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SPACE BEACON

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Photo of Universe Captured by James Webb Space Telescope

Nebula Chronicles: Unveiling the Secrets of the Universe

INDIAN TECHNOLOGY CONGRESS ASSOCIATION

Orbital

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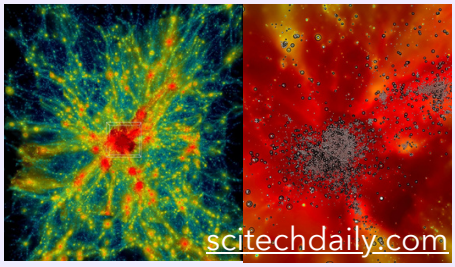
Webb Takes a Deep Dive into Monstrous Star Cluster



The James Webb Space Telescope (JWST) has captured an extraordinary infrared image of Westerlund 1, a supermassive star cluster about 12,000 light-years away in the constellation Ara. Home to some of the most massive stars in the Milky Way, this dense cluster is now revealed in stunning detail, with newborn stars, stellar nurseries, and cosmic dust clouds unveiled through JWST's ability to see through dust and gas.

Part of the Extended Westerlund 1 and 2 Open Clusters Survey (EWOCS), these observations provide critical insights into the formation, evolution, and explosive deaths of massive stars. Combining JWST's data with other telescopes will deepen our understanding of the processes shaping these cosmic giants.

Frontier Unveils the Universe's Largest Simulation: A Peek into the Cosmos



Scientists have created the most extensive simulation of the universe to date, powered by Frontier, the world's second-fastest supercomputer, at Oak Ridge National Laboratory. Dubbed ExaSky, this groundbreaking project models the universe's evolution over billions of years, capturing the formation and movement of galaxies.

By incorporating both atomic and dark matter, the simulation offers an unprecedented view of the cosmic structure.

ExaSky serves two key purposes: testing cosmological hydrodynamics models and refining theoretical models through comparisons with real-world observations. This achievement represents a major step forward in understanding the universe's origins and evolution, unlocking new possibilities for exploring cosmic mysteries on an unparalleled scale.

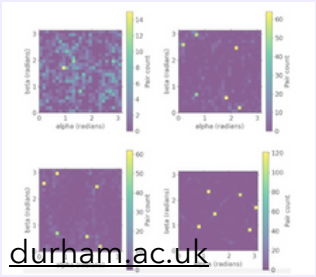
Venus: Earth's Evil Twin, a Hellish Hothouse



Despite its nickname as Earth's "twin," Venus reveals a starkly different reality, lacking liquid water despite its position in the habitable "Goldilocks Zone." Scientists believe Venus once had oceans like Earth, but a runaway greenhouse effect, fueled by massive volcanic activity and carbon dioxide emissions, transformed it into a blistering inferno with surface temperatures exceeding 860°F (460°C), hot enough to vaporize any water.

The mystery of Venus' lost water offers a cautionary tale for Earth, emphasizing the impact of unchecked climate change. By studying Venus' dramatic transformation, scientists hope to better understand planetary evolution and the fragile balance required for sustaining life.

Unraveling the Milky Way's Mysterious Planes


durham.ac.uk

A new study using data from the Gaia space observatory has uncovered a surprising structure in the Milky Way: multiple planes of satellite galaxies and star clusters orbiting our galaxy. These organized planes within the Milky Way's extended halo challenge traditional models of galaxy formation and offer valuable insights into the early universe.

The findings reveal that the Milky Way's satellite galaxies are not randomly distributed but arranged into distinct planes, hinting at a complex history of interactions and mergers.

By studying this system further, astronomers aim to deepen our understanding of galaxy formation and evolution, potentially reshaping our view of the cosmos and our place within it.

Moons of Uranus: Hidden Oceans Beckon Future Missions


scitechdaily.com

NASA's upcoming mission to Uranus' icy moons aims to uncover hidden oceans beneath their frozen surfaces, potentially harboring life. Researchers at the University of Texas Institute for Geophysics (UTIG) are developing advanced tools to support this effort, including a model that analyzes subtle wobbles in the moons' rotation to reveal details about their internal structure.

A significant wobble could indicate liquid oceans, while minimal movement suggests a solid interior, with gravity data helping estimate ocean depths and ice thickness.
This groundbreaking mission could transform our understanding of where life might exist in the universe. By identifying potential subsurface oceans and optimal landing sites, scientists hope to explore these distant moons and their life-supporting environments. Planetary scientist Doug Hemingway highlights the mission's significance: "Discovering liquid water oceans inside the moons of Uranus would transform our thinking about the range of possibilities for where life could exist."

