

News

from Across
the Universe

SPACE
SCOOP

Explore the wacky
methods designed to
keep Earth safe from

**deadly
asteroids**

Discover how close
we are to finding

alien life

Enjoy a view that
takes you to
the edge of

the Universe

Why Space Scoop?

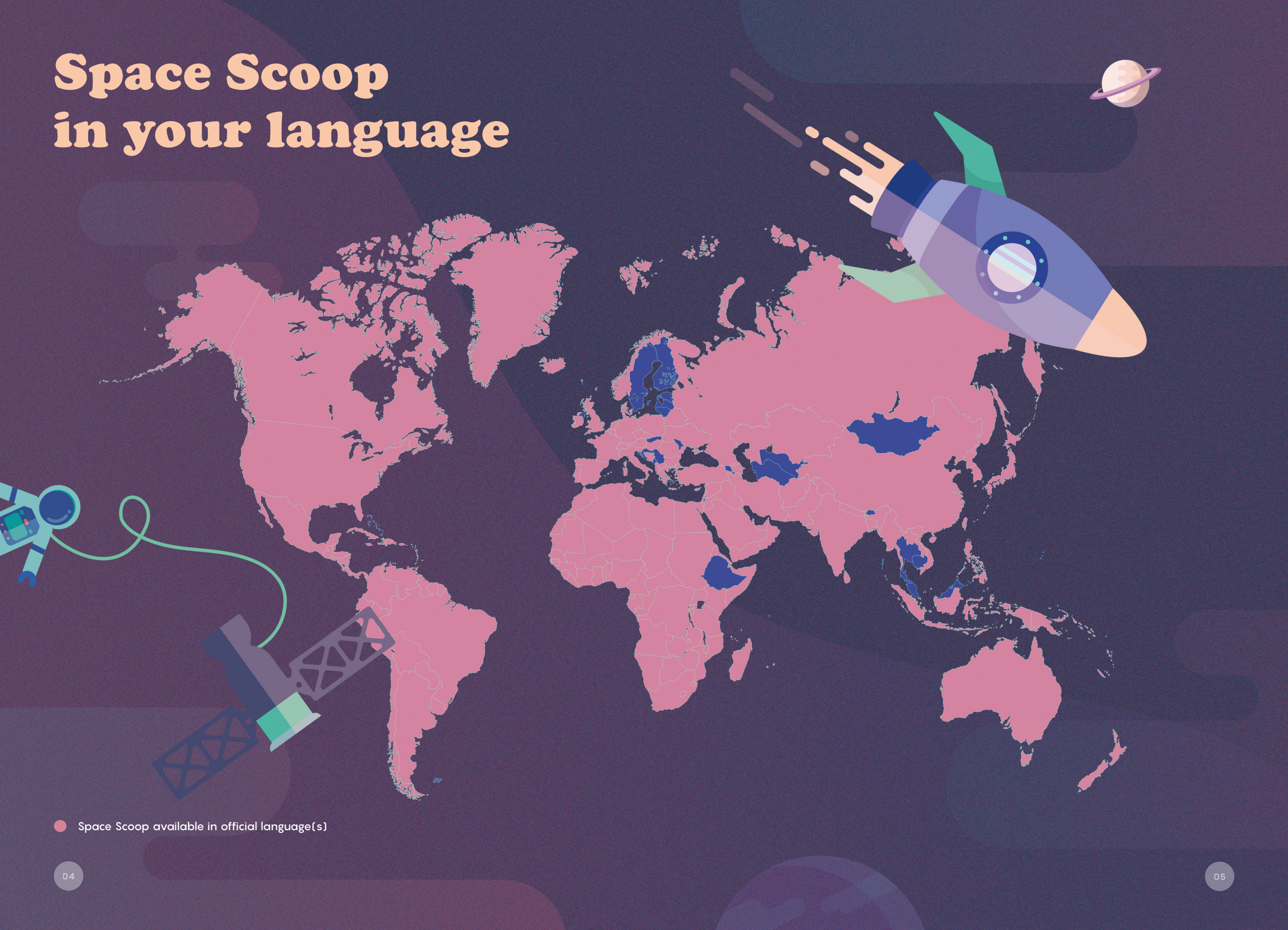
Sharing the excitement of the latest scientific discoveries is one of the best tools that we have to inspire the public — including young children. The question isn't whether astronomical news can inspire children, but how we can best communicate this information to youngsters.

In February 2011, Universe Awareness launched a weekly astronomy news service for children aged 8+, called Space Scoop. Space Scoop has now produced more than 350 astronomy news stories for young children, successfully tackling a wide variety of subjects — everything from exoplanets to cosmic reionisation.

