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GENTLE.NEWS

In Today's Edition

"One can never have enough socks," said Dumbledore. "Another Christmas has come and gone and I didn't get a single pair. People will insist on giving me books."

— J.K. Rowling

NASA Space Telescope Maps Magnetic Fields of ‘Lighthouse’ Pulsar

4 Min Read NASA Space Telescope Maps Magnetic Fields of ‘Lighthouse’ Pulsar For the first time, scientists have used NASA’s IXPE (Imaging X-ray Polarimetry Explorer) to directly measure the magnetic fields of PSR J1101−6101, a pulsar located within what is often referred to as the Lighthouse Nebula. The results provide new insight into the structure of some of the most extreme objects in the cosmos, as NASA continues to explore the secrets of how the universe works. A paper describing the results published Thursday in the Astrophysical Journal. Scientists have successfully measured the magnetic field of the Lighthouse pulsar’s nebula using NASA’s IXPE. Their measurements confirm the theory that high-energy particles escape along the galaxy’s magnetic field lines. This composite image contains X-ray data from IXPE in blue (highlighted in the inset), the Chandra X-ray Observatory in purple, and radio data from CSIRO in green. The starfield is optical data from the 2MASS optical survey. X-ray: Chandra: NASA/CXC/Stanford Univ./J.T. Dinsmore et al.; IXPE: NASA/MSFC/J.T. Dinsmore et al., Radio: CSIRO/ATNF/ATCA; Optical: 2MASS/UMass/IPAC-Caltech/NASA/NSF; Image processing: NASA/CXC/SAO/L. Frattare Fast facts A pulsar is a type of neutron star with a strong magnetic field that spins incredibly fast. The pulsar at the center of the Lighthouse Nebula is rotating 16 times per second. Neutron stars are the leftover cores of massive stars, formed at the

Source: NASA

end of their life cycles, that possess more mass than the Sun. They are condensed down to the size of a city, making them natural laboratories for studying extreme physics. Polarization is a property of light that describes the direction of its electric field vibrations. The polarization degree is a measurement of how aligned those vibrations are with each other. In June 2025, IXPE spent nearly 18 days focused on the Lighthouse Nebula. Astronomers studied two narrow X-ray offshoots extending from the pulsar to better understand how electrons at nearly the speed of light interact with this energetic system. The longer offshoot is known as the “filament,” and the shorter one is the “trail.” When high-energy particles from the pulsar collide with the gas of interstellar space, they form a bow shock, like the bow wave formed at the front of a speeding boat. Most particles become trapped behind this bow shock, forming the turbulent trail behind the pulsar. Researchers have suspected since 2008 that the highest-energy particles escape through this bow shock into interstellar space, flowing along the galaxy’s magnetic field lines to create the nebula’s long, thin filament. “We wanted to test that theory,” said Jack Dinsmore, undergraduate student at Stanford University, who led the study. “The ‘smoking gun’ would come by measuring the polarization of the light, which indicates the magnetic field direction. If the magnetic field points along the filament, that confirms that the filament’s particles are flowing along the field.” One challenge with these measurements is that the Lighthouse Nebula is relatively faint. To address this, IXPE scientists developed advanced analysis methods that use every bit of data, avoiding

Source: NASA

simplifying steps that could limit information. With these new tools and the new observations of the Lighthouse, the science team successfully measured the filament's polarization. These techniques also gave a polarization measurement of the trail, and the pulsar's emission signal. Their analysis confirmed with more than 99% confidence that the magnetic field does indeed align with the particles' flow. While the parallel direction confirms models for the particle's motion, the polarization degree was high enough to raise new questions. "Many of the models for filaments assume strong magnetic turbulence," said Roger Romani, a Stanford University professor who co-authored this paper. "The high polarization degree we measured indicates lower turbulence than such models require." The IXPE observations also showed that the magnetic field responsible for X-ray emission had to be parallel to the trail. However, the authors collected radio frequency observations showing a magnetic field pointing almost exactly perpendicular. "The striking divergence in magnetic field orientations observed between radio and X-ray wavelengths provides compelling evidence for the highly structured nature of these objects," said Niccolò Bucciantini of the Italian National Institute for Astrophysics and co-author of the study. "This marks the first clear indication that particles of different energies occupy distinct regions within the system, hinting at the presence of multiple, and potentially very different, acceleration mechanisms at work." More about IXPE The IXPE mission, which continues to provide unprecedented data enabling groundbreaking discoveries about celestial objects across the