Largest Ever Universe Simulation Ushers in Exascale Era


spxdaily.com

Researchers at the Department of Energy's Argonne National Laboratory have achieved a record-breaking simulation on Frontier, the world's fastest supercomputer. Dubbed "ExaSky," the project modeled the evolution of the universe on an unprecedented scale, incorporating both atomic and dark matter to provide a comprehensive view of cosmic structure and behavior.

ExaSky enables scientists to test cosmological models and reconcile observational data with theoretical predictions. By comparing its simulations with real-world observations, researchers can refine our understanding of dark matter and other cosmic mysteries. This milestone marks a significant leap in exploring the universe, offering unparalleled insights into its vast complexities.

Genspace

Cover broader space news not fitting into other categories

Lightspeed Takes Off: Canadian Satellite Constellation Clears Design Hurdle



Telesat, a Canadian satellite operator, has reached a critical milestone for its Lightspeed project, a global broadband internet constellation comprising 750-kilogram satellites. The constellation has passed an early design review, confirming the spacecraft design meets program requirements and paving the way for further development. The Lightspeed satellites use the reprogrammable Aurora platform from MDA Space, enabling flexibility and future upgrades.

With 14 launches secured with SpaceX starting mid-2026, Telesat plans to deploy the entire constellation within a year. MDA is also building a high-volume manufacturing facility in Canada capable of producing two satellites daily. This milestone underscores Lightspeed's potential to become a major player in bridging the digital divide, offering high-speed internet to underserved regions worldwide.

European Firms Offer Microgravity Missions



Europe's space industry is advancing research through a collaboration between Atmos Space Cargo and Space Cargo Unlimited, offering affordable microgravity testing in low Earth orbit. Atmos' Pulsar Scholars program provides grants for students to test projects, from satellites to experiments, in Mars-like conditions via suborbital flights, making space research more inclusive and accessible.

This initiative encourages innovation, fostering a new generation of researchers while providing valuable insights for future Mars missions. By simulating the Red Planet's conditions, it opens doors to groundbreaking advancements in space technology and exploration.

China Launches Enigmatic TJS-13 Satellite, Long March Rocket Makes History



China's space program marked a dual milestone on December 3rd with the launch of the TJS-13 communication technology experiment satellite aboard a Long March 3B rocket from the Xichang Satellite Launch Center. While details about the TJS-13 remain vague, with suggestions of potential military use, the mission highlights China's advancements in communication technology and raises concerns about transparency in its space activities.

The launch also marked the 100th successful mission for the Long March 3B, a reliable rocket that has supported China's ambitions in navigation, lunar exploration, and telecommunications.

This achievement underscores China's growing presence in the global space race, showcasing its expanding capabilities and technological prowess.

Quantum Tech Firm Wins Pentagon Contract for Navigation System


spacenews.com

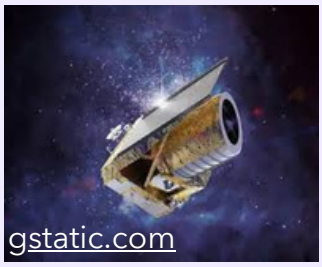
The Pentagon has awarded an $11 million contract to quantum technology firm Inflection to develop Tiqker, a compact optical atomic clock designed as an alternative to GPS for military navigation.

This initiative, funded through the APFIT program, reflects growing concerns over GPS vulnerabilities, such as jamming and spoofing, which pose risks to military operations.

This move highlights a broader commitment to exploring secure navigation solutions, with APFIT also funding other similar technologies.

By leveraging quantum technology, the military aims to create a more resilient system, reducing reliance on traditional GPS and enhancing operational security.

Unveiling Earth's Secrets: UCalgary Develops 3D Digital Globe System


gstatic.com

Researchers at the University of Calgary have developed a groundbreaking 3D Digital Earth System, transforming how geospatial data is visualized and analyzed. Unlike traditional flat maps, this immersive platform integrates data from satellites, drones, and sensors, enabling users to track wildfire risks, monitor weather patterns, and explore natural resources in an intuitive 3D environment.

Accessible to anyone with a computer, it simplifies the analysis of complex geospatial data, empowering researchers, students, and decision-makers alike. This system offers significant benefits, including enhanced decision-making through deeper insights into environmental and disaster-related issues, improved collaboration across disciplines, and democratized access to Earth science data. By revolutionizing data interaction, the 3D Digital Earth System opens new possibilities for understanding our planet and advancing sustainable solutions.

