Astronomers Confirm a Vast Interstellar Tunnel Linking Our Solar System to Far-Off Constellations

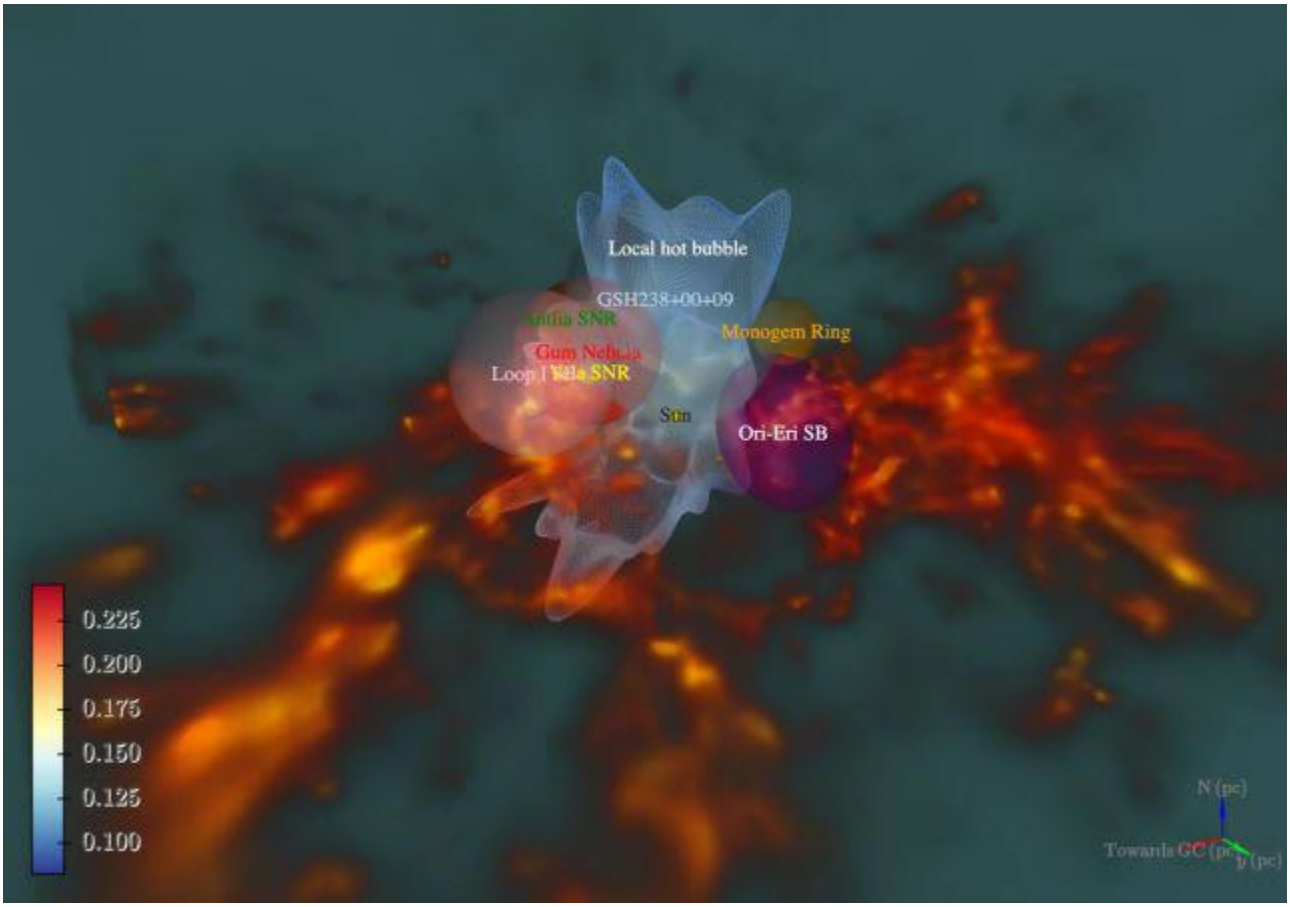
A Tunnel Of Light Through The Universe. Credit: Shutterstock | The Daily Galaxy --Great Discoveries Channel© Daily Galaxy US

A sweeping new analysis published in *Astronomy & Astrophysics* has revealed a striking feature in the fabric of our galaxy: a tunnel-like structure of hot plasma connecting our solar system's **Local Hot Bubble** to distant interstellar regions. The discovery, based on data from the **eROSITA X-ray telescope** aboard the Spectrum-Roentgen-Gamma (SRG) observatory, offers the clearest view yet of the complex, dynamic environment in which our solar system is embedded.

The **Local Hot Bubble (LHB)** is a massive cavity of low-density, superheated gas that extends roughly 1,000 light-years across. This region, which surrounds the solar system, is thought to have been carved out by a series of **supernova explosions** about 14 million years ago. These explosions swept away interstellar gas and dust, leaving behind a million-degree Kelvin plasma that continues to glow in **soft X-rays** detectable by instruments like eROSITA.

Mapping the bubble from within has long been a challenge. “It’s like trying to describe the shape of your fish tank while standing in the middle of it,” said lead researcher **Michael Yeung** of the Max Planck Institute for Extraterrestrial Physics. To overcome this, Yeung’s team divided the sky into over 2,000 sections and analyzed the soft X-ray light emitted from each, building the most detailed three-dimensional map of the LHB to date.