Over the last seven years the Space Scoop family has extended to include 12 additional partner organisations: the National Astronomical Observatory of Japan (NAOJ), Las Cumbres Observatory (LCO), Chandra X-ray Observatory, NASA/ESA Hubble Space Telescope (HST), the European Space Agency (ESA), Europlanet, the Dutch Institute for Radio Astronomy (ASTRON), the Royal Astronomical Society (RAS), the South African Astronomical Observatory (SAAO), the Sloan Digital Sky Survey (SDSS) and EUMETSAT. Space Scoop has grown into the biggest astronomy news service for children, with voluntary translators making the releases available in up to 40 languages.

www.spacescoop.org

Space Scoop in your language



● Space Scoop available in official language(s)

15,000 Space Rocks and Counting

Every single day, the Earth is bombarded by more than 100 tons of dust and sand-sized particles. That's the same as the weight of 14 elephants.

Once a year, an asteroid the size of a car hits Earth's atmosphere and burns up as a giant fireball before reaching the ground.

Every 2,000 years, a space rock the size of a blue whale hits Earth. And once every few million years, an object large enough to threaten humanity's future comes along.

COOL FACT

Some asteroids are so big they have their own moons!

But don't fear, all sorts of wacky methods have been devised to keep Earth safe from these rare cosmic threats. These range from blowing the asteroids up using nuclear weapons to hitting them with spacecraft to knock them off their collision course.

To stand a chance of protecting Earth from a deadly impact, we first need to discover all asteroids that pose a threat. Scientists around the world have been working hard to do this. So far, 15,000 so-called 'Near-Earth Objects' have discovered — with many more to go.

ASTERIODS, SOLAR SYSTEM

Near-Earth objects, or NEOs, are asteroids or comets whose orbits come close to ours, meaning they could hit our planet.

We believe that 90% of the largest NEOs have been discovered (that's 9 out of every 10 asteroids). But only 10% of medium-sized NEOs have been located, and 99% of the smallest rocks are still flying around the Solar System undetected.

The chance that one of the 15,000 NEOs we've discovered will impact the Earth in the next 40 years is very small. However, it's important to watch them closely to check they don't change course.

To do this, telescopes carry out automatic surveys of the entire sky each night, to make sure we don't become cosmic target practice!

ASTERIODS

Asteroids are chunks of rock and metal left over from when our Solar System formed. Most can be found between Mars and Jupiter, a region of space we call the Asteroid Belt.

