centers and home automation systems. It supports dual 4K displays via two micro-HDMI ports, making it suitable for multimedia projects and digital signage. With Gigabit Ethernet, dual-band Wi-Fi (2.4GHz and 5GHz), and Bluetooth 5.0, it provides excellent connectivity options for both wired and wireless networking. The Raspberry Pi 4 is a great platform for developers, students, and hobbyists looking to build creative and functional computing projects.







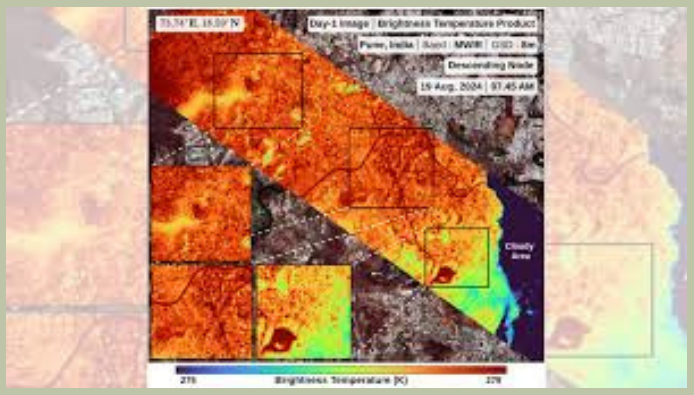




ISRO EOS-08 Satellite Begins Operations, With EOIR Payload

The ISRO has initiated operations for its Electro Optical-Infrared (EOIR) payload aboard the EOS-08 Earth Observation Satellite, launched on August 16 via the Small Satellite Launch Vehicle (SSLV). Designed to enhance India's thermal imaging capabilities, the EOIR payload, developed by ISRO's Space Applications Centre (SAC), features mid-wave infrared (MIR) and long-wave infrared (LWIR) channels that deliver high-resolution imaging. On August 19, the payload captured its first thermal image over Pune, followed by detailed thermal data from the Namibia Desert on August 21, demonstrating its capacity to detect temperature variations with spatial accuracy of up to eight meters.

The EOIR data's performance was validated against the Landsat-09 satellite's Thermal Infrared Sensor (TIRS), showcasing ISRO's superior resolution for more precise thermal measurements. This advanced technology holds significant applications in agriculture—enhancing water usage and crop yields through soil moisture mapping and vegetation health monitoring—as well as in wildfire detection and urban planning by identifying Urban Heat Islands (UHI). Ongoing data processing at the National Remote Sensing Centre (NRSC-ISRO) employs algorithms developed by SAC-ISRO, ensuring actionable insights for environmental monitoring and climate challenges.







75 Students' Satellites Mission

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Upcoming.....

International Astronautical Congress 2024

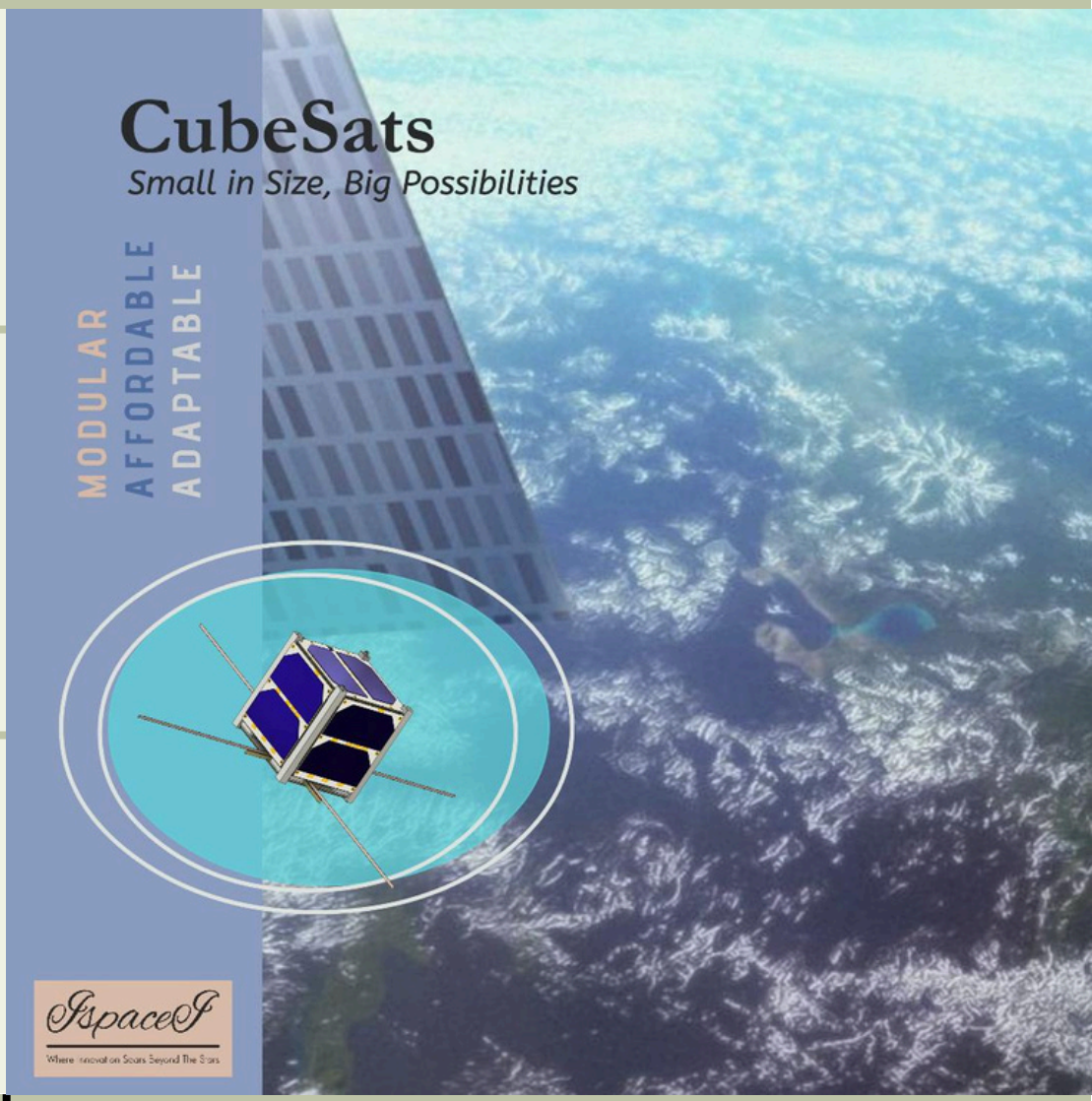
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Milan, Italy
https://www.iafastro.org

SmallSat Education Conference

26 - 27 October, 2024,
Songalo Convensia,
Kennedy Space Center,
USA
https://www.smallsateducation.org/

EUROPE'S LARGEST B2B SPACE EVENT

19 – 21 November 2024
Bremen, Germany
https://www.spacetechexpo-europe.com



SPACE BEACON
cosmic cadences on our radar

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