Their findings showed that the bubble is not a neat sphere but an irregular structure, expanding more **perpendicular to the galactic plane** than along it. The team also found a clear **north-south temperature gradient**, with the Southern Hemisphere registering an average temperature of **121.8 ± 0.6 eV**, compared with **100.8 ± 0.5 eV** in the Northern Hemisphere. This gradient had gone undetected in earlier surveys due to limitations in the instruments used, such as the R1 and R2 band ratios from the ROSAT satellite.



The Solar System Resides in a Hot 'Bubble' in Space – And Scientists Have Just Found a Tunnel Leading Out© Daily Galaxy US

The Unexpected Tunnel Toward Centaurus

One of the most surprising findings was the detection of a **tunnel-like corridor** of hot plasma extending from the bubble's edge toward the **constellation Centaurus**. This structure appears to cut a clear channel through cooler, denser interstellar material, suggesting a physical connection to another **low-density cavity** beyond the LHB.

Building a New Picture of the Galactic Neighborhood

Beyond the tunnel toward Centaurus, Yeung's team identified **dust-free cavities filled with plasma** throughout the LHB. These cavities seem to form interconnected pathways, further supporting the idea that the Milky Way is not a uniform void but a dynamic, porous structure.

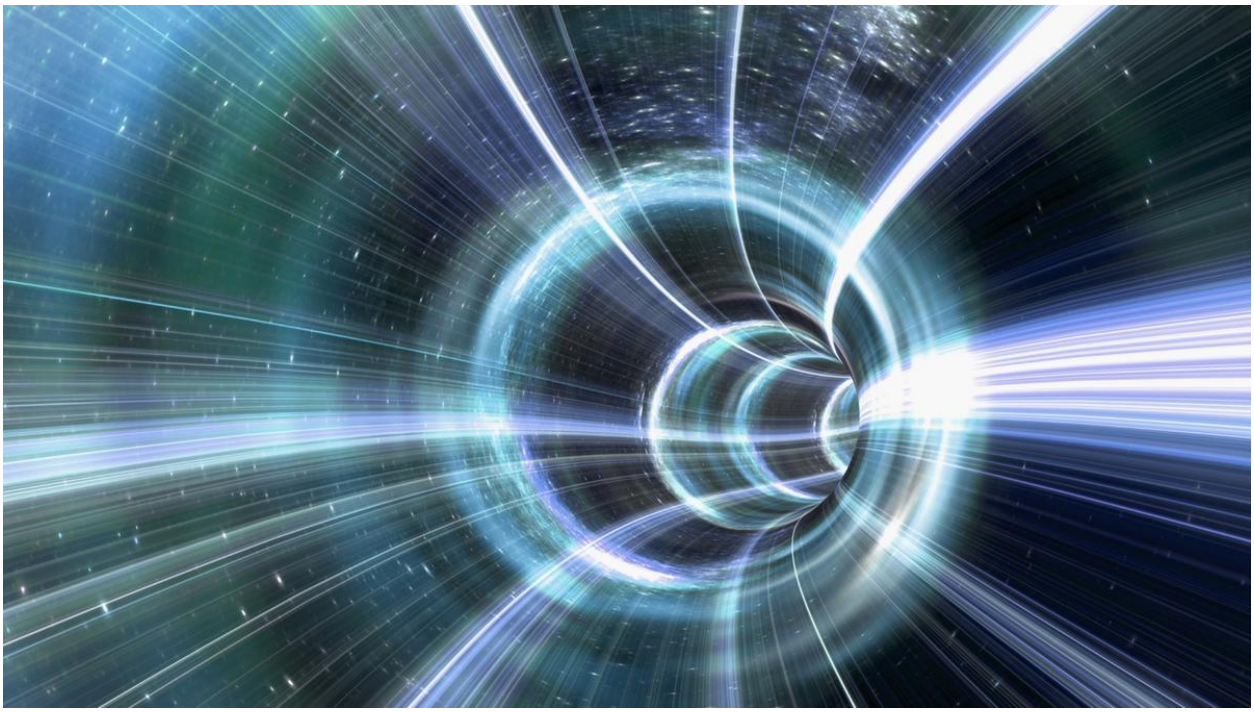
The team also modeled the bubble's **emission measure**, a parameter related to the density and size of the plasma, and found it was **anti-correlated with local dust column density**. In other words, areas with fewer dust grains are associated with stronger X-ray emission, reinforcing the picture of interconnected cavities.

The average thermal pressure of the LHB was measured at **10,100 cm^{-3} K**, which is significantly lower than that of typical **supernova remnants** or stellar wind-blown bubbles. This suggests the LHB may be "open" toward high galactic latitudes, allowing energy and plasma to escape and possibly connect with other bubbles.

Telescope finds ‘interstellar tunnel’ within our solar system’s hot bubble

This tunnel may connect our local bubble to neighboring superbubbles, forming a vast network of hot gas.

