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SPECTRUM

Unsolved Mysteries of the Universe

THE ASSAM VALLEY SCHOOL – SCIENCE MAGAZINE

Editor's Note

Dear Readers,

As we delve into the latest issue of Spectrum, we find ourselves at the threshold of some of the most profound and intriguing mysteries the universe has to offer. From the enigmatic presence of dark matter and dark energy to the unexplained phenomena within our own Solar System, the cosmos continues to challenge our understanding and spark our curiosity.

In this edition, we invite you to join us on a journey through the uncharted territories of science. We explore the mind boggling theories provided to us by physics and how the theories are way beyond our understanding of the universe. We also delve into decades long unsolved mysteries such as of the Bermuda triangle.

As we venture further into the unknown, questions about the universe's ultimate fate and the possibility of life beyond Earth remain at the forefront of scientific inquiry. Whether it's the search for extraterrestrial intelligence or understanding the intricate balance of planetary orbits, each puzzle solved brings us closer to unraveling the grand tapestry of existence.

In Spectrum, we celebrate the pursuit of knowledge and the relentless drive to uncover the secrets of the universe. We hope that this issue inspires you to explore, to question, and to seek answers alongside us in the vast expanse of scientific discovery.

Stay Curious. Explore Further.

-Tanveer Ahmed

Contents

Beyond The Horizon

—URVEE RATHI, XII

How many of us have been captivated by the tales of the Bermuda Triangle, often called the Devil's Triangle? This vast and mysterious area of the North Atlantic Ocean forms a triangle connecting Miami, Bermuda, and Puerto Rico.

The question of how and why this region operates as it does remains unanswered. Around 50 ships and 20 aircrafts have mysteriously disappeared here, leaving us to ponder what could be causing these mysteries. Is it rogue waves generated by converging storms? Could it be bubbles of methane gas rising from the ocean floor? Or perhaps it's the unpredictable weather, including sudden hurricanes that can appear out of nowhere? Some suggest that magnetic anomalies might confuse navigational instruments, leading to catastrophic errors. These explanations provide a logical framework for understanding the phenomena in this area.

However, there are those who entertain supernatural theories as well. What if this region is a gateway to a parallel universe? Could it be a time portal or wormhole that transports vessels across dimensions? Some even speculate about connections to the legendary lost city of Atlantis or the involvement of UFOs in these mysterious disappearances.

For those who believe in the extraordinary, it feels as though this region was plucked straight from a horror novel. And who can blame them? A quick search for "the truth behind the Bermuda Triangle" yields a variety of theories and speculations. Over the years, the Bermuda Triangle has become a canvas for our wildest imaginations. Scientists, writers, and dreamers alike have painted it with theories ranging from the plausible to the fantastical. This mystery serves as a reminder that even in an age dominated by science and technology, there are still places on Earth that defy explanation. The Bermuda Triangle stirs our curiosity and awakens our deepest fears, highlighting humanity's enduring fascination with the unknown. It reminds us that some mysteries may forever remain unsolved, lurking just beyond the horizon, waiting for someone brave enough to seek their truth.

THE INFINITE CONNECTION

THE THEORY OF QUANTUM ENTANGLEMENT

—VIVAAN AGARWALLA, XII

Quantum entanglement is a fundamental phenomenon in which certain particles cannot be defined independently as they are interconnected in such a pattern that they instantaneously influence each other regardless of the space between them.
The key feature of quantum entanglement is that it does not matter if two particles are light years apart, they still will be a unified system where we would not be able to define the particles independently.

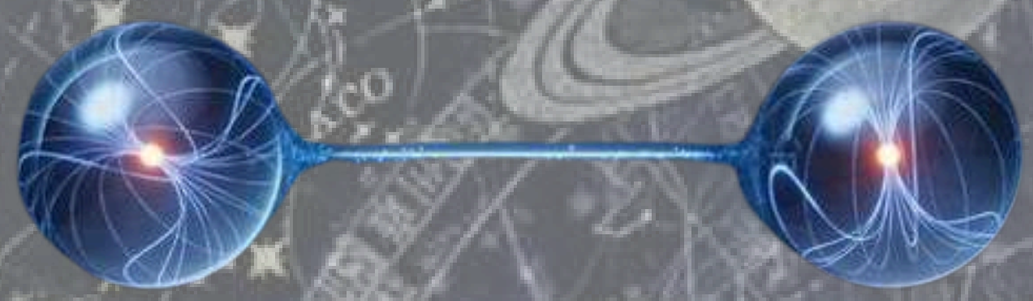
In 1932, Erwin Schrodinger wrote down the defining equations of quantum entanglement but set them aside, unpublished. In 1935, Grete Hermann studied the mathematics of an electron interacting with a photon and noted the phenomenon that would come to be called entanglement. After their research there was a long debate on the phenomenon before it was finally accepted.