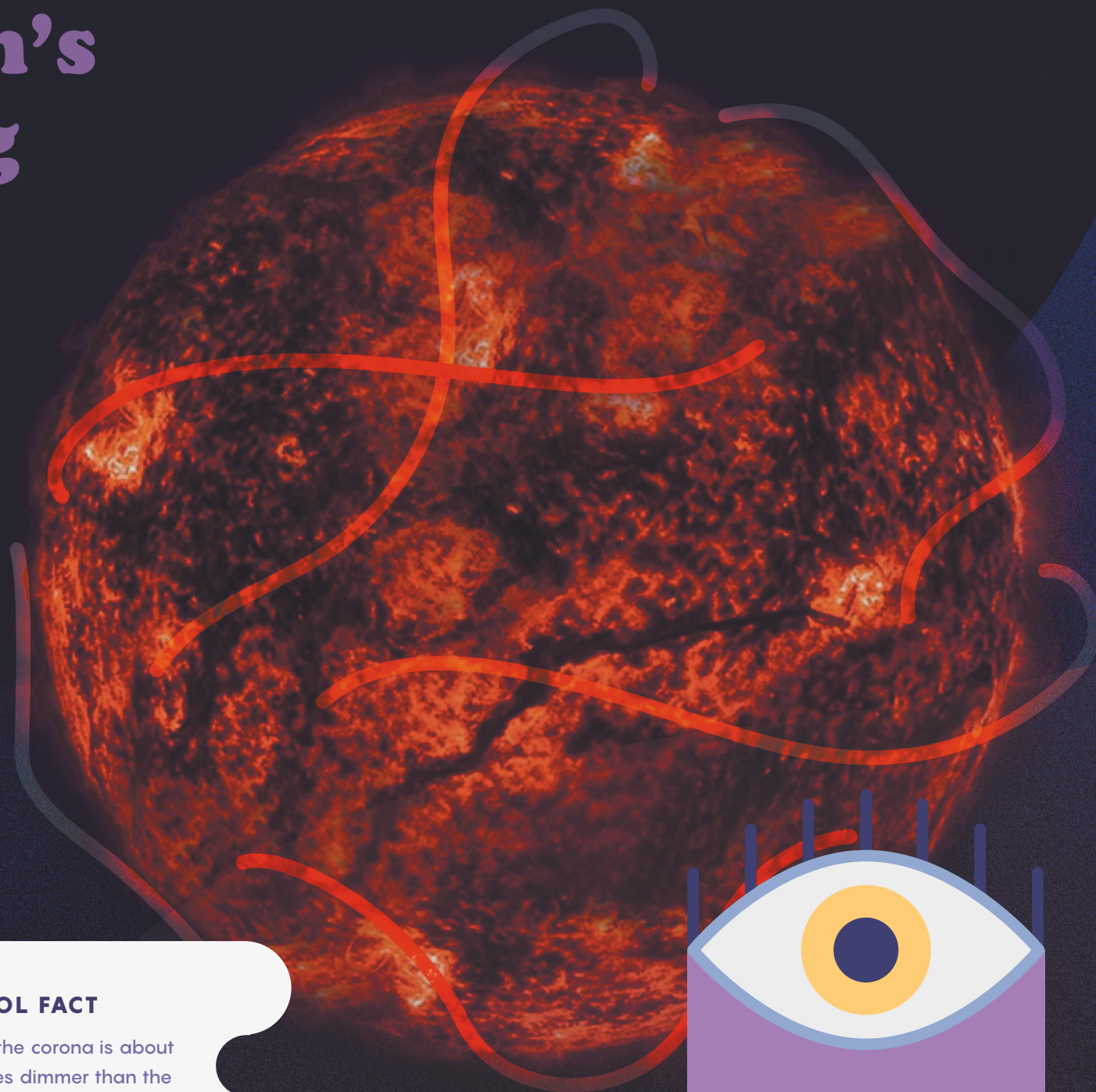
The Mystery of the Sun's Scorching Halo

We know so much about the Universe that it's hard to believe there are any big mysteries left to solve... but there are. One of the biggest mysteries in astronomy is about one of our closest neighbours: the Sun.

Calling the Sun a big ball of fire is the same as calling the Earth a ball of rock. The Earth is decorated with mountains, oceans and forests and the Sun's surface has its own interesting features. To top it off, the Sun has an atmosphere too, it's called the Corona.

COOL FACT

To our eyes, the corona is about a million times dimmer than the Sun. We can only see it during a solar eclipse, when it appears around the Sun like a silvery halo.



SUN,
SOLAR
SYSTEM

The Sun's corona poses one of the biggest mysteries in astronomy. To understand this mystery, try to imagine a flame coming out of an ice cube — something similar occurs on the Sun.

At the centre of the Sun temperatures reach 15 million degrees, but by the time the heat arrives at the surface of the Sun it has cooled down to 6,000 degrees. But the temperature of the corona soars back up to over 1 million degrees.

This unexpected rise in temperature has puzzled scientists for over 70 years. But now they might one step closer to an answer.

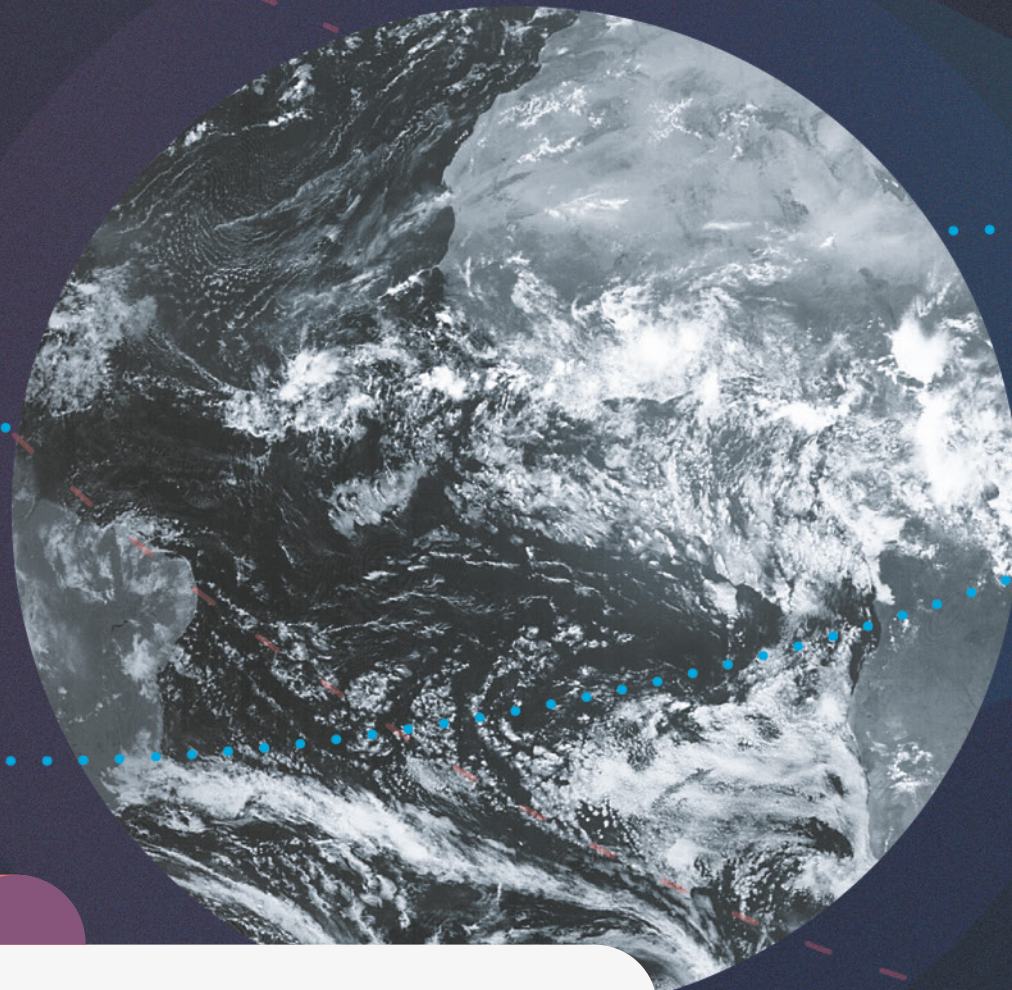
Astronomers know that the Sun has a magnetic field, much like the Earth and the magnets stuck on your fridge. And they know that it plays an important role in this mystery. But the million dollar question is: how can a magnetic field create heat?

