

Ode to E Pluribus Unum for Sunday January 19 2025

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M51: Tidal Streams and H-alpha Cliffs



Image Credit & Copyright: The Deep Sky Collective - Tim Schaeffer, Carl Björk, Steeve Body, Fabian Neyer, Aki Jain, Ryan Wierckx, Paul Kent, Brian Valente, Antoine & Dalia Grelin, Nicolas Puig, Stephen Guberski, Mike Hamende, Julian Shapiro, John Dziuba, Mikhail Vasilev, Bogdan Borz, Adrien Keijzer

An intriguing pair of interacting galaxies, M51 is the 51st entry in Charles Messier's famous catalog. Perhaps the original spiral nebula, the large galaxy with whirlpool-like spiral structure seen nearly face-on is also cataloged as NGC 5194. Its spiral arms and dust lanes sweep in front of its smaller companion galaxy, NGC 5195. Some 31 million light-years distant, within the boundaries of the well-trained constellation Canes Venatici, M51 looks faint and fuzzy to the eye in direct telescopic views.

But this remarkably deep image shows off stunning details of the galaxy pair's striking colors and fainter tidal streams. The image includes extensive narrowband data to highlight a vast reddish cloud of ionized hydrogen gas recently discovered in the M51

system and known to some as the H-alpha cliffs. Foreground dust clouds in the Milky Way and distant background galaxies are captured in the wide-field view.

A continuing collaboration of astro-imagers using telescopes on planet Earth assembled over 3 weeks of exposure time to create this evolving portrait of M51.

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India's Massive Pilgrimage



bbc.co.uk

This week saw the opening of India's Maha Kumbh Mela festival, touted as one of the largest gatherings in history. A projected 400 million visitors will participate in the pilgrimage over the next six weeks, as officials have set up a temporary 10,000-acre city, including 150,000 tents, 3,000 kitchens, and 99 parking lots.

The Hindu pilgrimage occurs once every three years at a rotation of four traditional river sites, with the most sacred occasion taking place in the city of Prayagraj (formerly Allahabad) in the country's most populous state, Uttar Pradesh, every 12 years. A sprawling pop-up economy of vendors supports participants as they ceremonially bathe in the Ganges River to wash away their sins (see explainer) and attend talks and discussions with religious leaders.

Observers claim the scale of investment in the event reflects the ruling Bharatiya Janata Party's priority of reclaiming Hindu traditions from Islamic influences in the country, where 80% of the population is Hindu and 15% follows Islam.

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NASA's First Aircraft Accident Investigation on Another World

The review takes a close look the final flight of the agency's Ingenuity Mars Helicopter, which was the first aircraft to fly on another world.



NASA's Ingenuity Mars Helicopter, right, stands near the apex of a sand ripple in an image taken by Perseverance on Feb. 24, 2024. Part of one of Ingenuity's rotor blades lies on the surface about 49 feet (15 meters) west of helicopter (at left in image).

Credit: NASA/JPL-Caltech/LANL/CNES/CNRS

Engineers from NASA's Jet Propulsion Laboratory in Southern California and AeroVironment are completing a detailed assessment of the Ingenuity Mars Helicopter's final flight on Jan. 18, 2024, which will be published in the next few weeks as a NASA technical report.

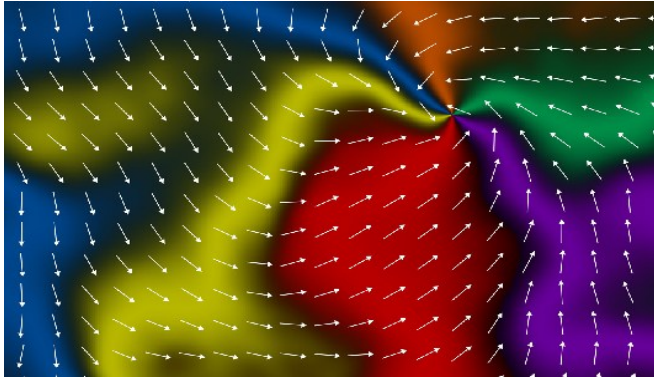
Designed as a technology demonstration to perform up to five experimental test flights over 30 days, Ingenuity was the first aircraft on another world. It operated for almost three years, performed 72 flights, and flew more than 30 times farther than planned while accumulating over two hours of flight time.