Few of the key applications of quantum entanglement are:

- Quantum Teleportation: This process involves transferring quantum states between particles at a distance using entangled pairs, which could revolutionize data transmission methods.
- Quantum Cryptography: Entangled particles can be used to create secure communication channels. Any attempt to eavesdrop on the communication would disturb the entangled state, alerting the parties involved.
- Quantum Computing: Entanglement enables quantum parallelism, allowing quantum computers to perform multiple calculations simultaneously by manipulating entangled qubits. This capability is essential for developing advanced algorithms and protocols that surpass classical computing limitations.

Entanglement has been experimentally verified through various setups involving photons, electrons, and other particles. These experiments have demonstrated the phenomenon's robustness and its ability to produce correlations that defy classical explanations. The Nobel Prize in Physics 2022 won by- Alain Aspect, John Clauser, and Anton Zeilinger recognized advancements in experimental techniques that further established the reality of quantum entanglement.

In summary, quantum entanglement is a cornerstone of modern physics with profound implications for technology and our understanding of the universe. Its unique properties challenge classical intuitions about separability and locality, making it a rich area for ongoing research and exploration.



DECONSTRUCTED

The String Theory

—TANVEER AHMED, XII

1. What is String theory and what led physics to this?

Originally it was believed that everything in this universe is constituted of point particles. But this was soon found to be incorrect as properties of matter were not completely aligning with this proposal. Then came Heisenberg with his theory of uncertainty stating that matter behaves as particles as well as waves. But still it failed to connect the four fundamental forces of nature- gravitational, electromagnetic, and the strong and weak nuclear forces. Hence to solve this dilemma came a very promising theory. The String Theory. The basic postulate of this theory states that the smallest building blocks of the universe are tiny vibrating strings instead of point-like particles. It also proposed that there were dimensions beyond the three we already know and time. But these dimensions were apparently too small for us humans to see.

2. What were the main postulates of the String theory?

String theory proposes that all particles in the universe, such as photons and quarks, are made up of tiny, vibrating one-dimensional strings, which can be either open or closed loops. It also introduces the idea of branes, higher-dimensional objects to which strings can attach. The theory suggests the existence of extra spatial dimensions beyond the familiar three dimensions of space and one of time, with these additional dimensions being compactified and hidden from direct observation. It aims to unify quantum mechanics and general relativity, offering a framework for understanding gravity at quantum scales. It incorporates supersymmetry, which pairs matter particles (fermions) with force-carrying particles (bosons), and seeks to explain how the four fundamental forces—gravity, electromagnetism, strong nuclear force, and weak nuclear force—can be unified into a single "theory of everything."

3. Why did the String theory fail?

String theory has faced criticism because it hasn’t lived up to its promise of explaining everything about the universe. One big problem is that it relies on extra dimensions that we can’t see or test, making it seem more like a mathematical idea than a physical theory. It also predicts so many possible universes (up to 10^500) that it’s impossible to figure out which one matches our reality. Another issue is that its ideas are hard to test experimentally because they involve scales far smaller than anything we can currently measure. Over time, many scientists feel the theory has become stuck, with little progress or new insights. While string theory is fascinating and ambitious, its lack of practical evidence and clear predictions has led some to believe it’s more of a beautiful idea than a successful explanation of how the universe works.

The Flow of Innovation

–DA–I–SHA EMI DIENGDOH, XII

In a Nutshell

If kisses were stars, i would give you the sky.