One possible answer to this riddle is 'waves'. Astronomers have seen waves rising in the Sun's magnetic field. These waves could be adding energy to the corona in the same way that a perfectly timed push on a swing can make you go higher!

MAGNETIC FIELD

A magnetic field is the area around a magnet where the attractive or repulsive force of a magnet can be felt.

Where Do Old Satellites Go to Die?



COOL FACT

The number of satellites in the graveyard orbit is already in the hundreds. With new spacecraft launched each year, this region could also become overcrowded. Scientists are still looking for a permanent solution for this issue, including removing or collecting the old satellites.

Thousands of satellites are currently flying around the Earth. They have many different uses, including communications, weather forecasting and studying the stars.

But, like all other machines, satellites don't last forever. They have limited fuel and the harsh conditions of outer space can put a lot of wear and tear on them. When they can no longer operate, great care has to be taken to ensure they don't damage other satellites.

SOLAR SYSTEM, MISSIONS

Those orbiting closest to Earth are maneuvered even closer to the planet. When they have achieved their mission (usually within 25 years) they will re-enter the atmosphere and burn up as they falls toward Earth at thousands of miles per hour.

But this is impossible for the more distant satellites. The amount of fuel they'd need to make it back into Earth's atmosphere would make them too heavy to put into space. Instead, at the end of their lives, these satellites are put into the 'graveyard' orbit.

The graveyard orbit is far beyond the orbits of normal satellite, almost 200 miles farther away from Earth than any active satellites. That's a whopping 22,400 miles above Earth!

This is exactly what happened last year to a successful satellite called Meteosat-7. After almost 20 years of trusty service, the satellite has been sent to its final resting place in the graveyard orbit.

Meteosat-7 was part of a group of weather satellites that continues to cover the whole Earth, providing weather forecasts and warnings. Not a single monsoon or snow storm goes undetected by them, saving of thousands of lives!



ATMOSPHERE

An atmosphere is a layer of gases surrounding a planet or a moon. Earth's atmosphere contains the oxygen we breathe.

