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7. Short News

Astronomers Detect Active Wind from Sagittarius A*

Context - After a fifty-year search, astronomers have finally discovered a steady, gentle cosmic wind blowing from Sagittarius A* (Sgr A*), the supermassive black hole at the center of our Milky Way galaxy, solving a long-standing space mystery.

Key Highlights

1. The Breakthrough - Scientists found that our galaxy's center is not completely quiet; its black hole is blowing a continuous cosmic breeze that has been active for at least 20,000 years.
2. The Smoking Gun - The wind has cleared out a massive, empty cone-shaped cavity (spanning 45 degrees wide and over 3 light-years long) in the thick fog of cold molecular gas surrounding the core.
3. The Tools Used - This subtle wind was detected by combining radio wave data from the Atacama Large Millimetre/Submillimeter Array (ALMA) telescope in Chile with X-ray data from NASA's Chandra X-ray Observatory.
4. Why it Matters - While violent black holes in deep space shoot out blinding beams, our black hole is in a quiet state. This discovery gives us our closest look at how "calm" black holes slowly shape their home galaxies over time.

About Supermassive Black Holes

1. A supermassive black hole is an unimaginably heavy object containing the weight of millions to billions of suns packed into a tiny region of space.
2. Galactic Anchors - Scientists believe that a supermassive black hole sits at the dead center of almost every large galaxy in the universe.
3. How They Feed and Breathe - As huge clouds of space gas and dust spiral inward toward the black hole, the material rubs together at extreme speeds. This heavy friction heats the gas to millions of degrees, creating immense outward pressure.
4. The Escape Route - Not all material gets swallowed past the event horizon (the point of no return). The intense heat and magnetic forces push a large portion of this hot gas back out into the universe as black hole winds.
5. Cosmic Thermostats - These winds act as traffic controllers for the galaxy. By blowing away or boiling the nearby cold gas, the black hole cuts off the raw material needed to make new stars, controlling the galaxy's growth.

About Sagittarius A* (Sgr A*)

1. Sagittarius A* (Sgr A*) is the specific supermassive black hole located at the exact core of our own Milky Way galaxy.
2. Size and Distance - It is located roughly 26,000 light-years away from Earth and has the weight of about 4 million Suns.
3. A Quiet Eater - Unlike the bright centers of distant galaxies that greedily swallow matter, Sgr A* is famously calm and on a very "starved" diet.

Sound Waves for Energy-Efficient Next-Generation Computing

Context – Researchers at the Institute of Nano Science and Technology have developed a method to use sound waves to generate and control spin currents, enabling low-power next-generation computing.

1. Conventional electronics rely on the movement of electric charge (electrons), which causes heat generation and energy loss.
2. Scientists are exploring spintronics, where information is carried by electron spin rather than electric charge, enabling faster and more energy-efficient devices.

Key Findings of the Study

1. Sound Waves Can Generate Spin Currents – Researchers demonstrated a new mechanism to generate magnon-based spin currents using surface acoustic waves (SAWs).
2. Role of Magnons – Magnons can act as efficient information carriers with much lower energy loss than conventional electronic currents.
3. Graphene-like Magnetic Material – The study used a two-dimensional graphene-like magnetic material placed on a piezoelectric substrate.
4. Discovery of Pseudogauge Fields – As sound waves travel through the material, they create tiny distortions called pseudogauge fields, which influence magnon movement and generate spin currents.
5. New Theoretical Model – Researchers developed a fresh analytical model linking –
 1. Surface acoustic waves
 2. Magnon transport
 3. Quantum geometric effects
6. Significance –
 1. Low-Power Computing – Can significantly reduce energy consumption in future computing devices.
 2. Quantum Computing – May help develop efficient quantum information-processing systems.
 3. Next-Generation Communication – Enables new methods of transmitting information with minimal energy loss.
 4. Strain-Engineered Devices – Supports devices where mechanical deformation is used to control electronic or magnetic behaviour.

Key Concepts

1. Spintronics – A technology that uses the spin of electrons, rather than their charge, to store and process information, enabling faster and more energy-efficient devices.
2. Magnons – Quasiparticles representing collective spin-wave excitations in magnetic materials, capable of carrying information without significant heat loss.
3. Surface Acoustic Waves – Sound waves that travel along the surface of a material and can influence the behaviour of electrons and magnetic excitations.
4. Piezoelectric Materials – Materials that generate an electric charge when subjected to mechanical stress or pressure.

Solar Community Hub Skill Vans

Context – Recently, India has launched five new solar-powered community skill vans across India.

About Solar Community Hub Skill Vans

1. Solar Community Hub Skill Vans are solar-powered mobile learning and skilling centres launched by Dell Technologies in partnership with National Skill Development Corporation (NSDC) and implemented by Learning Links Foundation.

2. Objective - These are designed to promote digital inclusion, education, future-ready skilling, and employability among underserved communities.
3. Coverage - India's first Solar Community Hub Skill Vans was introduced in FY23.
4. Expansion - The initiative has reached 18 districts across 14 states and benefited 2.67 million people in India.
5. Global Footprint - The programme is implemented through 63 Solar Community Hub Skill Vans operating across 12 countries, making it one of Dell Technologies' largest global initiatives for promoting digital inclusion and skill development.
6. Recent Expansion - Five new skill vans have been deployed in Uttar Pradesh, Delhi/NCR, Karnataka, Telangana, and Maharashtra.
7. Target Beneficiaries - Focuses on empowering youth, women, and marginalised populations.