Airbus Soars High with Skynet: Advanced Satellite Modems for UK Defence


googleapis.com

Airbus has secured a vital contract with the UK Ministry of Defence to supply advanced satellite modems for the Skynet military communications network. These next-generation modems offer increased bandwidth for faster data transfer, improved security with advanced encryption, and enhanced durability to withstand harsh conditions, ensuring reliable and secure communication for British forces worldwide.

The technology will play a crucial role in supporting modern military operations by enabling seamless information sharing across diverse environments. This upgrade reflects a broader push toward modernizing military communication systems to meet evolving operational demands. By enhancing Skynet's capabilities, Airbus strengthens the UK's military infrastructure, positioning it at the forefront of secure and reliable communication technologies. Such advancements are critical for maintaining strategic superiority and ensuring mission success in an increasingly interconnected world.

Satellogy

Focus on recent and upcoming satellites and launches

China Launches the World's First "Self-Driving" Satellites



China has advanced space technology with the launch of two "self-driving" satellites, Siwei Gaojing-2 03 and Gaojing-2 04, aboard a Long March-2C rocket. Equipped with advanced synthetic aperture radar (SAR) and high-precision radar payloads, these satellites feature remarkable capabilities such as automatic orbit correction with 100-meter accuracy and precision formation flying with sub-meter distances.

These technologies enable high-resolution Earth observation for applications like land management, resource exploration, and disaster response. Part of the Siwei commercial remote sensing constellation, these satellites are the first step toward deploying at least 28 satellites by next year. Their autonomous functionalities promise enhanced spacecraft operations, increasing efficiency and safety in satellite maneuvers. This successful launch reinforces China's position as a leader in developing innovative space technologies with broad applications in Earth observation and resource management.

ESA Greenlights NanoMagSat Mission



The European Space Agency (ESA) has approved the NanoMagSat project, marking a shift towards smaller, more efficient space missions. Spearheaded by Open Cosmos and research institutions, the project will launch a constellation of three 16U CubeSats, each equipped with advanced magnetometers to measure Earth's magnetic field and ionosphere.

These tiny satellites aim to enhance understanding of space weather, improve navigation systems, and build on the legacy of ESA's Swarm mission. NanoMagSat demonstrates the potential of CubeSats in scientific research, offering a cost-effective way to conduct complex studies. By utilizing cutting-edge technology in a compact form, this mission paves the way for future space exploration that is smarter, more agile, and capable of addressing critical scientific challenges, particularly in Earth observation.

Russia Bolsters Earth Observation Capabilities with Kondor-FKA2 Launch

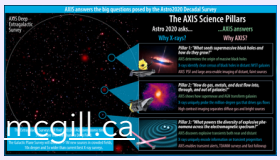


Russia has successfully launched the Kondor-FKA2 radar satellite aboard a Soyuz-2.1a rocket from the Vostochny Cosmodrome, enhancing its Earth observation capabilities. The satellite is equipped with advanced all-weather, round-the-clock radar imaging technology, allowing it to monitor the Earth's surface under any weather conditions or time of day.

The data from Kondor-FKA2 will have various applications, including precise mapping, environmental monitoring, and improving maritime safety.

This launch strengthens Russia's position in the global space industry, advancing its Earth observation and remote sensing capabilities for better navigation, climate change assessment, and infrastructure planning.

McGill University Soars in NASA Selection: Axis Mission Shortlisted



McGill University can celebrate a significant achievement! Their participation in the "Axis Mission" has been chosen as one of the final two contenders in NASA's rigorous selection process.

This accomplishment underscores McGill's leading role in space exploration and its commitment to groundbreaking scientific research. Details surrounding the Axis Mission remain undisclosed for now, but its selection by NASA highlights its potential for scientific discovery. This selection process is highly competitive, attracting proposals from top institutions across the globe. Reaching the final stage is a testament to the expertise and innovation present at McGill University. Further announcements regarding the chosen mission and its specific goals are expected soon. Regardless, McGill's involvement in the Axis Mission signifies a major step forward for Canadian involvement in NASA initiatives. It positions the university at the forefront of space exploration and paves the way for exciting future discoveries.

Twin Satellites Take Earth's Polar Temperature

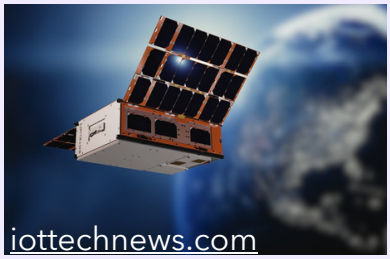


NASA's PREFIRE mission, consisting of two shoebox-sized CubeSats, is capturing groundbreaking data on Earth's polar heat emissions. The mission focuses on measuring far-infrared radiation escaping Earth's poles, an aspect of the planet's energy balance that has never been systematically studied before. This data is crucial for refining climate models and predicting the impact of global warming on ice, oceans, and weather patterns.