The Building Blocks of Life

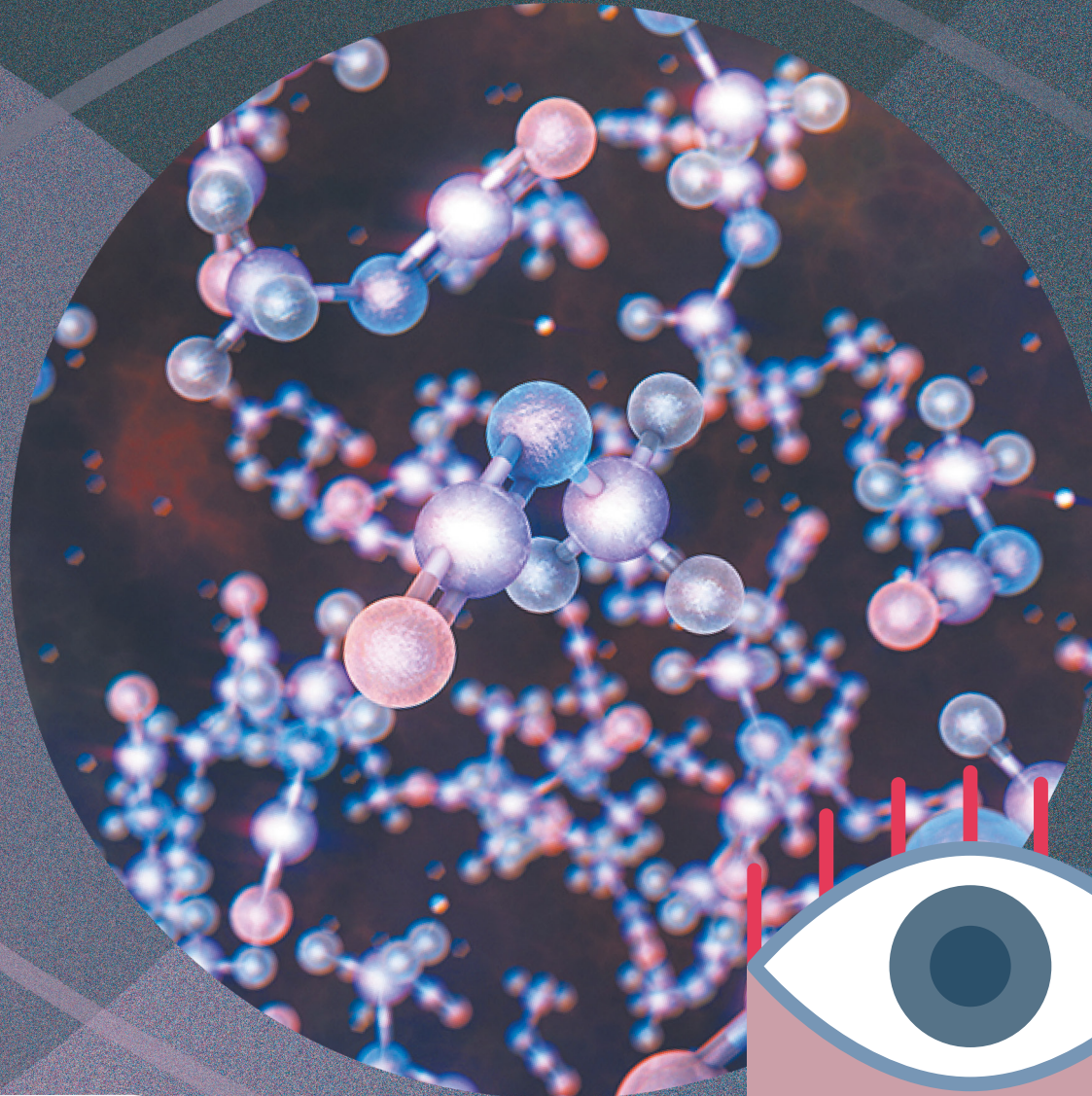
You can build some pretty amazing things simply by sticking blocks of lego together. People have made life-size lego houses, lego rockets and even lego ships! Like these impressive lego structures, humans are built of tiny pieces too. Human building blocks are called organic molecules (pronounced 'MOLL-eh-kyools').

Unlike lego, molecules are so small that nobody can see them, except with extremely powerful microscopes. They are made up of chemicals like carbon, hydrogen and oxygen. Organic molecules have been found all over the Universe.

Now, no-one knows how life began on Earth three billion years ago, but one thing is certain; it all began with these tiny organic molecules.

COOL FACT

Many scientists think it was asteroids that brought organic molecules to Earth in the early days of our Solar System!



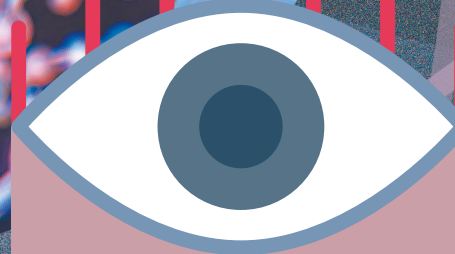
ATOMS AND
MOLECULES,
PLANETS

But if organic molecules are the building blocks of life and they exist all over the Universe, why have we still not found life beyond Earth?

Organic molecules are very fragile. They don't often survive the harsh conditions surrounding newborn stars. However, scientists have just detected huge amounts of organic molecules around a distant, young star.

This new-born star doesn't yet have any planets, but it is surrounded by a disc of planet-making material that will soon form into planets. It's in the outer edge of this disc, where the solar system's icy comets and asteroids will form, that astronomers found the organic molecules.

In a few millions year, newly formed comets from the disk's outer regions will start to rain down on the planets and the organic molecules may be carried with them. Who knows what kind of things could be built when they land?



MOLECULE

A molecule is a particle containing two or more atoms. For example water is a molecule made up of two atoms of hydrogen and one atom of oxygen.

Ultracool Dwarf and the Seven Planets



COOL FACT

The star at the centre of this solar system is small, but it's by no means the smallest star known. That title goes to OGLE-TR-122b, which is only slightly bigger than Jupiter!

One of the most exciting things happening in science at the moment is the search for alien life. And we're lucky enough to live in a time when the search is getting serious.

Just 25 years ago, we only knew of the eight planets within our Solar System. Today we've discovered well over 3,000 so-called 'exoplanets'. And we know that most of the stars in the Universe have planets orbiting them!

The next big challenge is to find other planets like Earth, and guess what? We've just found exactly what we've been searching for: a new Solar System with seven small, rocky planets.