Updated: Nov 12, 2024



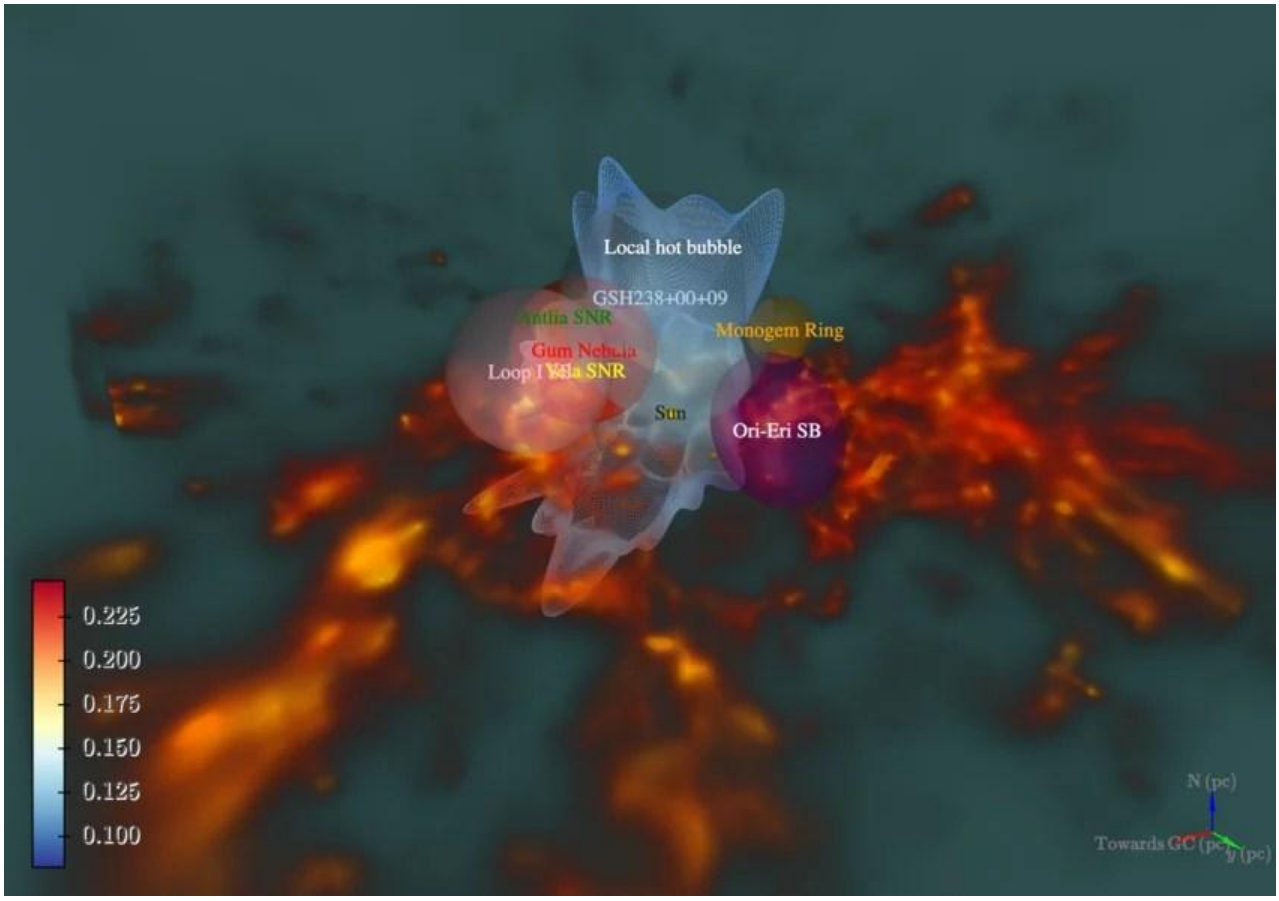
Representational image of interstellar tunnel.

Our solar system resides within a bubble of superheated gas known as the Local Hot Bubble (LHB). Scientists have long pondered its origins.

To better study this region, the Max Planck Institute for Extraterrestrial Physics (MPE) researchers used data from the eROSITA All-Sky Survey.

And they spotted a fascinating feature within the LHB: an interstellar tunnel towards the constellation Centaurus. This tunnel may connect our local bubble to neighboring superbubbles, forming a vast network of hot gas.

“The highlight of this work features the discovery of a new interstellar tunnel towards the constellation Centaurus, potentially joining our LHB with a neighboring superbubble,” the authors noted in the press release.



3D model of the solar neighborhood. The color bar represents the temperature of the LHB as colored on the LHB surface. The direction of the Galactic Centre (GC) and Galactic North (N) is shown in the bottom right. Michael Yeung / MPE

Supernova explosion role

Our solar system is situated inside a vast, 1,000-light-year-wide cavity, Local Hot Bubble. This idea was first introduced about 50 years ago.

This bubble is a rarified region of interstellar space, much less dense than the surrounding medium. Moreover, the hot bubble is filled with a tenuous, million-degree gas emitting soft X-rays.

Astronomers have analyzed data from the eROSITA X-ray telescope to map the LHB's structure and properties in unprecedented detail.

Scientists believe that supernova explosions over millions of years carved out this cavity.

As per the press release, the eROSITA data uncovered a large-scale temperature difference within the bubble. This suggests that past supernova explosions may have heated and expanded the bubble, creating a complex and dynamic environment.
“What we didn’t know was the existence of an interstellar tunnel towards Centaurus, which carves a gap in the cooler interstellar medium (ISM). This region stands out in stark relief thanks to the much-improved sensitivity of eROSITA and a vastly different surveying strategy compared to ROSAT,” said Michael Freyberg, the study author, who was part of the ROSAT.

Although the tunnel is intriguing, the current understanding is limited. Additionally, observations of the tunnel are complicated by the presence of another enormous structure located above the galactic center.

Studying x-ray emission

While the LHB is indeed incredibly hot, reaching temperatures of around a million Kelvin, its low density prevents it from significantly heating objects within it.

This is because the atoms in the LHB are spread out over vast distances, making collisions between particles relatively rare.
Despite its low density, the extreme temperature of the gas causes it to emit X-rays.