Source: NASA

universe, is a joint NASA and Italian Space Agency mission with partners and science collaborators in 12 countries. It is led by NASA's Marshall Space Flight Center in Huntsville, Alabama, and BAE Systems, Inc. manages spacecraft operations together with the University of Colorado's Laboratory for Atmospheric and Space Physics in Boulder. Learn more about IXPE's ongoing mission here: https://www.nasa.gov/ixpe About the Author Michael Allen Share Details Last Updated Jul 09, 2026 Editor Lee Mohon Contact Joel Wallace Location Marshall Space Flight Center Related Terms IXPE (Imaging X-ray Polarimetry Explorer) Astrophysics Chandra X-Ray Observatory Marshall Astrophysics Marshall Space Flight Center Nebulae Pulsars The Universe Explore More 3 min read NASA's IXPE Measures White Dwarf Star for First Time By Michael Allen For the first time, scientists have used NASA's IXPE (Imaging X-ray Polarimetry… Article 6 months ago 4 min read NASA's IXPE Obtains First X-ray Polarization Measurement of Magnetar Outburst What happens when the universe's most magnetic object shines with the power of 1,000 Suns… Article 1 year ago 8 min read NASA Telescopes Tune Into a Black Hole Prelude, Fugue NASA released three new pieces of cosmic sound Thursday that are associated with the densest… Article 1 year ago Keep Exploring Discover More Topics From NASA IXPE The Imaging X-ray Polarimetry Explorer (IXPE) is NASA's first mission to study the polarization of X-rays. Chandra X-ray Observatory Hubble Space Telescope Since its 1990 launch, the Hubble Space Telescope has changed our fundamental understanding of the universe. James Webb Space Telescope Webb is the

Source: NASA

premier observatory of the next decade, serving thousands of astronomers worldwide. It studies every phase in the…

Source: NASA

Shedding New Light on Yukon River Chinook Salmon Declines

Yukon River Chinook salmon have been declining for decades. These declines have limited salmon harvest and posed hardships for local communities that depend on these fish for their food sovereignty, culture, and livelihoods. Adult run sizes recently reached their lowest point ever following a downturn from 2019 to 2023. The causes were unclear. But a new study identified a heatwave-associated increase in natural mortality as an important driver of this most recent and particularly severe decline. Addressing the Challenge Like most salmon, Yukon River Chinook are anadromous. They hatch in freshwater, migrate to the ocean to grow and mature, and return to freshwater to reproduce. Adult salmon spawn in the same river in which they hatched, and each of these reproductive units is called a “run.” One of the main challenges for understanding Yukon River Chinook salmon runs is their vast range. Their life cycle spans the interior of Alaska and Canada to the Bering Sea and beyond. This makes monitoring and studying them—and identifying the causes of their declines—extremely difficult. New research led by NOAA’s Alaska Fisheries Science Center and its partners aimed to overcome these challenges. Using cutting-edge analyses, they pulled together multiple data sources from across the life cycle into a unified model framework. Integrative Research Leads to Comprehensive Model To reconstruct the full life cycle, this new modeling approach combined data from multiple sources: Juvenile marine