Key Features of the Solar Community Hub Skill Vans

1. Solar-Powered Mobile Learning Hubs - Equipped with laptops, interactive screens, internet connectivity, and AI-enabled learning tools.
2. Future-Ready Skilling - Offers customised training modules aligned with emerging industry requirements.
3. Structured Employability Pathways - Connects learners with vocational education and job opportunities.
4. Community-Centric Model - Delivers services directly to underserved areas lacking digital infrastructure.
5. Renewable Energy Integration - Operates on solar power, ensuring sustainable and reliable access.

Ayushman Bharat – Pradhan Mantri Jan Arogya Yojana (PM-JAY)

Context - Recently, West Bengal became the 36th State/UT to implement Ayushman Bharat PM-JAY, making the scheme operational across the entire country.

About Ayushman Bharat – Pradhan Mantri Jan Arogya Yojana (PM-JAY)

1. Ayushman Bharat PM-JAY is the world's largest government-funded health assurance scheme, providing financial protection against major healthcare expenses.
2. Launch - The scheme was launched in 2018 based on the recommendations of the National Health Policy, 2017, to advance Universal Health Coverage (UHC).
3. Objective - To provide accessible, affordable, and quality healthcare by addressing health needs at primary, secondary, and tertiary levels.
4. Components
 1. Health and Wellness Centres (HWCs) - HWCs provide comprehensive primary healthcare services with a focus on prevention, promotion, and early diagnosis.
 2. HWCs have been rebranded by the Government of India as Ayushman Arogya Mandir.
 3. Over 1.8 lakh of Ayushmann Arogya Mandir are operational across urban and rural areas nationwide
2. Pradhan Mantri Jan Arogya Yojana (PM-JAY) - PM-JAY offers financial protection for hospitalization and advanced medical treatment to eligible families.

Key Features of PM-JAY

3. Health Insurance Coverage - The scheme provides cashless health coverage of ₹5 lakh per family per year for secondary and tertiary hospitalization.

4. Beneficiaries – More than 10.74 crore poor and vulnerable families, comprising around 50 crore beneficiaries, are eligible under the scheme.
5. Eligibility Criteria –
6. Beneficiary Eligibility Criteria under PM-JAY
 1. Rural households identified in the SECC 2011 database, including landless labourers, SC/ST families, female-headed households, differently-abled members, and other deprived categories, are eligible.
 2. Urban families engaged in specified vulnerable occupations such as street vendors, domestic workers, construction labourers, sanitation workers, transport workers, artisans, and other informal-sector workers are covered.
 3. All Indian citizens aged 70 years and above are eligible under the Ayushman Vay Vandana initiative, irrespective of income, occupation, or socio-economic status.
 - There are no restrictions on family size, age, or gender, and all pre-existing diseases are covered from the first day.
7. Nationwide Portability – Eligible beneficiaries can avail treatment anywhere in India through a network of empanelled public and private hospitals.
8. Comprehensive Treatment Package – The scheme covers hospitalization costs, medicines, diagnostics, ICU charges, surgeon fees, and pre- and post-hospitalization expenses.

Significance of PM-JAY

1. Financial Protection for Vulnerable Families – The scheme reduces catastrophic healthcare expenditure and protects poor households from falling into poverty due to medical costs.
2. Progress Towards Universal Health Coverage – PM-JAY strengthens equitable access to healthcare and supports India's commitment to achieving Universal Health Coverage and the Sustainable Development Goals (SDGs).
3. Strengthening Healthcare Infrastructure – The scheme enhances healthcare delivery through a vast network of over 36,000 empanelled hospitals and promotes improved access to quality treatment across the country.

H-1B Visa Programme

Context – A US federal court has cancelled a tough executive policy that forced companies to pay a huge \$100,000 annual fee for new H-1B visas.

1. The court held that only Congress can impose taxes under the US Constitution, and the President cannot create a new tax without clear congressional approval.

About H-1B Visa Programme

The H-1B visa is a temporary work permit that allows US companies to legally hire skilled professionals from other countries.

1. Specialized Knowledge – To qualify, a worker must have at least a bachelor's degree and specialized skills in high-demand areas like STEM (Science, Technology, Engineering, and Math), medicine, or teaching.
2. The Yearly Caps – The US Congress limits these visas to 65,000 slots per year for regular jobs, plus an extra 20,000 slots for foreigners who earned a master's degree from a US university.
3. Exempt Employers – Public institutions like universities, government research labs, and non-profit hospitals do not have to follow these strict yearly limits. They can hire as many H-1B workers as they need.

4. **Standard Pricing** – Before the shock \$100,000 rule, a company usually paid a modest \$2,000 to \$5,000 in administrative fees to apply for a worker.

Ruling Impacts India's IT Sector and Service Exports

1. **Secures the Talent Pipeline** – Indian nationals consistently secure more than 70% of all approved H-1B visas every year. Cancelling the fee prevents a sudden drop in young Indian tech talent moving to Silicon Valley.
2. **Boosts Service Exports** – India's software service exports to the US are a major driver of our Foreign Exchange reserves.

By keeping the cost of deploying technical experts low, Indian tech giants can continue to win large US consulting contracts, keeping India's service export balance healthy.

Major High-Skilled & Employment Visas in the US (Apart from H-1B)

1. **L-1 Visa** – Used by multinational companies to transfer managers, executives, or specialised employees from foreign offices to US offices.
2. **O-1 Visa** – Issued to individuals with extraordinary achievements in fields such as science, business, arts, education, or sports.
3. **EB-2 & EB-3 Visas** – Employment-based Green Card categories for highly skilled professionals, advanced degree holders, and skilled workers seeking permanent residency.
4. **J-1 Visa** – Exchange visa for researchers, professors, medical trainees, interns, and academic exchange participants.