PLANETS

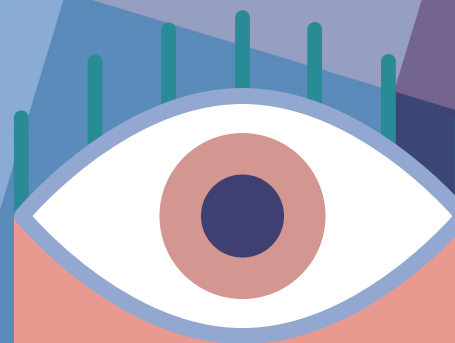
The new system is a record-breaker on two accounts: it has the most Earth-sized planets, and the most potentially life-bearing worlds.

The new Solar System was discovered when astronomers noticed the star's light dimming slightly as the planets passed in front of it. It's impossible for us to see such distant planets directly, but we can actually gather lots of information using this technique.

We know that all of these new planets are made of rock, they're a similar size to Earth and at least three of them could have oceans. However, all the planets orbit much closer to their star than Earth, or even Mercury, which is the closest planet to our Sun.

Yet, the temperature on the planets is actually similar to the rocky planets of our Solar System because their star is an 'ultracool dwarf star'. It's 10 times less massive than the Sun and four times cooler, so it gives off less light and heat.

Astronomers expect to find lots of Earth-like planets around dwarf stars, but this is the first time such a packed Solar System has been discovered.



EXOPLANET

An extrasolar planet (exo-planet for short) is a planet that orbits a star beyond our Solar System.

The Star That Would Not Die

COOL FACT

The star that exploded was at least 50 times more massive than our Sun — probably much larger. It may have been the most massive supernova ever seen!

Just like all good stories, the life of a star has a beginning, a middle and an end.

The most massive stars end their lives in the most dramatic fashion, lighting up the sky in an explosion bright enough to outshine a galaxy and violent enough to send the star's insides flying out into space. When the dust eventually settles, all that remains is the collapsed core of the once mighty cosmic giant.

These explosions are called supernovae. Over the years, thousands have been seen and studied by astronomers. So, when one astronomer spotted a new supernova back in 2014, he thought nothing of it. Like all other supernovae, this one lit up the night sky for a short time, before beginning to fade away. Since the event looked like it was coming to and end, the astronomer moved on to other projects.

ANTIMATTER

Antimatter is made up of tiny particles that are the opposite of normal material. When matter meets its antimatter equal they are both destroyed, releasing lots of energy.

SUPERNOVAE, STARS

A few weeks later, he returned to check up on the fading star and was astonished to see that it was getting brighter. Unbelievably, the star looked as if it had exploded a second time!

For the next two years, a team of astronomers watched in amazement as this star broke all records. Over 600 days, the star brightened and dimmer five times — it was erupting over and over again! What's more, delving into the star's past revealed that it has exploded once before, over 60 years ago.

So, what's happening? The truth is, no-one really knows. The best guess is that the explosions are not being caused by the star collapsing, like a normal supernova. Instead, this star began making a weird substance called 'antimatter'. When the anti-matter touched the normal material in the star, it resulted in a powerful explosion. This allowed the star to flare up again and again.

But, like all good stories, the tale of this star has come to an end. After 600 days, the poor, exhausted star could no longer continue its cosmic firework display. After one last explosion, it began to fade forever...

A Bridge Between Worlds

Cosmic objects like to travel in groups. Moons orbit around planets, planets orbit around stars, and galaxies sometimes orbit around other galaxies.

Our galaxy is called the Milky Way. It's a gigantic collection of stars, cosmic dust, gas and other stuff. About 50 smaller galaxies are thought to orbit around our galaxy, although we can only see two without telescopes. These two are called the Large and Small Magellanic Clouds (pronounced ma-jell-AN-ic).

COOL FACT

Space telescopes also revealed that the Large Magellanic Cloud is four times bigger than we thought!

Although we can see them without telescopes, studying the Magellanic Clouds in detail has always been difficult because they sprawl out over a such large area of the sky. Try looking at an entire building through binoculars and you might understand why.

But using space telescopes, we're finally able to see our galactic neighbours in fabulous detail and we've found something very exciting — the two galaxies appear to be connected by a cosmic bridge.

The bridge, made of stars and cosmic gas, stretches across 43,000 light years of space. That's more than four times the length of the Large Magellanic Cloud itself!

ORBIT

An orbit is the path along which cosmic objects, satellites and even spacecraft travels. For example, the Earth's orbit around the Sun takes 365 days to complete (or one year).

GALAXIES

This 'bridge' is at least partly made from stars being pulled out of the Small Magellanic Cloud by the Large Magellanic Cloud. This may have happened 200 million years ago, when the dwarf galaxies passed fairly close by each other.

The rest of stars and gas might have been pulled out from the Large Magellanic Cloud by our Galaxy, the Milky Way. It's almost like a parent teaching a lesson to siblings for fighting over their toys!

The photograph shows the arch of the Milky Way galaxy stretching across the night. Underneath you can see the two dwarf galaxies; the brighter blob of the Large Magellanic Cloud and the dimmer Small Magellanic Cloud below.