As per *Science Alert*, this X-ray emission is what astronomers detected, leading to the discovery of the LHB decades ago.

One significant challenge in studying the LHB is the interference from Earth’s atmosphere.

The geocorona, a diffuse halo of hydrogen gas extending far beyond Earth’s surface, can interact with the solar wind, producing soft X-rays. This X-ray emission can mimic the signal from the LHB, making it difficult to isolate and study.

To overcome this challenge, astronomers need to observe the X-ray sky from a distance far enough to avoid the geocorona’s influence. The eROSITA telescope’s position in space proves advantageous in this case.

eROSITA is located 1.5 million kilometers from Earth. From this position, the telescope can provide a clearer, more accurate view of the LHB and other celestial X-ray sources. Further observations may provide more insights on LHB.

Astronomers Confirm a Distant Interstellar Tunnel Between Our Solar System and Faraway Constellations

March 8, 2025

In a breakthrough discovery that could reshape our understanding of the cosmos, astronomers have confirmed the existence of a vast network of interstellar tunnels connecting our solar system to distant stars and constellations. These cosmic "highways," formed by the remnants of ancient stellar explosions, have opened up exciting new possibilities in the study of space and interstellar matter.

A Hidden Network in Space

For centuries, we have viewed space as an empty, silent void. But recent discoveries are challenging that traditional view. A team of **astronomers**, after years of careful analysis using the **eRosita space observatory**, has uncovered a complex web of cosmic channels—literally **cosmic highways**—that stretch across vast distances in our galaxy. By mapping **X-ray emissions** from regions of **hot plasma**, scientists have discovered areas where ionized matter, primarily composed of gas and dust, extends for hundreds of light-years.

What's even more astounding is that these regions are not isolated; they are connected by narrow channels, resembling cosmic arteries, that interlink different regions of space. These structures are remnants of **supernova explosions**, which are among the most powerful events in the universe. When massive stars explode in a supernova, they eject vast amounts of matter into space at incredible speeds, creating hot plasma bubbles. Over time, these bubbles collide, forming an intricate network of cavities and channels. These structures have profound effects on the interstellar medium, influencing everything from **cosmic ray propagation** to the formation of new stars.

Implications for Our Understanding of the Universe

The discovery of these cosmic tunnels carries significant implications for how we understand the universe. It suggests that space is not an empty vacuum, but a dynamic and interconnected environment shaped by the life cycles of stars. Rather than simply being isolated points in space, the stars and galaxies are part of a vast, evolving network that influences the distribution of **matter** across the cosmos.

Moreover, these interstellar highways could play a critical role in the distribution of essential elements. The material ejected by supernovae—rich in heavy elements—could travel through these channels, serving as a transport system for the building blocks necessary for planet formation and, ultimately, life. As these elements move through the cosmic network, they may influence the creation of new stars and planetary systems, providing key ingredients for the formation of habitable worlds.

What's Next for Cosmic Exploration?

The discovery of these **interstellar** tunnels is only the beginning. To fully understand how they shape the universe, scientists will need more advanced tools and technologies. **X-ray missions**, deeper studies, and refined models of the distribution of hot gases will be crucial in expanding

our knowledge. Over time, astronomers hope to map out these cosmic highways more comprehensively, studying how they impact everything from the **local cosmic rays** to **stellar wind dynamics** and the movement of **cosmic dust**.

These findings serve as a reminder that even in the relatively familiar neighborhood between our Sun and nearby stars, there are still countless mysteries waiting to be unraveled. The discovery of these cosmic channels challenges long-held assumptions about the nature of space and adds layers of complexity to our understanding of the cosmos. Our view of the universe is far from complete, and the study of these interstellar tunnels promises to uncover even more astonishing truths about the universe's interconnected nature.

Space and Astronomy News

Interstellar 'Passageway' Discovered Linking Our Solar System to Distant Stars

December 20, 2024 Space Quarter

Scientists have discovered an interstellar "tunnel" that connects our solar system to other stars. This finding could provide astronomers with a better understanding of the galactic space and potentially offer a new way to explore distant stars and galaxies.

The tunnel, known as a magnetic portal or "flux transfer event," is a sort of magnetic field line that connects the Earth to the Sun, about 93 million miles away. These magnetic portals open and close dozens of times each day, creating a direct path between the Earth and the Sun. Experts believe that the same phenomenon could be happening at a much larger scale between our solar system and nearby stars.

The discovery was made using data from the National Aeronautics and Space Administration's (NASA) Solar Terrestrial Relations Observatory (STEREO) and Wind spacecraft. The data revealed a series of spiraling magnetic field lines extending from our solar system to the interstellar medium, the 'empty' space between stars. This discovery could provide scientists with a new understanding of how our solar system interacts with the rest of the Milky Way galaxy.