The investigation concludes that the inability of Ingenuity's navigation system to provide accurate data during the flight likely caused a chain of events that ended the mission. The report's findings are expected to benefit future Mars helicopters, as well as other aircraft destined to operate on other worlds.

<https://bit.ly/4gmpVfY>

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New Third Class of Magnetism Could Transform Digital Devices



Nottingham.ac.uk

A new class of magnetism called altermagnetism has been imaged for the first time in a new study. The findings could lead to the development of new magnetic memory devices with the potential to increase operation speeds of up to a thousand times.

Scientists from the University of Nottingham's School of Physics and Astronomy have shown that this new third class of magnetism exists and can be controlled in microscopic devices. The findings have been published in [Nature](#).

Altermagnets combine the favorable properties of ferromagnets and antiferromagnets into a single material. They have the potential to lead to a thousand fold increase in speed of microelectronic components and digital memory while being more robust and more energy efficient.

<https://bit.ly/49Q4wdb>

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Chords & Riffs

Igor Stravinski (1882–1971)



pinterest

Igor Stravinsky was born on June 17, 1882, in Oranienbaum, Russia. He rose to fame in the early 1900s for his compositions for the Ballets Russes, including the controversial The Rite of Spring. Stravinsky brought his family to Switzerland and then France, continuing his output with such works as Renard and Persephone. After moving to the United States in 1939, he completed his famed Symphony in C and became an American citizen. Stravinsky died in New York City on April 6, 1971, with more than 100 works to his name.

In 1909, the founder of the Ballets Russes, Sergei Diaghilev, invited Stravinsky to orchestrate a couple of Chopin works for his ballet Les Sylphides. That, in turn, led to the commission of The Firebird; a collaboration with choreographer Michel Fokine, the ballet turned Stravinsky into a household name upon its premiere in Paris in June 1910. The composer's fame was reinforced with the production of Petrouchka in 1911 and especially with The Rite of Spring, which incited a riot upon its 1913 premiere but was soon hailed for its revolutionary score.

Said New York Philharmonic musical director Pierre Boulez upon hearing the news of Stravinsky's death in 1971, "Something radically new, even foreign to Western tradition, had to be found for music to survive, and to enter our contemporary era. The glory of Stravinsky was to have belonged to this extremely gifted generation and to be one of the most creative of them all."

The Firebird Vienna Philharmonic <https://youtu.be/RZkIAVGlfWk>
Petrouchka Concertgebouw Orchestra <https://youtu.be/esD90diWZds?t=2>
Rite of Spring – LA Philharmonic <https://youtu.be/bcDCHnAd8N4>

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Making Sense of John Coltrane's "Giant Steps."

The most feared song in jazz, explained



simonandschuster.com

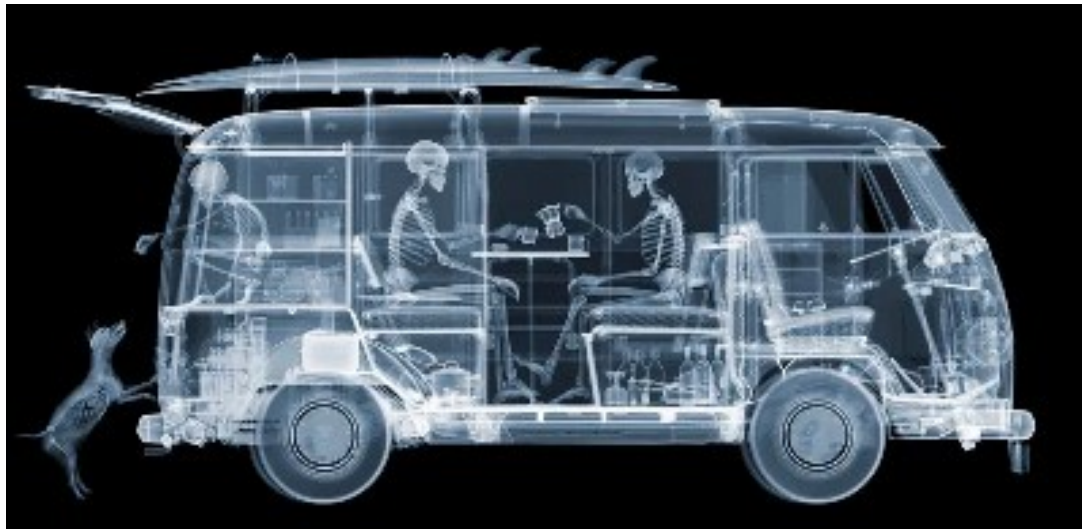
In the pantheon of jazz, few albums have left a more indelible mark on the genre than John Coltrane's "Giant Steps." It's a work of staggering virtuosity, a testament to the prowess of the musicians involved, and a milestone in Coltrane's illustrious career.