–PRIYAM BAGARIA, XII

BIG BANG THEORY

Big-Bang Theory, it is the prevailing cosmological model explaining the origin and evolution of the universe. It posits that the universe began approximately 13.8 billion years ago from an extremely hot, dense singularity and has been expanding ever since. Georges Lemaître was the one who formulated the modern Big- Bang Theory and he is also known as the father of Big-Bang Theory, having first proposed the idea in 1927, suggesting the universe originated from a single point and is expanding. Big-Bang Theory has been developed and supported by numerous scientists and astronomers over decades, with key figures like Georges Lemaître, Edwin Hubble, and Arno Penzias and Robert Wilson making significant contributions. It's important to remember that in science, theories are not proven but rather supported by evidence, and the Big-Bang theory is strongly supported by multiple pieces of evidence.

–SOTTILE SEB, X

DYSON SPHERE THEORY

Imagine a super-advanced alien civilization needing lots of energy. In 1960, Freeman Dyson thought they might build a "Dyson Sphere" around their star to collect it all. Later on, a star, KIC 8462852 also known as “Tabby’s Star” was dimmed in an unusual pattern, and people wondered if this could be possible evidence of an alien civilization. Kepler, a space telescope, and everyday people looking at data found the star's strange dimming. It wasn't like a planet passing by. Some thought maybe aliens built a giant energy collector. But, scientists checked, and the star didn't glow with the extra heat a Dyson Sphere would make. Instead, they think dust clouds are blocking the star's light. Dyson imagined aliens using a "swarm" of collectors, not a solid shell. While the theory isn’t proved, it shows how we're looking for signs of life beyond Earth. It reminds us that space is full of mysteries, and we're always trying to figure them out.

–VIVAAN AGARWALLA, XII

PLACEBO EFFECT

The placebo effect is a complex phenomenon where individuals experience real improvements in their health after receiving a treatment that has no therapeutic value. It involves the complex brain chemistry while taking the fake treatment that results in the release of neurotransmitters such as endorphins and dopamine, which can alleviate symptoms like pain and anxiety. While some people support the use of placebo for clinical tests, some other people express ethical concerns regarding placebo use, particularly when it involves deception. They argue that transparency is crucial in patient care and that knowingly administering a placebo could undermine trust in medical professionals. Despite placebo’s limitations, including an inability to cure diseases, placebos demonstrate that the mind can influence physical health.

I know nothing with any certainty,

RAVENOUS BLACK

—NAMISHA AGARWAL, XII

A giant star, it fell and died,
Made something dark, where light can't hide.
It pulls and pulls, with potent force,
A huge hole, on celestial course.

It takes up stars, and dust, and light,
And hides them deep, in endless night.
A heavy thing, we can't really see,
A mystery, for you and me.

No escape route, no backward glance,
Just swirling void, a cosmic dance.
No light escapes, no whispered plea,
Just silent void, eternally.

A mystery deep, a cosmic night,
The black hole's power, and endless might.
But today the hole's grip, women overcome,
And a feminist dawn, has finally come.

Space Explorers *&* The Secret of Dark Matter

—KAVYA GOEL, XII

Captain SpaceBob of the spaceship AstroNuts , a crackhead and eccentric space explorer led a chaotic crew consisting of hilarious characters: A spaceship mechanic who was an expert in fixing things with duct tape, an alien linguist named Blarg who only spoke in riddles, and a hyper-intelligent AI named BumbbleBrain.

The Galactic Council, for reasons no one could quite understand, assigned Bob and his crew to investigate dark matter—the invisible stuff that made up most of the universe but had baffled scientists forever. Bob squinted at the mission file and groaned, “So… we’re looking for something we can’t see, can’t touch, and don’t understand? Sounds like finding my socks after laundry day.”

With his crew by his side, Bob set out on this daring mission. Their first station was the dark matter cloud, a massive, shimmering field of invisible particles. BumbbleBrain showing off his vast pool of knowledge claimed,“These clouds are thought to float around galaxies, holding them together like cosmic glue. Without them, galaxies would fling their stars into space like a frisbee at a bad family outing. Dark matter clouds are the unsung heroes of the universe—quietly ensuring cosmic order while refusing to take center stage.” The mechanic retorted,“Wait, so you're telling me these invisible clouds are basically the bouncers of the universe?... Woah!That’s... kind of incredible.”