Source: NOAA Fisheries

survey data and bycatch information collected by the Alaska Fisheries Science Center Adult monitoring data collected by Alaska Department of Fish and Game and Fisheries and Oceans Canada One of the first questions that the research team set out to answer with this new tool was: Where in the life cycle are Chinook salmon experiencing significant impacts that could be driving declines? The team examined four factors across different stages of their life cycle: Juvenile recruitment to the ocean: the number of juveniles produced per spawner that survive in freshwater and outmigrate to the ocean Mortality due to natural causes in the marine environment during the juvenile to the adult life stages (natural mortality) Harvest on adult fish in directed fisheries Bycatch of non-targeted marine fisheries NOAA researcher and the study's lead author, Dr. Lukas DeFilippo, noted, "Not surprisingly, we found evidence to suggest that impacts operating in the early life stages have likely contributed to declines in run sizes over the past two decades, which is consistent with previous research." However, the research team found something else that stood out. Beginning in 2016, natural mortality in the post-juvenile life stages began increasing substantially. Shortly after this period, adult Yukon River Chinook salmon runs suffered their steepest drop in abundance to date. Interestingly, this collapse could not be explained by weak juvenile recruitment to the ocean alone. Rather, it reflected the effects of increased mortality occurring after the juvenile stage, such as later in the marine life cycle or during adult spawning migrations. This suggests that the bottleneck limiting adult production has shifted to later

Source: NOAA Fisheries

life stages. The increase in natural mortality aligns with a period of acute and prolonged marine heatwaves in the Bering Sea. Some of the dramatic changes to the marine ecosystem during this time may have contributed to the increased mortality. For instance, steep declines in prey species— such as capelin —during and following marine heatwaves limit energy available to predators like Chinook salmon. The study also indicated that—despite fewer severe heatwave events in the Bering Sea since 2020—natural mortality rates had not yet returned to their lower, pre-heatwave levels as of 2023. They continued to limit population productivity. Finally, the study found no evidence that harvest of adult salmon or bycatch removals prior to spawning have been significant factors in population level declines of Yukon River Chinook salmon. The integrative approach developed in this study has a number of broad applications for future research as well. “A model like this is a big step towards promoting research on the factors affecting salmon productivity across their life cycles, which was recommended by the recently convened Alaska Salmon Research Task Force ,” added Dr. Kathrine Howard, co-author of the study and Task Force member. The research team has plans to leverage this new tool for future work aimed at supporting Yukon River Chinook salmon research and recovery.

Source: NOAA Fisheries

Snapshot: Community Effort Saves Hundreds of Endangered Sunflowers in South Carolina

Community Partners Come Together in South Carolina to Conserve Schweinitz's Sunflower Jul 6, 2026 Written By Gary Peeples Rock Hill, S.C. - More than 500 endangered Schweinitz’s sunflowers are now conserved at York County’s Catawba Bend Preserve, thanks to staff from York County, the Catawba Nation, York County Natural Gas Authority, and the U.S. Fish and Wildlife Service. “What we saw unfold in York County to protect those endangered plants was a model of imperiled species conservation. Those sunflowers are part of what makes York County unique, and the community showed up in a tremendous way to take care of them,” said Melissa Chaplin, biologist with the U.S. Fish and Wildlife Service. In August 2025, Chaplin, who is based in Charleston, S.C., received an e-mail from Marvin Bouknight, then the natural resources program manager with the Catawba Nation. Because of his work at Catawba Nation, and being familiar with the species, Bouknight was aware of a population growing along the shoulder of Church Road. He and fellow tribal biologist Courtney Skeldon had even been out to count them. While driving Church Road one day, he was caught off guard by the sight of tiny, white survey flags running through the population. Stopping to investigate, he saw the flags belonged to the York County Natural Gas Authority, leading him to cold call the authority, reaching Marc Fortner, project manager for the gas

Source: U.S. Fish & Wildlife Service

pipeline installation that was marked by the flags, and beginning a conversation about how to conserve the sunflowers. “Marc was nothing but supportive of the entire effort to conserve the sunflowers. You could not have asked for a better partnership – the gas authority was on-board from the get-go and worked with us to conserve the plants. Without their cooperation, it never would’ve happened,” said Bouknight. Initially it seemed the plants were safe as the plan was to bore the gas line beneath the plants, without disturbing the surface, but as the project developed, it became evident going beneath the plants wouldn’t be an option - a trench would have to be dug through the sunflowers. A new strategy was needed, so Bouknight broadened the conversation. With the help of staff at the South Carolina Department of Natural Resources, he connected with Chaplin, who works in the U.S. Fish and Wildlife Service office that administers the Endangered Species Act in South Carolina. During this period, Bouknight joined York County Parks and Recreation Department as superintendent of Catawba Bend Preserve, with Courtney Skeldon taking over his role with the tribe. With York County Parks and Recreation, York County Natural Gas Authority, the Catawba Nation, and the U.S. Fish and Wildlife Service all represented around the table, conversation turned to moving the plants out of the gas line footprint to a place where they would enjoy long-term protection. Catawba Bend Preserve, a new park located in and operated by York County, was chosen as the destination. Over four hot days in late spring and early summer, teams from York County Parks and Recreation, the Catawba Nation, and the