<https://youtu.be/62tIvfP9A2w>

https://youtu.be/KwIC6B_dvW4

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Nick Veasey's Incredible X-Ray Photographs



Nick Veasey

Working with x-rays comes with serious safety risks, so Nick has built a custom concrete "black box" to contain the radiation while he works. Inside, he has several x-ray machines with different capabilities, all set up to safely capture images. The x-ray head units are inside the secure area, while the controls are outside.

To take an x-ray, the subject is placed on a lead floor or wall with film positioned behind it. Once everything's set, Nick steps outside, adjusts the settings, and runs the machine based on the material he's imaging—more x-rays for heavy steel, less for lighter materials like plastic.

<https://bit.ly/49Dlxqx>

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What Happens in a Mind That Can't 'See' Mental Images

Neuroscience research into people with aphantasia, who don't experience mental imagery, is revealing how imagination works and demonstrating the sweeping variety in our subjective experiences.



What is imagination in a mind that lacks mental imagery?
Kristina Armitage/Quanta Magazine

Between 1 and 4% of the population lack the skill of mental imagery—a condition known as aphantasia. The brain's process for creating mental images can be described as perception in reverse.

<https://bit.ly/4iBcbzO>

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Science News Favorite Animal Stories of 2024

Pigeons that do somersaults, snakes that fake death with extra flair and surprised canines are among the organisms that enthralled the Science News staff.



*Common eastern bumblebee queens (*Bombus impatiens*), like the one seen here visiting*

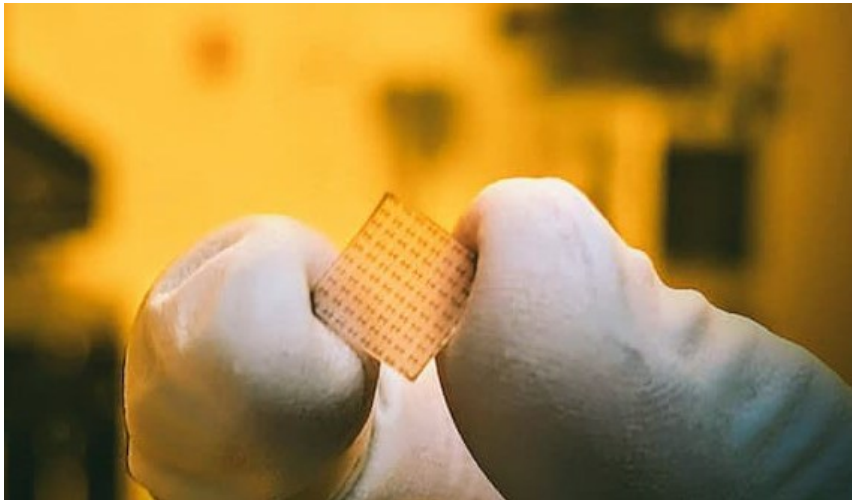
an apple flower, are remarkably resilient to flooding when hibernating in their underground chamber, new experiments show.

Nigel Raine

<https://bit.ly/4iMofOC>

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Novel Semimetal Conducts Electricity Better Than Copper



Thin conductor: A chip made of the non-crystalline topological semimetal niobium phosphide.

(Courtesy: A Khan)

Metals usually become less conductive as they get thinner. Niobium phosphide, however, is different. According to researchers at Stanford University, US, a very thin film of this non-crystalline topological semimetal conducts electricity better than copper even in non-crystalline films. This surprising result could aid the development of ultrathin low-resistivity wires for nanoelectronics applications.

“As today’s electronic devices and chips become smaller and more complex, the ultrathin metallic wires that carry electrical signals within these chips can become a bottleneck when they are scaled down,” explains study leader Asir Intisar Khan, a visiting postdoctoral scholar and former PhD student in Eric Pop’s group at Stanford.