Their second stop was the Great Attractor, the strange gravitational force pulling galaxies towards it. Blarg was in charge of first contact, naturally rhyming, “Oh mighty force, reveal the course!” To everyone’s shock, the Great Attractor actually responded—with a sneeze. Bob had a theory: “It’s a cosmic magnet. Probably trying to collect all the shiny stuff in space!” As their ship approached, they received a transmission from alien janitors who explained: “This isn’t a magnet—it’s a giant broom, sweeping galaxies into neat piles!”

Finally, they tackled the Fermi Paradox—why no alien civilizations had visited Earth. BumbbleBrain, the AI, nervously chimed in, “What if they saw Earth’s reality shows and decided to keep their distance? They probably think we’re all competing for roses and singing in costumes.”

After a chaotic journey filled with wrong turns, miscommunication, and a game of galactic hide-and-seek, Bob presented his report : “Dark matter is the universe’s cosmic glue. The Great Attractor? The ultimate cosmic magnet. And aliens? They think we’re weird, but that’s our charm!” The Galactic Council was less than impressed, but Bob defended his crew by saying, “Sure, we’re chaotic, but so is the universe, and that seems to be working just fine!”

Whispers of the Earth

THE MYSTERY OF TAOS HUM

—NAISHA N. GOGOI, X

—MAINOW GOYARI, X

Have you ever heard a sound no one else can explain? Well in a small town called Taos in New Mexico, is a mystery that continues to exist since the early 1990s. There is a persistent, low-frequency humming or droning sound heard by roughly 2% of residents that live there. For some, it’s like the distant rumble of a truck engine or as a vibration or a pressure in their ears but for others it becomes a constant source of discomfort and anxiety, even causing headaches or sleep disturbances and what’s most surprising is the fact that it doesn’t come from a particular direction and doesn’t disappear when you cover your ears and is usually heard more at night in quiet, rural areas.

You might think that a noise like this could be a case of mass hysteria or a psychological phenomenon, but that doesn’t fully explain the mystery of the Taos Hum. Some researchers suggest that the hum could be a form of tinnitus, a condition that causes ringing or buzzing in the ears while another theory involves infrasound, which are low-frequency sound waves that are below the range of human hearing or involvement of electromagnetic frequencies. Despite these theories, no single explanation has been universally accepted.

Even after years of speculation, research, and debates, the Taos Hum remains an unsolved mystery. It's a story that feels incomplete, just like a whisper that fades into the background. Is it science, or just our minds? The Hum has become a key part of Taos's stories, and remains to be a mystery till date.

Worlds Beyond the Chasm

–Rokovor Nakhro, XII

The night whispers, chilly winds whoosh through
Stars twinkle secrets above an aviator's mind. Tall as
spires. Each shimmer sparks myriad avenues
Mysteries carried on the breeze through an aviator's face.

Classroom doors hide universes, realities collide
Here an aviator, there lingers a sceptre in the garden fog.
Paths chosen, others forsaken; the school chimes,
Mocking certainty, echoing through the school's corridors.

In this universe, equations sprawl eager minds, while in another,
stars disperse In this life, grand questions loom, answers
elusive.
From this vantage point, worlds beyond beckon,
The cosmos laughs at our limited view.

Galaxies spin far from the aviator's skies,
A vast universe waits past the school's gates.
Aviators spread wings, horizons expand,
Beyond the chasm, infinite journeys begin.