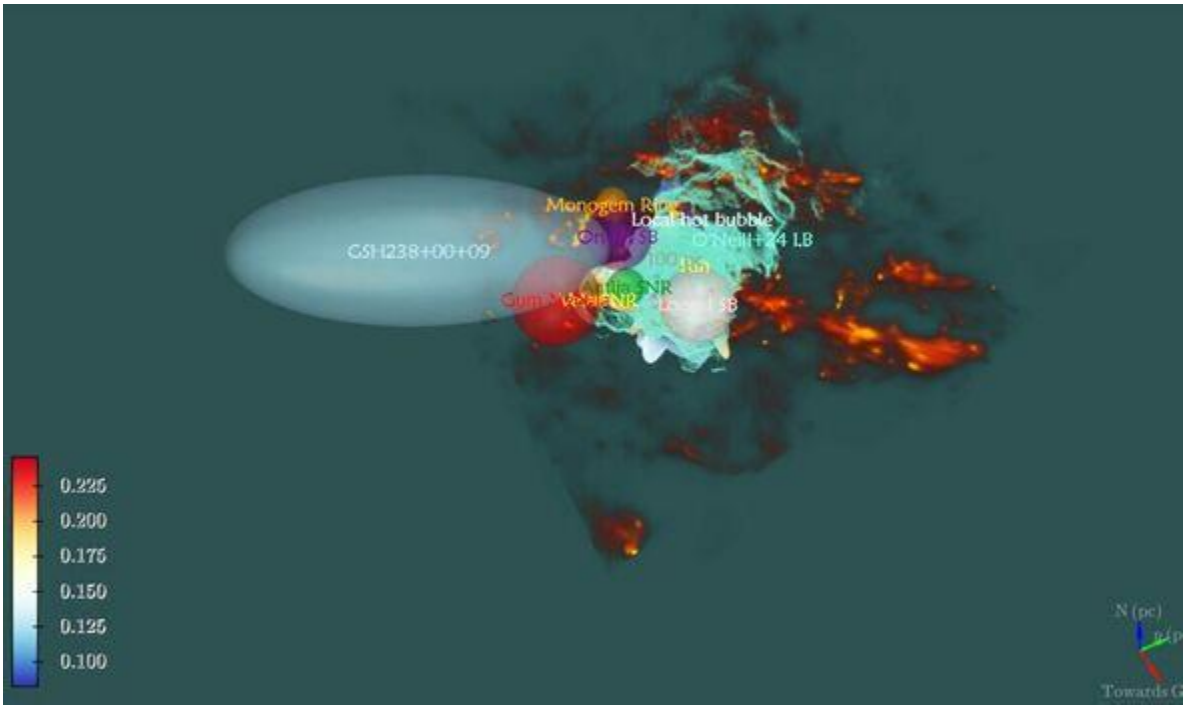
This research also opens up new possibilities for space travel. If these magnetic tunnels can be harnessed, they could potentially provide a shortcut for spacecraft, enabling faster travel between our solar system and other stars. However, more research is required to determine the feasibility of such interstellar travel.

The concept of magnetic portals is not new in the field of astrophysics. Scientists have long known that the Earth and the Sun are connected through these portals. However, the discovery that these connections could extend to interstellar distances is a significant breakthrough.

In addition to potentially revolutionizing our understanding of space travel, this discovery could also have implications for our understanding of cosmic rays. These high-energy particles, which originate from outside our solar system, could potentially be channeled along these magnetic field lines. Understanding this could help scientists better predict and understand the impact of these cosmic rays on our planet.

This discovery is just one of many recent advances in our understanding of the cosmos. With ongoing research and advancements in technology, our knowledge of the universe continues to grow, offering exciting possibilities for the future of space exploration.

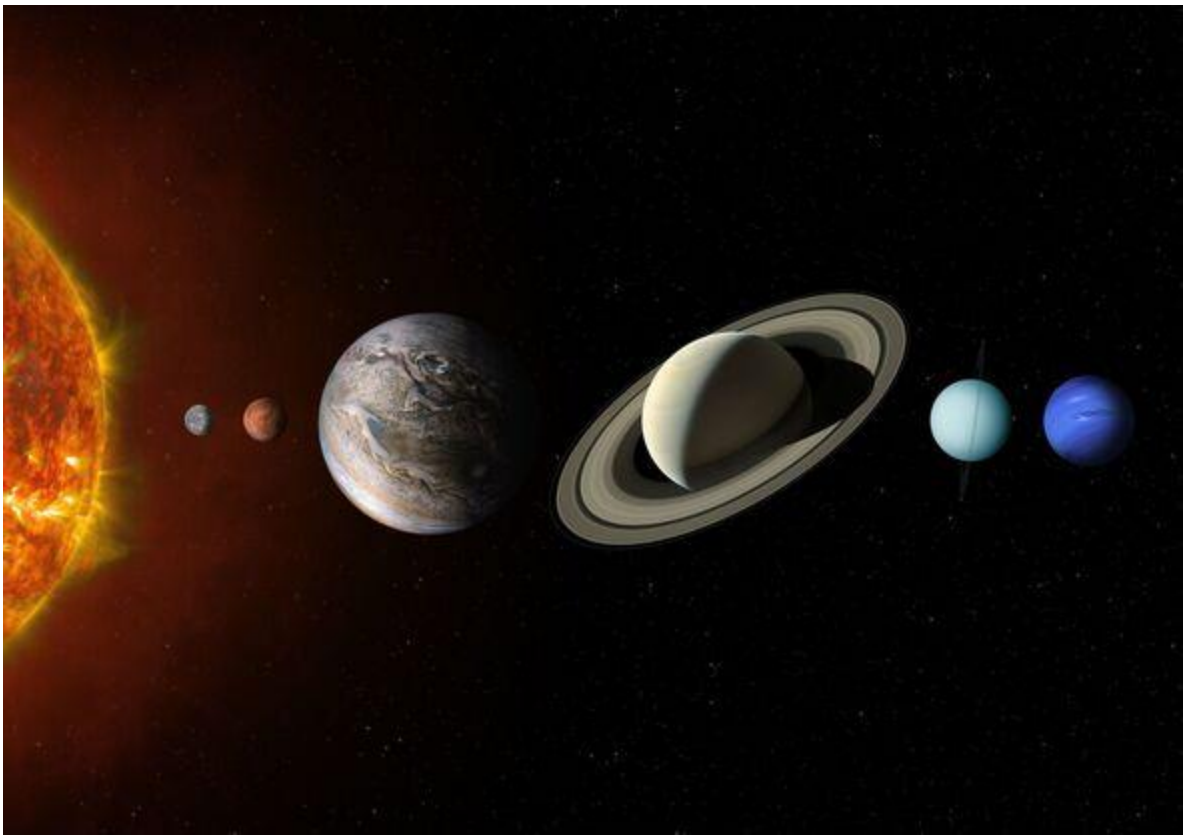
Astronomers discover 'tunnel' connecting solar system to other stars