The solution, he says, is to create ultrathin conductors with a lower electrical resistivity to make the metal interconnects that enable dense logic and memory operations within neuromorphic and spintronic devices. “Low resistance will lead to lower voltage drops and lower signal delays, ultimately helping to reduce power dissipation at the system level,” Khan says.

The problem is that the resistivity of conventional metals increases when they are made into thin films. The thinner the film, the less good it is at conducting electricity.

Topological semimetals are different

Topological semimetals are different. Analogous to the better-known topological insulators, which conduct electricity along special edge states while remaining insulating in their bulk, these materials can carry large amounts of current along their surface even when their structure is somewhat disordered. Crucially, they maintain this surface-conducting property even as they are thinned down.

In the new work, Khan and colleagues found that the effective resistivity of non-crystalline films of niobium phosphide (NbP) decreases dramatically as the film thickness is reduced. Indeed, the thinnest films (< 5 nm) have resistivities lower than conventional metals like copper of similar thicknesses at room temperature.

Another advantage is that these films can be created and deposited on substrates at relatively low temperatures (around 400 °C). This makes them compatible with modern semiconductor and chip fabrication processes such as industrial back-end-of-line (BEOL). Such materials would therefore be relatively easy to integrate into state-of-the-art nanoelectronics. The fact that the films are non-crystalline is also an important practical advantage.

A “huge” collaboration

Khan says he began thinking about this project in 2022 after discussions with a colleague, Ching-Tzu Chen, from IBM’s TJ Watson Research Center. “At IBM, they were exploring the theory concept of using topological semimetals for this purpose,” he recalls. “Upon further discussion with Prof. Eric Pop, we wanted to explore the possibility of experimental realization of thin films of such semimetals at Stanford.”

This turned out to be more difficult than expected, he says. While physicists have been experimenting with single crystals of bulk NbP and this class of topological semimetals since 2015, fabricating them at the ultrathin film limit of less than 5 nm at a temperature and using deposition methods compatible with industry and nanoelectronic fabrication was new. “We therefore had to optimize the deposition process from a variety of angles: substrate choice, strain engineering, temperature, pressure and stoichiometry, to name a few,” Khan tells Physics World.

The project turned out to be a “huge” collaboration in the end, with researchers from Stanford, Ajou University, Korea, and IBM Watson all getting involved, he adds.

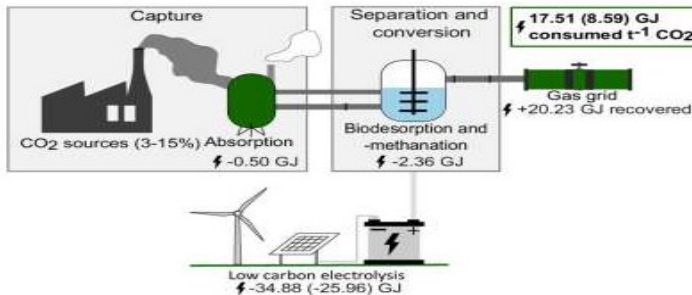
The researchers say they will now be running further tests on their material. “We also think NbP is not the only material with this property, so there’s much more to discover,” Pop says.

The results are detailed in [Science](#).

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CO₂-Eating Bacteria Can Recycle Carbon from Chimney Smoke

B) Bio-Integrated Carbon Capture and Utilization



Process diagram of BICCU.
Credit: Nature Communications (2024)

Researchers from Aarhus University (AU) have developed a new technology that uses microorganisms to convert the CO₂ in flue gas directly for new purposes—for example fuels or substances for the chemicals industry.

The technology can exploit CO₂ as a raw material, unlike conventional carbon capture and storage (CCS), which captures carbon from flue gas and converts it into solid matter that can then be stored underground, for example. The research has recently been [published](#) in the journal Nature Communications.

<https://bit.ly/4gp32ZI>

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FLASHMOB CENTRAL

Amazing Flash Mob Leaves Londoners Speechless!