SCIENCE QUEST

FIND THE WORDS

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

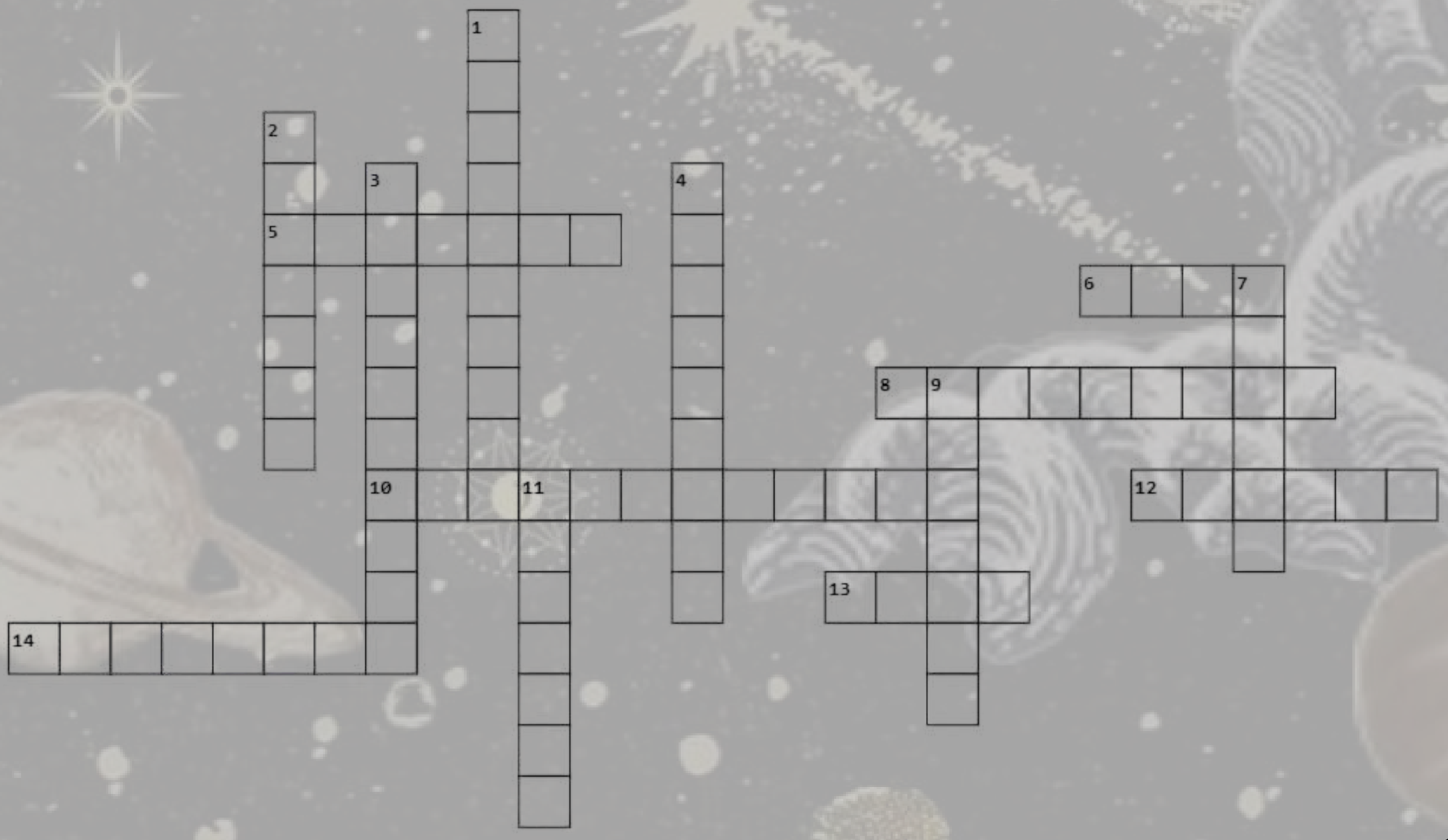
CONSTELLATION
SOLAR SYSTEM
DARKMATTER
ASTRONAUT
ASTEROIDS

BLACKHOLE
MYSTERIES
LIGHTYEAR
ATOM
SPACE

SATELLITE
MILKYWAY
UNIVERSE
QUANTUM
GRAVITY

GALAXY
PLANET
COSMOS
COMET
ORBIT

CROSSWORD



ACROSS

5. An unseen force that causes objects to fall toward each other.
6. The name for the hypothetical particles thought to make up dark matter.
8. This unexplained object in space could possibly contain a singularity where gravity is so intense that not even light can escape.
10. The hypothetical boundary around a black hole beyond which nothing can escape.
12. The first particles to form after the Big Bang, according to some theories
13. This vast region of space is thought to be empty but may actually be filled with dark matter
14. This galaxy is known for its mysterious dark matter halo.

DOWN

1. A hypothetical construct to explain why the universe appears to be the same in all directions.
2. This giant explosion is thought to have started the universe.
3. The force that causes galaxies to move apart at an accelerating rate.
4. This phenomenon occurs when a star explodes in a brilliant burst of light.
7. The name for a star that emits regular bursts of radiation.
9. What we see when light is bent by gravity
11. A small, very dense star that might form from a supernova

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