Source: U.S. Fish & Wildlife Service

Service transplanted more than 500sunflowers, digging them from the shoulder of Church Road and planting them at Catawba Bend Preserve, where the maintenance team had plowed a dedicated area to receive the plants. County staff used two portable water tanks to provide regular watering as a counter to drought conditions. To minimize the effects of deer and rabbit browsing, they installed a solar electric fence to give the plants the best chances of survival “Nothing like this happens because of one person,” said Bouknight. “It happens because passionate, dedicated folks see the value. This was elective from the start – nothing was mandated. It reminds me that there are still good people and organizations out there that care about our natural resources.” Schweinitz’s sunflower is found only in the Piedmont of North Carolina and South Carolina and is considered an indicator of prairie remnants. It has been on the federal endangered species list since 1991, when only 13 populations were known to exist, though today that number has increased to 94. Story Tags Biologists (USFWS) Endangered and/or Threatened species Flowering plants Plants Work of the Service Written By Gary Peeples Published Jul 6, 2026 Featured in the Story Melissa Chaplin Endangered Species Act Facilities Asheville Ecological Services Field Office South Carolina Ecological Services Field Office Latest Stories Current Road Conditions at Pocosin Lakes National Wildlife Refuge Jul 9, 2026 Current Road Status at Alligator River National Wildlife Refuge Jul 8, 2026 Wildlife Management When we protect water, we protect pollinators Jul 7, 2026

Source: U.S. Fish & Wildlife Service

Can the shingles vaccine lower your dementia risk?

A study led found that older adults who received the shingles vaccine currently used in the US were less likely to be diagnosed with dementia within four years. Older adults who received a shingles vaccine after a stay in a skilled nursing facility had a 24% lower risk of being diagnosed with dementia over a four-year period than those who were not vaccinated, according to the study. The findings are based on an analysis of health records and Medicare data from more than 500,000 adults age 66 and older who were admitted to skilled nursing facilities for short or long-term care. Researchers compared those who received at least one dose of the recombinant shingles vaccine, known as RZV or Shingrix, with those who did not. The vaccine was introduced in 2017 and is the only shingles vaccine currently on the market. “A lot of previous studies with similar results focused on an older vaccine,” says study author Kaley Hayes, an assistant professor at Brown University’s School of Public Health. “This study looks at the newest vaccine only in an older, vulnerable adult population who were not up to date with shingles vaccination and are at a very clear clinical point in care: entering a skilled nursing facility.” The findings align with several earlier studies that focused on a prior shingles vaccine have linked shingles vaccination to a lower risk of dementia. “It fits into this large puzzle that’s just starting to come together that the vaccines are effective at preventing shingles and also appear to have

Source: Futurity.org

neuroprotective benefits as well," says Hayes, who is also the associate director of pharmacoepidemiology for Brown's Center for Gerontology and Healthcare Research. Hayes led the study published in Annals of Internal Medicine alongside colleagues from Brown, the University of Delaware, the Providence Veterans Affairs Medical Center, and other institutions. To analyze the data, the team used a method known as a target trial emulation, which is designed to mimic the conditions of a randomized clinical trial when conducting one is not practical. The study included Medicare claims and electronic health record information from patients admitted to more than 5,500 skilled nursing facilities across the country between 2017 and 2022. Only 8,843 of 509,926 participants received the vaccine. To be included in the study, patients could not have a prior diagnosis of dementia and had to be eligible to receive the shingles vaccine. After a four-year follow-up, the team found that people who received at least one of the two doses of Shingrix had a substantially lower risk of being diagnosed with dementia than those who did not receive the vaccine. According to the data, only 18.8% of vaccinated adults developed dementia within four years compared with 24.6% of those who were not vaccinated. "This translates to about one in 17 dementia cases potentially being prevented," Hayes says. The primary caveat of the study is the researchers cannot say for certain that the vaccine was the reason that vaccinated adults developed dementia at a lower rate. People who got vaccinated, for instance, tended to be slightly younger and healthier than those who did not, which may have also lowered their dementia risk. The