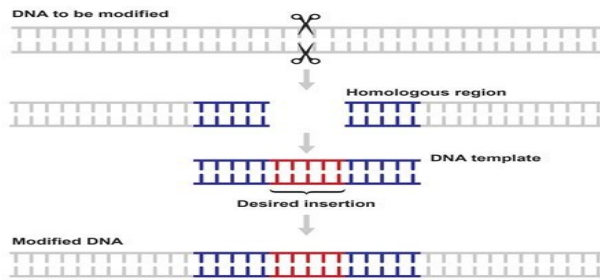
youtube

https://youtu.be/xQ_GwWTdYtk

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Homology-Directed Cell Repair

How the Cell Edits DNA After a CRISPR-Induced Break



integra-biosciences.com

Sometimes DNA breaks because of insults like x-rays, UV rays, or genetic scissors (e.g., CRISPR-Cas9). DNA breakage can have serious consequences if not corrected. Luckily, the cell has mechanisms to repair those breaks, including one known as homology-directed repair. In this fun animated clip, scientists describe how homology-directed repair works in an accessible way. You're left with a haiku to better remember it.

<https://youtu.be/Rv6-RB20f0s>

I'm going to keep after CRISPR until I understand it

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The Year in Biology

Biologists used AI to make discoveries about molecules and the brain, and overturned long-held assumptions about the immune system and RNA.



Fran Pulido for Quanta Magazine

https://youtu.be/p9XHI_26cPE

New discoveries continue to show, "It ain't necessarily so."

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See How This Robot Waddles, Falls Down and Leaps into Flight

This birdlike RAVEN might change forever how drones take off.



(Image credit: Alain Herzog, CC-BY-SA 4.0)

The new machine, aptly called "Robotic Avian-inspired Vehicle for multiple Environments" (RAVEN), is a new remote-controlled-drone prototype that combines a fixed-wing design with articulated legs, allowing it to traverse various environments and take off more efficiently than current drones can. The researchers published their findings in a study published Dec. 4 in the journal [Nature](#).

<https://bit.ly/4gPSiCU>

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Lilium Secures Lifeline with New Investors

eVTOL startup Lilium announced a deal with new investors just days after making plans to cease operations.



lilium

Just days after announcing plans to cease operations, electric aircraft manufacturer Lilium has found a buyer in Mobile Uplift Corporation GmbH—a coalition of European and North American investors.

The German electric vertical takeoff and landing (eVTOL) company announced the news that the deal is expected to enable its two subsidiaries to secure the funding needed to resume operations and hire back the nearly 1,000 employees it let go.

“We are very pleased to announce the signing of an investment agreement with a very experienced consortium of investors, which is a major breakthrough,” said Lilium CEO Klaus Roewe. “Deal closing at the beginning of January will allow us to restart our business.”

Lilium did not give any details on the price or the investors behind the corporation. According to the manufacturer, certain conditions must be met before the contract is finalized.

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Poetry Corner

The Bells

Edgar Allan Poe

Hear the sledges with the bells-
 Silver bells!
What a world of merriment their melody foretells!
 How they tinkle, tinkle, tinkle,
 In the icy air of night!
While the stars that oversprinkle
All the heavens, seem to twinkle
 With a crystalline delight;
 Keeping time, time, time,
 In a sort of Runic rhyme,
To the tintinnabulation that so musically wells
 From the bells, bells, bells, bells,
 Bells, bells, bells-
From the jingling and the tinkling of the bells.

II

Hear the mellow wedding bells,
 Golden bells!
What a world of happiness their harmony foretells!
 Through the balmy air of night

How they ring out their delight!
From the molten-golden notes,
And an in tune,
What a liquid ditty floats
To the turtle-dove that listens, while she gloats
On the moon!
Oh, from out the sounding cells,
What a gush of euphony voluminously wells!
How it swells!
How it dwells
On the Future! how it tells
Of the rapture that impels
To the swinging and the ringing
Of the bells, bells, bells,
Of the bells, bells, bells,bells,
Bells, bells, bells-
To the rhyming and the chiming of the bells!

III

Hear the loud alarum bells-
Brazen bells!
What a tale of terror, now, their turbulency tells!
In the startled ear of night
How they scream out their affright!
Too much horrified to speak,
They can only shriek, shriek,
Out of tune,
In a clamorous appealing to the mercy of the fire,
In a mad expostulation with the deaf and frantic fire,
Leaping higher, higher, higher,
With a desperate desire,
And a resolute endeavor,
Now- now to sit or never,
By the side of the pale-faced moon.
Oh, the bells, bells, bells!
What a tale their terror tells
Of Despair!
How they clang, and clash, and roar!
What a horror they outpour
On the bosom of the palpitating air!
Yet the ear it fully knows,
By the twanging,
And the clanging,

How the danger ebbs and flows:
Yet the ear distinctly tells,
In the jangling,
And the wrangling,
How the danger sinks and swells,
By the sinking or the swelling in the anger of the bells-
Of the bells-
Of the bells, bells, bells, bells,
Bells, bells, bells-
In the clamor and the clangor of the bells!

