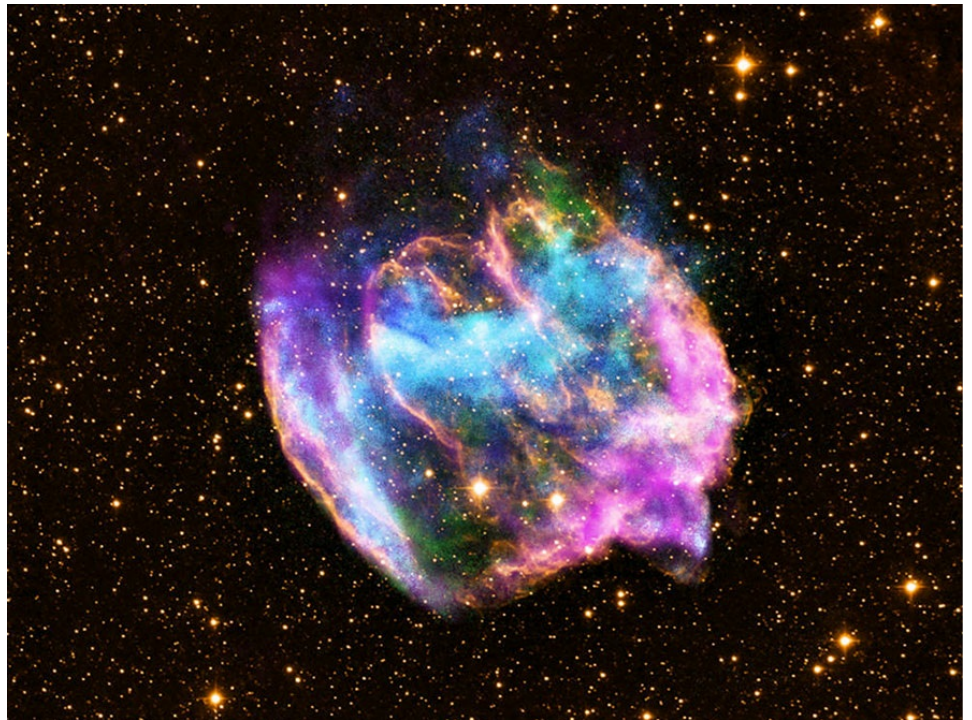


Cosmos may be expanding faster than we think

We know that the universe is expanding and accelerating — but recently physicists have begun to disagree about the speed. Now some say that they could be missing a major piece of the puzzle.



Wide world: Scientists measure how quickly the universe expands by observing supernovae. © NASA

Imagine a deflated balloon, with dots covering its surface. Then imagine that balloon inflating. As it gets bigger and bigger, the dots move further apart.

This is what has been happening to our universe for billions of years — ever since the **Big Bang**. As the universe expands and **accelerates**, everything inside it is getting further apart. And the stuff which is furthest from Earth is moving faster than the stuff closest to it. But how fast exactly?

The answer is known as the ‘**Hubble** constant’, and scientists have spent decades trying to measure it accurately. This is done through a variety of methods, including calculating the distance and brightness of stars and **supernovae**.

For the last two decades or so, scientists have roughly agreed that for every 3.3 million light years a galaxy is away from us, it is moving around **67 km** per second faster. Importantly, this fits with a ‘standard model’ of the universe as being 5% atomic matter, 27%

dark matter and 68% **dark energy** — the latter being a mysterious substance which drives the universe’s acceleration. But in January a team of top physicists put the Hubble constant at 72 km per second. And last year a different team said it was 73.

In other words, it is possible that the universe is expanding even faster than scientists thought. And that matters — because if it is true, they may need to rethink the standard model that they are all used to working with.

That, says Michael S. Turner of the University of Chicago, is ‘just what the younger generation wants — a chance for big discoveries, new insights and breakthroughs.’

It is an exciting and familiar feeling for physicists. Their science depends on finding accurate equations which explain the universe. When these are discovered — such as when Einstein found the equations for **relativity** — they sharpen our understanding of the universe and open up amazing opportunities.

But there are still many mysteries left unsolved, and many gaps in our knowledge.

Will we ever find all the answers?

Universal theories

Of course we will, say some. The universe is big and complicated, but it is also logical. It can be explained through reason and mathematics — there are rules. And ever since Isaac Newton first started measuring gravity, we have found better and better ways of discovering what those rules are. Eventually, we will know them all.

This is blindly optimistic, say others. The more scientists search for a clear explanation of the universe, the more confusing and elusive it becomes. Perhaps we put too much faith in reason, and we must accept — as religion once taught us — that the world works in mysterious ways. It is arrogant to think we can know everything.



Q: So it might be 67 km, or it might be 72 — does it really matter?

A: You’re right — it seems like a small difference. But physics is a science where maths matters. Because they cannot exactly stretch a measuring tape across the entire

universe, scientists must use other means of calculating how big the cosmos is, and how quickly it is getting bigger. And if their numbers don’t match, that could mean they are missing something significant.

Q: Like what?

A: We don’t know — that is what makes it so exciting! Some think it could be to do with a

missing subatomic particle — a building block that we haven’t noticed yet. Others say it could be to do with what happened at the very beginning of the universe. Others have suggested that it could be related to dark energy, which we know very little about.

YOU DECIDE

1. Does it matter how fast the universe is expanding?
2. Will we ever know all the laws of the cosmos?

WORD WATCH

Big Bang – For now, most scientists agree with the theory that around 13.7 billion years ago, all of the matter in the universe was concentrated in a very dense, very tiny point. This exploded outwards, and has continued expanding ever since.

Accelerates – For a long time, scientists assumed that gravity must be causing the expansion of the universe to be slowing down.

ACTIVITIES

1. Class debate: If we discover all the rules of the universe, religion will become obsolete.
2. Create a short video in which you explain what we know about Hubble's constant — use the links in Become An Expert to help you.

But in the late 1990s, the opposite was discovered— it is getting faster.

Hubble – Named after Edwin Hubble, the American astronomer who first realised that the universe is expanding.

Supernovae – A supernova is an explosion of a star at the end of its life. It is one of the brightest events in the sky.

67 km – Or around 42 miles — take note, Douglas Adams fans.

SOME PEOPLE SAY...

'The universe is full of magical things, patiently waiting for our wits to grow sharper.'
Eden Phillpotts

WHAT DO YOU THINK?

Dark energy – An unknown force which is causing the universe to accelerate. It is called 'dark' because we have not found a way to observe it.

Relativity – The surprising but fascinating idea that space and time are essentially the same thing, and that large objects distort it. This helps to explain gravity, and is one of the pillars of modern physics.

BECOME AN EXPERT

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 Notes