Launched in May and June 2024 from New Zealand, the CubeSats faced initial technical issues but are now operational and providing valuable data.

The information gathered will enhance our understanding of how atmospheric water vapor and clouds influence heat loss from Earth's polar regions, paving the way for a more detailed understanding of the planet's climate system.

Eseye and Sateliot Team Up: Bridging the Gap for Global IoT Connectivity



Eseye and Sateliot have partnered to revolutionize global IoT connectivity by integrating satellite and terrestrial networks. This collaboration addresses challenges in remote locations or areas requiring constant coverage, offering uninterrupted connectivity, enhanced flexibility, and streamlined management of IoT devices.

Customers can choose the most suitable network based on their needs, ensuring efficiency and cost-effectiveness. The partnership opens new possibilities for IoT applications, such as monitoring remote environmental conditions or tracking assets across oceans. By combining satellite and terrestrial networks, Eseye and Sateliot provide an innovative solution to connectivity, paving the way for a future where devices can stay connected anywhere on Earth.

CubeTech

Showcase innovative CubeSat missions and unique payloads

CubeSatGPT FOR communication with orbiting Satellites



Vector Space Biosciences is advancing space exploration with their CubeSatGPT project, which enables real-time communication with CubeSats orbiting Earth. Utilizing AI and language processing, CubeSatGPT facilitates data collection on microgravity and space radiation, offering valuable insights into how these factors affect organisms and technology.

The data, transmitted through Microsoft Orbital ground stations, is further enhanced by AI-driven visualizations, making it accessible for both researchers and students. Additionally, CubeSatGPT plans to launch over 50 Tardigrades (water bears) on their CubeSats to study the impact of space travel on these resilient creatures. This initiative not only furthers scientific understanding but also democratizes space exploration, allowing individuals and educational institutions to contribute to research. With this innovative approach, Vector Space Biosciences is paving the way for more collaborative and accessible space exploration.

SSTL and LatConnect60 Team Up for Cutting-Edge Earth Observation



SSTL (Surrey Satellite Technology Ltd) and LatConnect60 are collaborating to develop an advanced Short Wave InfraRed (SWIR) payload for Earth observation satellites. SWIR technology offers remarkable advantages, such as penetrating haze, smoke, and dust to reveal surface features, enabling precise environmental monitoring and disaster response.

It also enhances vegetation analysis by accurately assessing plant health and stress levels and improves mineral mapping by detecting subtle surface variations, advancing resource exploration. By combining SSTL's expertise in satellite design with LatConnect60's cutting-edge SWIR sensor technology, this partnership aims to create a powerful payload for Earth observation. This collaboration marks a significant leap in imaging technology, with the potential to revolutionize monitoring of Earth's resources, environment, and natural processes.

PolyU Experiments with Catalysts in Low-Earth Orbit



Researchers at Hong Kong Polytechnic University (PolyU) have conducted successful catalyst experiments in Low-Earth Orbit (LEO), studying how these materials behave in microgravity and radiation-rich conditions. This breakthrough paves the way for developing advanced catalysts, improving industrial processes, and understanding material behavior for spacecraft and space-based manufacturing.

PolyU's achievement highlights its strength in space research, opening doors for future innovations. The findings could revolutionize material science and establish space as a hub for groundbreaking discoveries.

Solar Beams from Space: The Future of Sustainable Energy



A revolutionary concept is emerging in the realm of space technology: harnessing the Sun's energy and beaming it back to Earth via laser. A proposed satellite design envisions using sunlight to generate laser energy, which can then be transmitted over vast distances with minimal energy loss. Inspired by photosynthesis, this technology seeks to capture and concentrate sunlight using advanced mirrors and lenses.

The collected solar energy is then converted into laser beams, which can be precisely directed towards Earth. This could potentially provide a sustainable and abundant source of energy for our planet. While still in the early stages of development, this ambitious project holds the potential to revolutionize how we harness and utilize solar energy. If successful, it could significantly reduce our reliance on fossil fuels and pave the way for a more sustainable future.