A 3D map of the Milky Way's Local Hot Bubble from eROSITA data (Image: Max Planck Institute)

Astronomers have made a shocking new discovery about our solar system. A new study in the Astronomy & Astrophysics journal revealed that we live inside a hot and low-density region with a cosmic channel that stretches across our solar system toward distant constellations.

The research was conducted by astronomers at the Max Planck Institute in Germany led by Dr. L. L. Sala. The team relied on data gathered by the eRosita X-ray instrument that belongs to a Russian-German observatory. Scientists have known that our solar system exists in a region of space called the Local Hot Bubble.



Our solar system exists in a region of space called the Local Hot Bubble (Image: Getty)

It is believed to be formed as a result of supernovas and is estimated to be around 300 light-years across. The eRosita was designed to make more discoveries about the space region as part of the Spectrum-Roentgen-Gamma mission. Using old and new X-rays, the researchers were able to make new observations about the space region.

Astronomers Say They Found a Tunnel Connecting Our Solar System to Other Stars By Joshua Hawkins

Astronomers have made a startling discovery. Using data from the eRosita X-ray instrument, researchers say they've discovered a "cosmic tunnel" that connects our solar system to other stars.

Scientists have long known that our solar system exists in a Local Hot Bubble. This bubble is believed to have formed following several supernovas over the past several million years and is estimated to be around 300 light-years across.

Using data from the eRosita, researchers from the Max Planck Institute say they found evidence of a cosmic tunnel stretching from our solar system out toward the Centaurus constellation. The tunnel appears to move through the material that makes up the Local Hot Bubble.

The researchers say that they also discovered a second cosmic tunnel that links our solar system to Canis Major. Exactly what caused these tunnels is unclear—or even if they are something we could ever travel through. However, their existence does suggest that there may be a larger network of channels between different star regions.

Astronomers have long proposed the idea of wormholes—rips in space and time that we could possibly use to travel between distant places. These wormholes play a vital part in science fiction media. And perhaps these newly discovered cosmic tunnels could be key to tapping into that power.

That, of course, is just a lot of conjecture on my part. However, it wouldn't be surprising if scientists started trying to connect the two pieces together in some way. For now, this new research, featured in Astronomy & Astrophysics, raises some intriguing questions about how connected the different parts of our universe are. Read More: https://www.bgr.com/science/astronomers-say-they-found-a-tunnel-connecting-our-solar-system-to-other-stars/

Mysterious Interstellar Tunnel connects the Solar System with Constellation Centauri