Source: Futurity.org

research team adjusted for those differences and found that those factors did not fully account for the association. More research, including clinical trials, will ultimately be needed to determine whether the vaccine directly reduces the risk of dementia. The researchers say the results point toward a generally accessible tool that can help both protect the body and mind. “Our cognition is so tied to our overall health and what happens to us physically,” Hayes says. “It’s really amazing to see that something that’s supposed to prevent a physical ailment can also help keep our brain healthy, too.” In the study, the authors acknowledged funding from Glaxo-SmithKline, which makes the shingles vaccine Shingrix, noting that the company had no control over the study design, analysis or decision to publish the results. Source: Brown University The post Can the shingles vaccine lower your dementia risk? appeared first on Futurity .

Source: Futurity.org

Oak Ridge National Lab, Cleveland Clinic, and IBM achieve first-known computations of fusion materials on a quantum computer

Quantum-centric supercomputing algorithm takes aim at tritium extraction – a bottleneck to abundant energy and a long-standing challenge for classical computers working alone Published: July 7, 2026 Updated: July 9, 2026 A team of scientists from Oak Ridge National Laboratory (ORNL), Cleveland Clinic and IBM (NYSE: IBM), has calculated nine molecular configurations of a promising material to produce fuel for fusion energy – the first-known instance of such computations on quantum computers. Such calculations, demonstrated in a new paper published on arXiv , are computationally challenging for classical computers to scale when working alone. They are a fundamental step towards optimizing the production and extraction of tritium – an extremely rare material in nature that is necessary to produce fusion energy with most of the proposed machines. Ensuring adequate supplies of tritium has long been a barrier to realizing the promise of clean and abundant energy from fusion power plants, and solving this issue is a key objective of the United States Department of Energy’s (DOE) Genesis Mission. Quantum computers are well-suited to compute the atomic-level chemistry of a liquid salt that contains fluorine, lithium, and beryllium (FLiBe), one of the leading candidate materials for extracting tritium fuel in fusion reactors. To compute different configurations of clusters of FLiBe, the team used the

Source: Oak Ridge National Laboratory

same quantum-centric supercomputing techniques now being applied to 12,635-atom protein simulations with Cleveland Clinic. These methods can calculate the quantum behavior of electrons in complex materials, complementing and enhancing the capabilities of classical supercomputers and algorithms. Tom Beck. Credit: Carlos Jones/ORNL, U.S. Dept. of Energy “In order to demonstrate the capabilities catalyzed by the Genesis Mission, we have built a team of leading experts across seven DOE national labs, four universities, three industry partners and Cleveland Clinic to pursue a multi-pronged discovery cycle aimed at optimizing tritium production in molten salt fusion blanket materials,” said Tom Beck, Section Head for Science Engagement in the Computing and Computational Sciences Directorate at ORNL . “Quantum computers, such as those built by IBM and enhanced by AI and exascale computing, are key tools that accelerate the discovery and design cycles needed to produce sufficient tritium to fuel fusion reactors.” “This work builds on our advances in simulating complex biological systems at scale, including proteins spanning 12,635 atoms and extends those techniques into materials science to explore fusion-relevant systems with greater accuracy and efficiency,” said corresponding author Kenneth Merz, PhD, staff scientist at Cleveland Clinic . “At Cleveland Clinic, we are focused on applying advanced technologies to deepen scientific understanding and accelerate discovery. This collaboration reflects the growing importance of quantum computing, AI and high-performance computing as tools for scientific inquiry. By bringing these technologies together, researchers can