IV

Hear the tolling of the bells-
Iron Bells!
What a world of solemn thought their monody compels!
In the silence of the night,
How we shiver with affright
At the melancholy menace of their tone!
For every sound that floats
From the rust within their throats
Is a groan.
And the people- ah, the people-
They that dwell up in the steeple,
All Alone
And who, tolling, tolling, tolling,
In that muffled monotone,
Feel a glory in so rolling
On the human heart a stone-
They are neither man nor woman-
They are neither brute nor human-
They are Ghouls:
And their king it is who tolls;
And he rolls, rolls, rolls,
Rolls
A paeon from the bells!
And his merry bosom swells
With the paeon of the bells!
And he dances, and he yells;
Keeping time, time, time,
In a sort of Runic rhyme,
To the paeon of the bells-
Of the bells:
Keeping time, time, time,

In a sort of Runic rhyme,
To the throbbing of the bells-
Of the bells, bells, bells-
To the sobbing of the bells;
Keeping time, time, time,
As he knells, knells, knells,

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Stonehenge



theworldinmypocket.co.uk

Located about 90 miles west of London, Stonehenge is one of the world's most famous and mysterious prehistoric monuments. Built around the same time as Egypt's Great Pyramid, this complex of giant stones, some weighing up to 30 tons, has captivated archaeologists and historians for more than a thousand years ([see maps over time](#)).

About 5,000 years ago, some Europeans started building "hengese," ceremonial monuments encircled by round or oval ditches, the ruins of which have been found in France, Germany, and the UK.

England's Stonehenge is the best-known of these, composed of concentric circles of large silica-filled sandstones called "sarsens" as well as bluestones, an igneous rock found in Wales. The slabs were engineered to join seamlessly together and are laid out symmetrically around an axis that runs southwest to northeast.

<https://bit.ly/4gmxbsy>

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The Blue Ghost Lunar Lander Is Now Headed to the Moon

NASA's Blue Ghost Mission will carry the LEXI telescope that will image Earth's protective shield



LEXI Moon Lander
NASA

NASA's Blue Ghost lunar lander successfully launched on Wednesday and is on its way to the moon. Blue Ghost, from Firefly Aerospace, is accompanied by the Tenacious lunar rover from the Japanese company ispace. The mission is named Ghost Riders in the Sky,

Blue Ghost is one of eight US landers anticipated to take off in the next two years and will deploy on the near side of the moon, in a flat region called Mare Crisium. Once LEXI opens its protective dust cover—mounted on top of the lander—it will get an unprecedented view of Earth's magnetosphere, the magnetic bubble that shields us from harmful charged particle radiation.

<https://bit.ly/3PDa8hp>

Do you think Johnny Cash or Vaughn Monroe will be waiting for Blue Ghost to land?

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Ghost Riders in the Sky



sallyandsamblogspot.com

An old cowboy went riding out one dark and windy day
Upon a ridge he rested as he went along his way
When all at once a mighty herd of red eyed cows he saw
A-plowing through the ragged sky and up the cloudy draw

Their brands were still on fire and their hooves were made of steel
Their horns were black and shiny and their hot breath he could feel
A bolt of fear went through him as they thundered through the sky
For he saw the Riders coming hard and he heard their mournful cry

Yippie yi yaaaay
Yippie yi ohhhhh

Ghost Riders in the sky

Their faces gaunt, their eyes were blurred, their shirts all soaked with sweat
He's riding hard to catch that herd, but he ain't caught 'em yet
'Cause they've got to ride forever on that range up in the sky
On horses snorting fire
As they ride on hear their cry

As the riders loped on by him he heard one call his name
If you want to save your soul from Hell a-riding on our range
Then cowboy change your ways today or with us you will ride
Trying to catch the Devil's herd, across these endless skies

Yippie yi yaaaay
Yippie yi ohhhhh

Ghost Riders in the sky
Ghost Riders in the sky
Ghost Riders in the sky

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Inside a Fusion Startup's Insane, Top-Secret Opening Ceremony

Robots! Huge capacitors! A pianist-programmer of impossible skill! One of Silicon Valley's formative figures takes the stage at a wild event.