Are You Afraid of the Dark?

COOL FACT

The pink galaxy is a new type of galaxy named 'red geysers'. They are named after geysers found on Earth, which are natural pools of hot water that sometimes erupt, sending boiling hot steam and water gushing into the air.

Almost everyone is afraid of the dark at some point in their life; creaking floorboards, rustling curtains or random bumps in the night fill us with terror. But it's not the dark itself we find terrifying, it's the fear of what is lurking in the dark.

(A fear of the dark is actually an advantage; it keeps us on our toes in dangerous situations!)

We all know the boogeyman isn't real, so is there really anything to be afraid of? Maybe not on Earth, but there are monsters hiding in space — they're called black holes.

Black holes form when a massive star dies. Anything that gets too close to a black hole is pulled to it with such a strong force that it has no chance of escape. The monster will gobble it up!

BLACK HOLE

Black holes form when a massive star dies and is squashed down into an incredibly tiny space. Black holes' very strong gravity can even swallow-up light if it gets too close.

BLACK HOLE, GALAXIES, STARS

To make these monsters even more menacing, black holes are all but invisible, until they start to feed...

This picture shows two galaxies; the bright pink galaxy on the right has an enormous, feeding black hole at the centre. If you look closely, you can see a stream of material being sucked from the blue galaxy into the black hole.

Black holes are messy eaters. As it gobbles up material, it is spraying out hot cosmic gas like cookie crumbs.

The gas shooting out of the black hole almost look like a giant cosmic explosion in this picture, and it has a similarly devastating effect. The hot gas is heating up the entire galaxy to the point that it is unable to make new stars.

Galaxies start out as star-making machines with a simple recipe: cosmic gas + gravity = stars. Here we have a galaxy that has everything it needs to form new stars, but it isn't. Now, for the first time, we know why.

The Disappearance of the Cosmic Spinning Tops

The Universe can be thought of as a sheet of fabric. The natural, relaxed state of this sheet is perfectly flat. However, it can be stretched and squeezed by objects, like planets and stars. The more massive the object the more it makes dents in the fabric (which we call 'spacetime').

In this picture we can see two stars circling around each other, one is a white dwarf (the larger star) and the other is a pulsar (the smaller star). Although we cannot see it in real life, an artist has tried to demonstrate how the fabric of spacetime scrunches around the stars.

Pulsars are extremely compact stars that spin hundreds of times a second and shoot out beams of light. Like a lighthouse, these beams can regularly sweep over the Earth.

COOL FACT

The pulsar from this story, J1906, spins 144 times per second. That's almost 1 million times faster than Earth!

WHITE DWARF

When a Sun-like star has burned up all its fuel, it begins to collapse inwards. The material in the star's core ends up squashed tightly down into a tiny ball called a white dwarf.

COSMOLOGY,
STARS,
GRAVITY

Each of the two stars is far more massive than the Sun and over 100 times closer together than the Earth is to the Sun. The small distance means it only takes four hours for them to circle each other, it has also led their combined gravity to causes some remarkable effects.

When you start a spinning top, it doesn't just rotate it also wobbles. In the same way, pulsars begin to wobble when they move through a ripple in spacetime caused by strong gravity.

By measuring the wobble of this pulsar, scientists can work out how much spacetime has been warped around the two objects. From this, they can calculate how massive the stars are.

This is quite an impressive feat, because weighing stars while they freely float through space is exceedingly difficult — imagine trying to weigh a cloud!

Scientists were quite lucky with their research on this pulsar, because not long after they had collected their data, it disappeared! The star has wobbled so much that the pulsar jets no longer point towards Earth. But don't worry, they will wobble back towards us within the next 160 years or so.

Our Space Senses are Tingling

Humans have five basic senses that we use to interact with the world around us: sight, smell, touch, taste and hearing.

Many things stimulate more than one of our senses. For example, we see the light of a bonfire, hear the crackle of flames and feel the heat on our skin. The more senses we use to study an object, the better we can understand it.

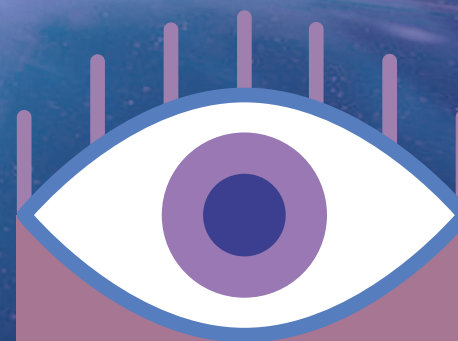
COOL FACT

A neutron star collision is called a 'kilonova' (pronounced KEE-lo-nova). Scientists think that most of the gold on Earth was created in a kilonova explosion.