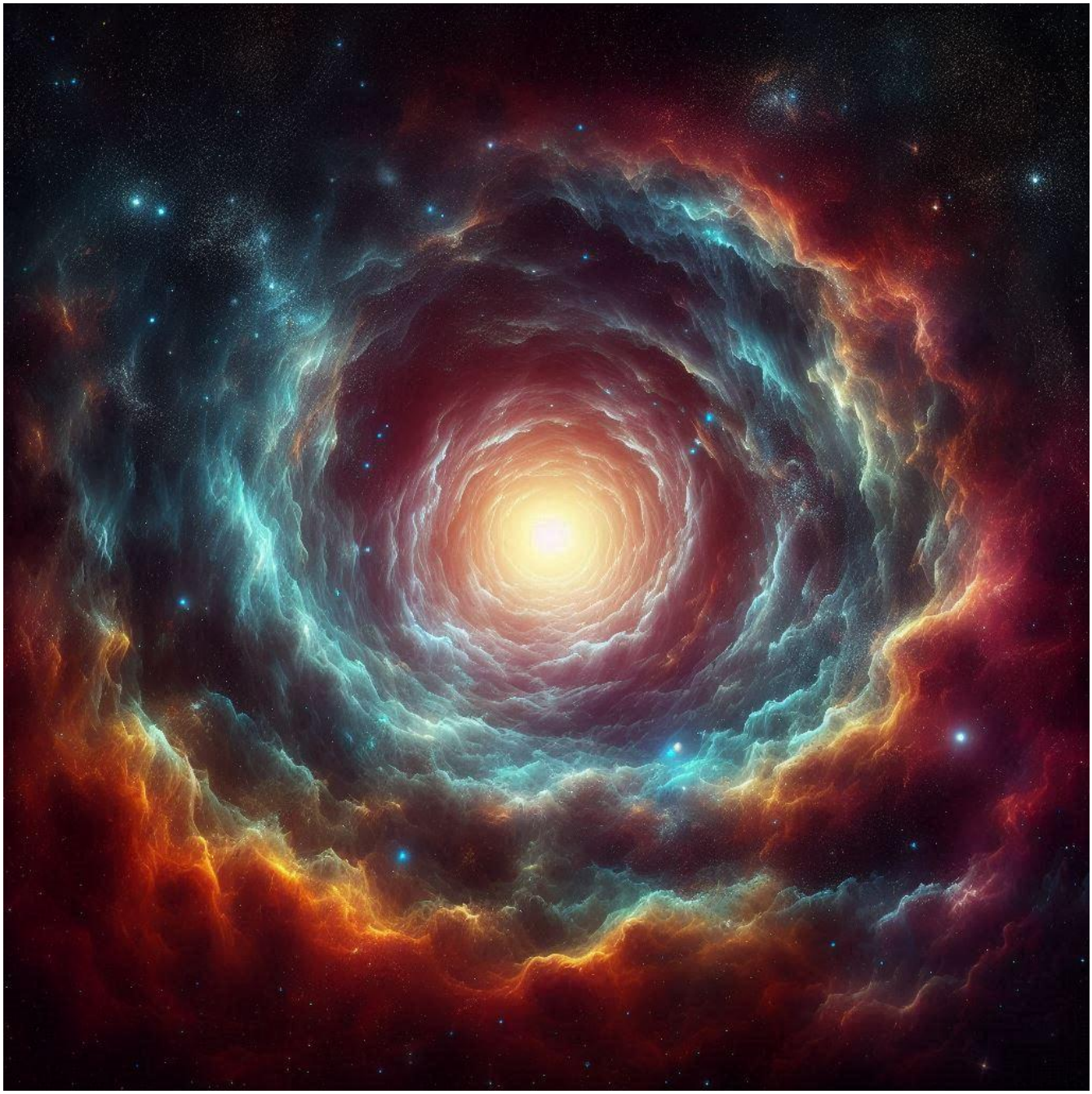
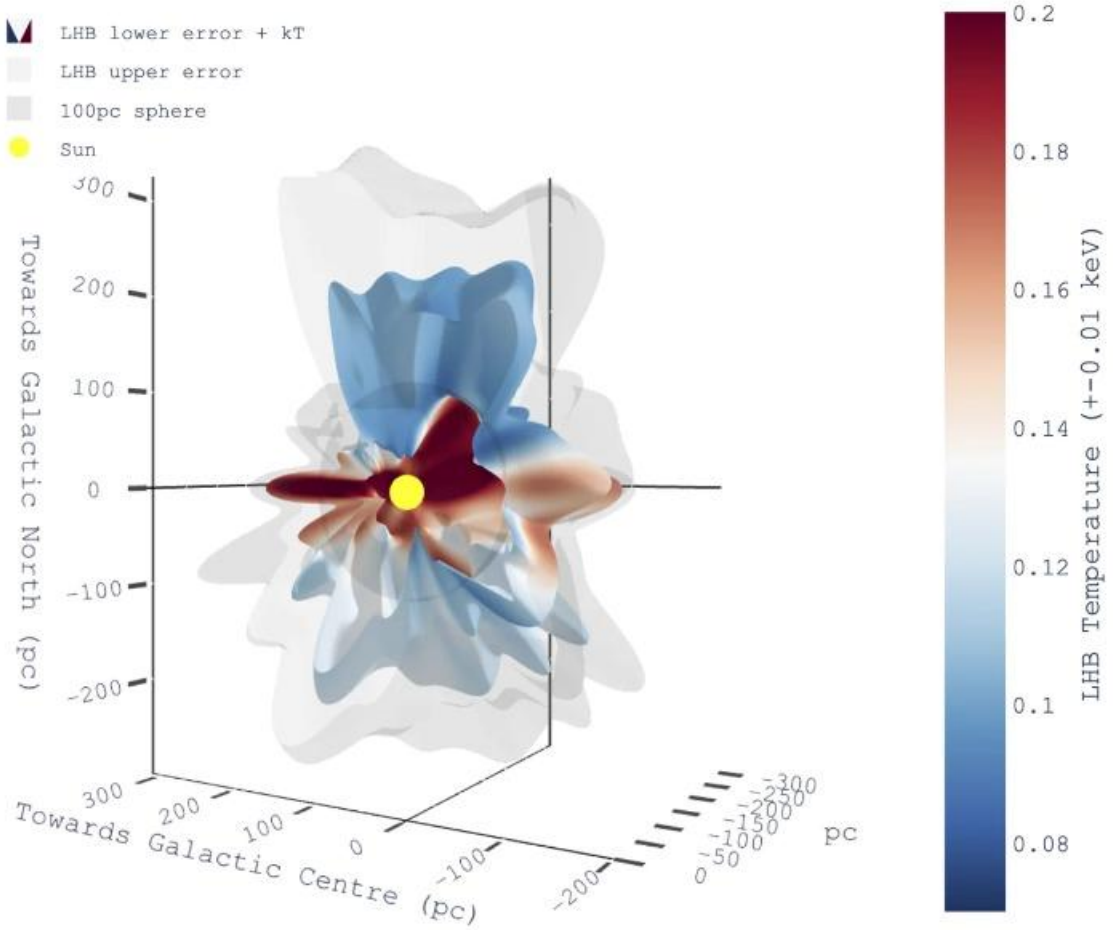


Illustration of an interstellar tunnel. Authorship: Microsoft Copilot

Astronomers have discovered an “interstellar tunnel” near the Solar System, which can connect our zone with other star systems. According to a study in the journal Astronomy & Astrophysics, this tunnel is part of a large hot gas structure known as the Local Hot Bubble, with a radius of hundreds of light-years. Scientists suggest that this LHB may be connected with another, even larger bubble.