Source: Oak Ridge National Laboratory

provide solutions to challenging real-world problems with greater speed and precision.” “Bringing quantum, AI, and classical computing together is essential to tackling our society's most fundamental scientific challenges – unlocking capabilities which none of these paradigms can access alone," said Jerry Chow, CTO of Quantum-Centric Supercomputing at IBM . “These results add to mounting evidence that quantum-centric supercomputing is now a practical scientific tool for problems that have long challenged chemists, engineers and materials scientists. As quantum computers scale, the path ahead is promising." In a future tokamak, neutrons released from the plasma during fusion could bombard the surrounding molten salt blanket to create tritium. This new work uses quantum computers to model the interaction between tritium and a cluster of atoms in the molten salt. Credit: IBM The Tritium Challenge at the Heart of Fusion Energy The exploration aligns with the Genesis Mission’s broader goal to unify high-performance computing (HPC), artificial intelligence and quantum computing with the country’s major scientific instruments across the DOE’s 17 national laboratories to accelerate scientific discovery. As one of the mission’s industry collaborators, IBM is working with its partners to explore how quantum-centric supercomputing – which brings together CPUs, GPUs, and QPUs to solve problems they cannot tackle alone – could help to address critical national challenges, including precisely modeling complex material interactions to help unlock a fuel supply for widespread, fully working fusion power plants. Optimizing the best recipe for FLiBe – whose composition is dynamically

Source: Oak Ridge National Laboratory

changing under intense neutron radiation, extreme heat, and magnetic fields – is one of the hardest science and engineering challenges today. It requires extensive study of its quantum mechanical properties including energetics, stability and interaction with tritium to understand how it will perform multiple functions, including that of tritium breeding material at very hot temperatures. Today, such research is only possible through difficult and expensive experimentation, or through classical computing approximation methods that can lack accuracy. To compute energies of different FLiBe conformations with and without tritium, the team used quantum-centric supercomputing to enable quantum and classical computers to work together – in which the parts of a problem that can be broken down into quantum circuits are solved on a quantum computer. This allowed the team to more precisely determine the electronic structure of the material and how its atoms behave, particularly how strongly they bind tritium at a fundamental molecular level. In turn, the scientists could identify the range of configurations the atoms moved through and extract properties – such as how strongly and through which mechanism each configuration binds tritium – that would otherwise remain hidden. The Road Ahead The collaboration is ongoing, aiming to reduce the time it takes for data to transfer between quantum and classical resources and to scale the size of molecular interactions simulated. Eventually, the team hopes the fusion energy ecosystem will be able to use this workflow directly to design and verify their own materials. This work adds to a growing body of 2026 milestones demonstrating IBM quantum computers

Source: Oak Ridge National Laboratory

as useful scientific tools – including simulating real magnetic materials , creating a never-before-seen half-Möbius molecule , and modeling proteins relevant to biological research that span up to 12,635 atoms. For more about this research, please read the blog . This story was originally published by IBM. UT-Battelle manages ORNL for the DOE’s Office of Science, the single largest supporter of basic research in the physical sciences in the United States. The Office of Science is working to address some of the most pressing challenges of our time. For more information, please visit energy.gov/science . Media Contact Scott Jones , Communications Manager, Computing and Computational Sciences Directorate , 865.241.6491 | JONESG@ORNL.GOV

Source: Oak Ridge National Laboratory

Activity Time - Word Search

Find the words below in the puzzle. Words go across or down only.

Words to Find:

L	E	U	L	X	T	S	Q	I	Y	K
D	E	V	B	X	W	L	K	W	V	R
A	P	Q	S	Z	A	T	G	K	U	M
H	R	F	G	M	C	O	V	L	P	E
V	T	N	R	C	N	E	G	J	X	A
W	R	A	A	J	Z	L	D	C	X	M
C	U	C	B	O	O	Z	Y	E	U	M
F	M	V	E	E	R	G	Z	B	D	W
M	J	D	M	X	Q	E	G	F	B	F
O	B	N	D	R	L	S	K	Y	Z	C
M	A	E	J	A	H	K	W	L	G	Q