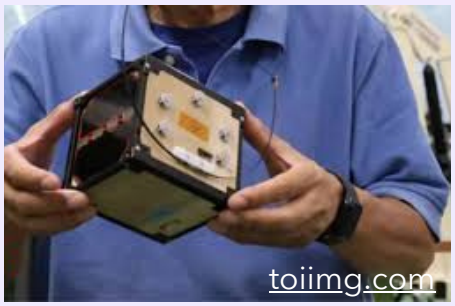
Indian CubeSat to Travel to the Moon Soon on Japanese Lander



India and Japan have joined forces for a pioneering space collaboration, with an Indian CubeSat set to accompany a Japanese lunar lander to orbit the Moon. HEX20Labs India Private Limited has partnered with Japan's ispace to launch the CubeSat aboard an upcoming ispace lunar mission. The agreement, signed by HEX20Labs CEO Lloyd Jacob Lopez and ispace CEO Takeshi Hakamada in Milan, marks a milestone in expanding Indian satellite operations beyond Earth's orbit.

The CubeSat, designed by HEX20Labs, will conduct scientific research and technological experiments in cislunar space, showcasing India's growing role in international lunar missions. While ispace has several lunar landing ventures planned, details on the specific mission carrying the CubeSat are yet to be revealed.

Wooden CubeSat to Launch from ISS



LingoSat, a CubeSat constructed mainly of wood, will be aunch from the ISS . Initial opportunities for data acquisition and amateur radio packet activities will take place on December 10th.

Deployment time from the ISS is scheduled for December 9, 2024, 20:30 JST/11:30 UTC +-90 minutes.

A CW beacon will be present on 435.82 MHz with first passes for Japan at 06:30 JST on December 10th and North America around 12:20 UTC if the deployment process occurs early.

Initial tracking of LingoSat can be accomplished by tracking the ISS as the wooden satellite will follow the same orbit as ISS until eventually flying ahead of the ISS.

The 75SSM

SSM: Students' Satellites Mission

Update readers on our ITCA internal space-based innovations

Hall-effect Sensor (SS49e)

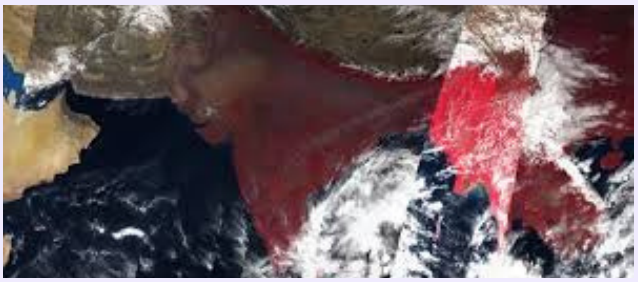
The SS49E is a compact, linear Hall-effect sensor designed to detect magnetic fields and convert them into proportional analog voltage signals. Operating within a supply voltage of 2.7V to 6.5V, it is highly sensitive, consuming just 6mA of current, and functions reliably across a wide temperature range (-40°C to +125°C). Encased in a TO-92 package, the SS49E is durable and easy to integrate, making it ideal for applications like position sensing, speed detection, motor control, and proximity sensing in industries ranging from automotive and robotics to renewable energy and consumer electronics. Its high precision, low power consumption, and versatility ensure accurate magnetic field detection, even in challenging environments, enabling seamless integration into a variety of systems.





Space@India

Glimpses into India's space chronicle, every week



ISRO satellites watch Cyclone Fengal approaching Tamil Nadu from space

Read more at:
https://www.indiatoday.in/science/

ISRO To Launch European Satellite Proba-3 Into Space For Solar Study On December 4

Read more at:
https://www.news18.com/india/isro





India plans to build a moon-orbiting space station by 2040

Read more at:
https://www.space.com/the-universe/moon/india-plans-to-build

Startups have key role to play in space sector: ISRO chairman

Read more at:
https://economictimes.indiatimes.com/tech/startups





India's Gaganyatris complete initial astronaut training for ISRO-NASA mission to ISS

Read more at:
https://www.spacedaily.com/reports/

75 Students' Satellites Mission

ITCA's Engineering Prowess and Ingenuity

ITCA: Pioneering India's Tech Future

Driving India's tech innovation for over 21 years, we've built strong academia-industry partnerships. Pioneer of the '75 Students' Satellites Mission,' we've made a global impact in space tech, precision agriculture, and Industry 4.0. We are shaping the future of India's technology landscape.

Upcoming.....

CubeSat Developers Workshop 2025

16 - 18 December 2024
Fiera di Roma - Italy
https://www.nseexpoforum.com/

SmallSat Symposium 2025

4 – 6 February 2025
at the Computer History Museum in Mountain View, California
https://smallsatshow.com/

Global Space Technology Convention & Exhibition 2025

26 - 27 February 2025
Sands Expo and Convention Centre, Marina Bay Sands, Singapore
https://www.space.org.sg/gstce/



SPACE BEACON
cosmic cadences on our radar

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