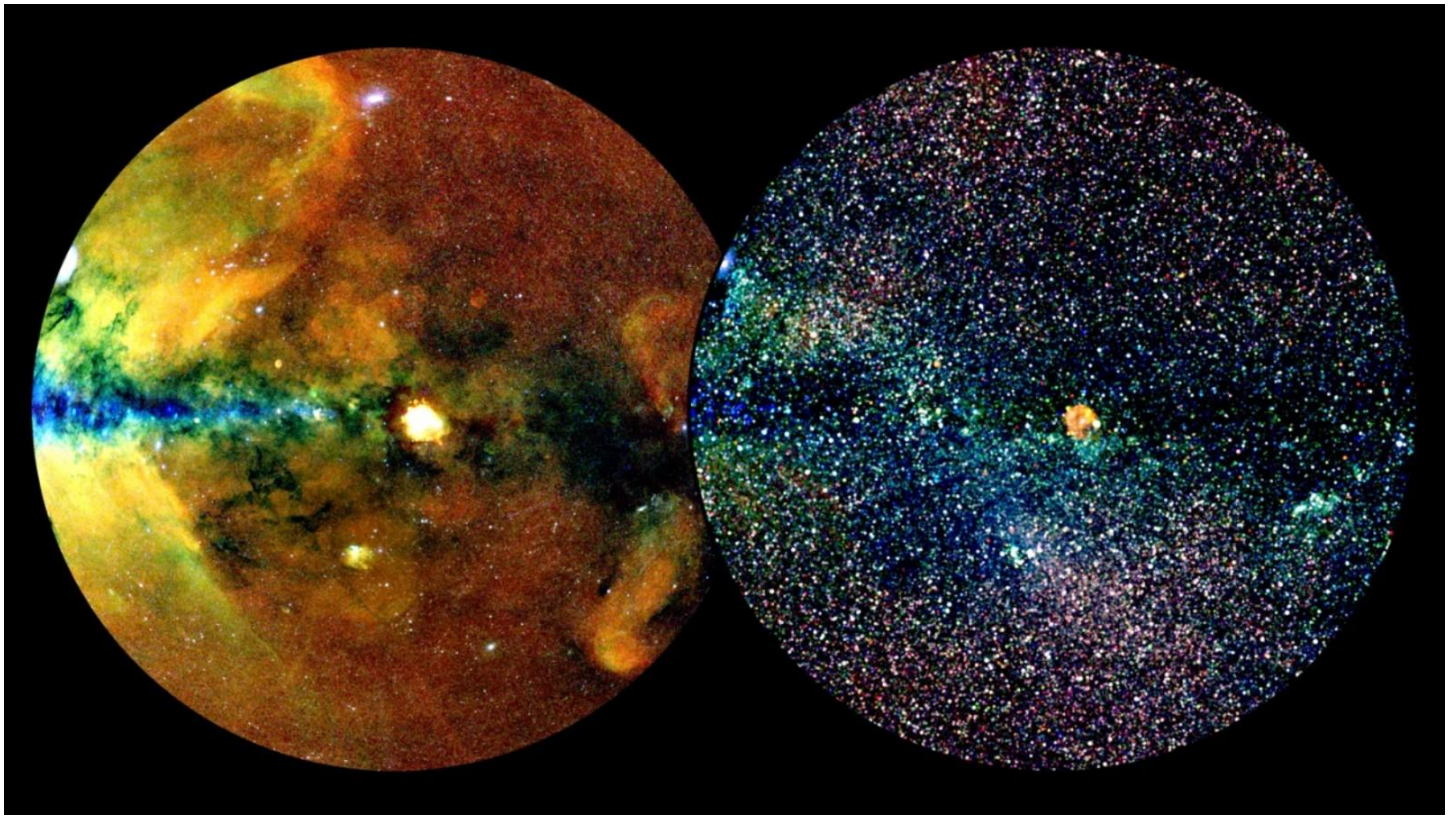
Using data from the eROSITA X-ray telescope, scientists have created a 3D model of the bubble, which confirms previous hypotheses, as well as reveals new details. In particular, as noted by Michael Freyberg, a researcher at the Max Planck Institute, the model made it possible to detect an “interstellar tunnel” in the direction of the constellation Centauri, cutting through the cold interstellar medium.



A three-dimensional structure of the local bubble of the Milky Way, created using eROSITA data. Copyright: Michael Young/MPE

The idea of the existence of a Local Hot Bubble dates back more than half a century, when astronomers tried to explain the source of background X-ray radiation that should have been absorbed by the interstellar medium – the diffuse matter from which stars form. However, if there was a cavity in our zone of interstellar space, it would explain why X-rays can reach us. According to scientists, this "bubble" appeared about 14 million years ago due to a series of supernova explosions that blew away interstellar material and created a cavity with a diameter of 1000 light years. According to the researchers, the remnants of these supernovae can still be observed today.

Two versions of eRosita All-Sky Survey Catalogue (eRASS1) data (Right)



the X-ray sky over earth (right) X-ray sources. Image credit: MPE, J. Sanders für das eROSITA-Konsortium

Although the Local Hot Bubble hypothesis has long had conflicting data, modern observations, particularly of young stars at its boundary, support its existence. According to the researchers, the interstellar tunnel may be part of a large-scale network of such cavities located in the Milky Way and created as a result of supernova explosions.

Analysis of the temperature in the LHB shows that the northern part of this structure is noticeably hotter than the southern part, which may be a consequence of recent supernova explosions that have further expanded and heated the LHB.