Photograph: Serene

Once in a while, Silicon Valley is still Silicon Valley. It happened on August 8, 2024, at the opening ceremony for a nuclear fusion energy startup. The events of that day were so astonishing I wish I could blurt them out to you in an instant, like a hologram, but you will need to be patient, as the linear nature of language allows me to unveil only one piece at a time.

An audience composed of venture capitalists, US military and intelligence agency officials, physicists, and San Francisco artists have been invited to a secret event. They enter through an imposing vault door to take their places in rows of seats that feel tiny in the shadows of a vast space. Behind them is a sea of refrigerator-sized capacitors. In front is a stage set that is a little hard to visually interpret. It is white and heavenly, high tech, large, glowing.

<https://bit.ly/49tiz80>

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The J-58: It's What Makes the Blackbird Go Bye-Bye



airzoo

The Air Zoo is a world-class, Smithsonian-affiliated aerospace and science museum, in Kalamazoo, Michigan, with over 100 air and space artifacts, inspiring interactive exhibits, full-motion flight simulators, indoor amusement park rides, a theater and over 100 education programs!

<https://youtu.be/MJrXUh0eZjw>

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Building a Getaway Kit for Emergencies

If the recent fire catastrophes haven't been enough of a wakeup call, then perhaps nothing will convince you of the need to prepare for out-of-the-blue events, but here's some suggestions from FEMA you might pass along to your neighbors.



thenearroom.net

Being prepared means having your own food, water and other supplies to last for at least 72 hours. A disaster supplies kit is a collection of basic items your household may need in the event of an emergency.

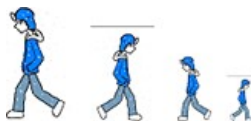
Make sure your emergency kit is stocked with the items on the checklist below. Most of the items are inexpensive and easy to find and any one of them could save your life. Headed to the store? Download a printable version to take with you. Once you take a look at the basic items consider what unique needs your family might have, such as supplies for pets or seniors.

<https://bit.ly/4fRdxDR>

Los Angeles Fire Department's "six Ps" for packing for an evacuation: people and pets; papers, phone numbers, and important documents; prescriptions, vitamins, and eyeglasses; pictures and irreplaceable memorabilia; personal computers; and "plastic" credit and ATM cards.

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My Walking Thoughts



For Sunday January 19 2025

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Mostly they're on my son David and his family who lost their house to fire in Pacific Palisades. The good news is they're safe, and looking forward rather than backwards, which is not to say that there won't be lingering memories to haunt them for the rest of their lives.

My granddaughter, Chelsea, may suffer the deepest sense of loss because of what has happened to friends and classmates that formed such a substantial part of her life. Will they all recover? I hope so... I believe so... but even so... they may never be able to recover what has been most valuable in their severed or at least truncated relationships.

Where do Angelenos go from here? That's really the question, isn't it. They—we—have seen what has been sitting on the doorstep for going on two centuries, and there have been constant reminders of the dangers implicit in the increasingly blurred boundaries between the limits of urban infringement on rugged wilderness areas.

Clearly there is the need to rethink what makes sense in this arrangement and what the role of our various organs of government have in making sure that our infrastructure reflect the reality of the environment.

But first we face the daunting task of managing the remains of the devastation—not only huge amounts of construction and demolition debris, but large portions of medical, hazardous, and mixed waste fractions as well that until thoroughly removed will impact the health and safety of everyone living and working in the Los Angeles Basin... and beyond.

How Much Land Do Wildfires Burn in the US?

Wildfire suppression costs have risen in recent decades, averaging \$3.0 billion from 2019–2023.



science.org

Since 1983, federal fire agencies have tracked 2.9 million wildfires across 216 million combined acres. That's more than twice the area of California.

From 2014 to 2023, an annual average of 62,277 wildfires have burned an average of 7.02 million acres. Total annual acres eclipsed 10 million three times in that period: in 2015, 2017, and 2020.

In general, wildfires are not happening more frequently, but they're burning more and more land. The total area covered has risen since federal fire agency tracking began in the 1980s.

<https://bit.ly/4hfP0JR>

All this may be due for a change in the near future.

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