When it comes to studying space, we've always had to rely on sight, we see light coming from distant objects. But we've now achieved a new way to detect or 'sense' events in the Universe — we can feel ripples in the fabric of the Universe itself!

These ripples are called 'gravitational waves'. They were first suggested by Einstein 100 years ago, but we didn't have the advanced technology to identify them until last year.

Gravitational waves are caused by violent and energetic events in space, like black holes colliding, stars exploding and even the birth of the Universe itself.



GRAVITATIONAL WAVES

Gravitational waves are created by violent cosmic events, like an exploding star or two black holes colliding. Like ripples on water, these are ripples through space-time.

COSMOLOGY

On 17 August 2017, we detected gravitational waves for the sixth time. And, for the first time, we saw the collision responsible for creating, too! Two neutron stars were seen spiraling closer and closer, before crashing violently together.

The collision shook space so much that gravitational waves travelled outwards in every direction, like the ripples created when a rock is thrown into a pond. Although their birth was extremely violent, by the time the gravitational waves reached Earth they were absolutely minuscule — a million, million times smaller than the width of a human hair!

Neutron stars are tiny and extremely dense. Unlike black holes, they give off light, making it possible to study the explosion using different telescopes all over the world, as well as gravitational waves.

For the first time in history we were able to see and feel an event far away in the cosmos!

Our Universe is Big, Beautiful... and Mostly Invisible!



COOL FACT

Dark matter is found all over the Universe. Astronomers think there is four times as much dark matter in the Universe than the normal matter that we can see!

It's hard to picture just how big the Universe is. For instance, the Earth seems like a big place to us, but you could fit about one million Earths inside our nearest star, the Sun. And the Sun is just one of billions of stars that make up our galaxy, which is called the Milky Way. When you think about how the Milky Way is just one galaxy in a group of about 40 nearby galaxies, the Universe is starting to seem like a big place!

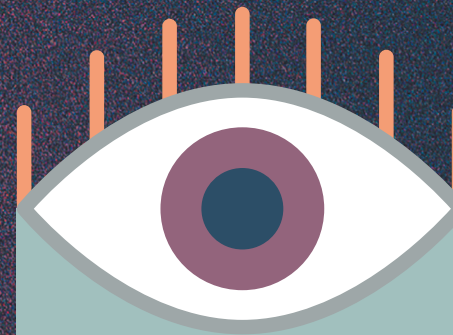
This new picture shows a different group of galaxies that is much bigger than ours, which is called Pandora's Cluster. The picture shows such a big part of the Universe that each galaxy only looks like a little white scratch on the photo!

DARK MATTER, COSMOLOGY

The galaxies are only a tiny part of what is really inside Pandora's Cluster. It is also made up of hot gas (shown in pink in the photo) and lots of strange stuff that doesn't give off any light at all — it is invisible to us! Astronomers call this invisible stuff 'dark matter'.

Although dark matter is invisible, astronomers can work out where it is in space from the effect that it has on the things around it — like seeing a sofa cushion being pushed down by an invisible man. In this picture, anywhere containing matter — both visible and invisible stuff — has been coloured in blue by astronomers. Can you spot some blue regions that don't contain any galaxies? That's dark matter!

Astronomers still have a lot to learn about dark matter, which is why new photos like this one are so important.



GALAXY

A Galaxy is a gigantic collection of stars, along with cosmic gas, dust and other stuff. The galaxy we live in is called the Milky Way.

A Journey to the Edge of the Universe

GALAXIES, COSMOLOGY

What happens when you point a powerful telescope at a seemingly empty patch of sky? You get a view that takes you to the edge of the Universe!

This photograph shows a tiny patch of sky. To give you an idea of the size, it's about the same size as a pinhead held at arm's length. But, despite being so small, this one patch of sky contains around 10,000 galaxies, some of which are over 13 billion light years from Earth!

This tiny patch of sky was previously photographed by the same telescope (the Hubble Space Telescope) in 2004, but the original image left astronomers in a curious position.

The picture told them a lot about stars being born in the newest and most ancient galaxies. However, there was very little information about new stars forming in the middle group — galaxies that existed about 5 to 10 billion years ago. This happens to be when most of the stars in the Universe were formed.

This left a big gap in our knowledge of how the hottest, most massive and youngest star were born. So, scientists made this new picture to fill in their gap in knowledge.

Hot young stars give off large amounts of UV light (the kind of light that causes sunburn). Therefore, the scientists included pictures taken in UV light this time. The new picture is being used to help us to understand how stars form and how galaxies grew in size from small groups of very hot stars to the massive structures they are today.

COOL FACT

When we look deep into space, we're actually looking back in time. Light from the most distant stars takes over 13 billion years to reach our telescopes, meaning that by the time we see them, they probably no longer exist!

ULTRAVIOLET

Ultraviolet (often shortened to UV) is an invisible type of light. UV waves have high energy. UV rays from the Sun are capable of damaging cells in our skin and causing sunburn.

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Las Cumbres
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