

How big is the universe?

October 5 2015, by Dr Luke Davies, Sciencenetwork Wa



The universe is so big that even light hasn't had time to cross it in nearly 14 billion years Credit: inefekt69

Our brains struggle to comprehend how big the universe is because everything here on Earth, and even the Earth itself, is very small when compared to the immense scale of the universe.

So let's think about it a different way, using something we see and interact with every day... [light](#).

While we imagine light to be instantaneous, photons of light actually take time to travel from one side of the room to the other.

In the time it took you to read this far, a photon of light leaving the Sun

has travelled about 10 million kilometres – equivalent to travelling around the Earth 250 times.

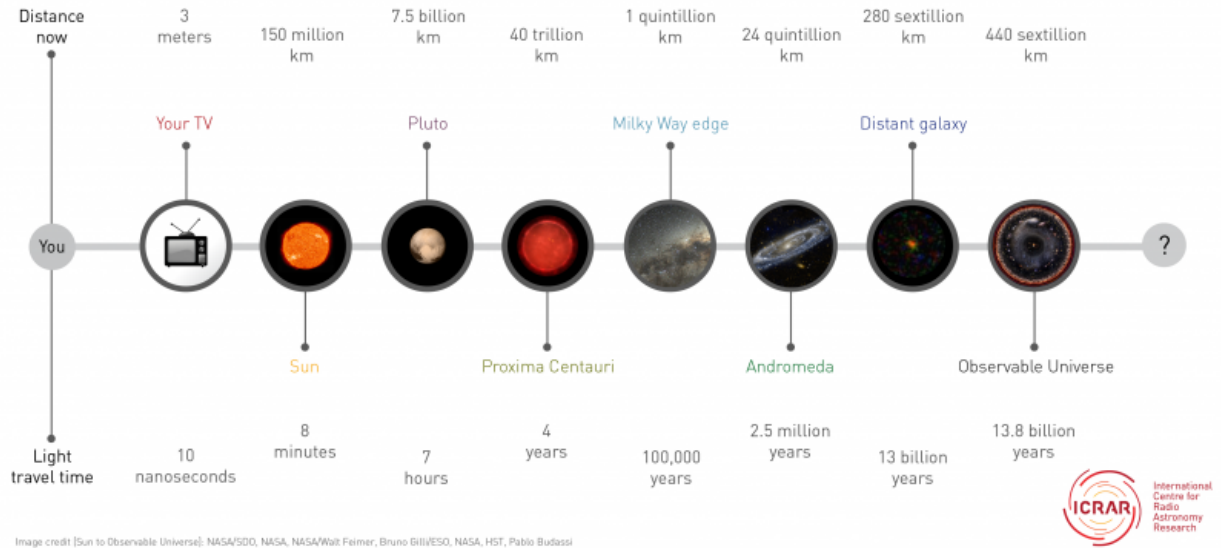
Light that leaves our second nearest star, Proxima Centauri, takes just over four years to reach Earth and so we can define it as four light years away.

As such, if you were to look at Proxima Centauri, you would not be seeing the star as it is right now, but how it 'was' 4 years ago!

We see all things in the universe as they were in the past, whether they're on the other side of the room or the other side of the galaxy.

To take this concept further, the nearest large galaxy to us is Andromeda which is so big and close that you can see it in the night sky with your [naked eye](#).

What you're really seeing is 1,000's of billions of stars in a configuration similar to our Milky Way. However, all of those stars are about 2.5 million light years away, which means you're seeing Andromeda as it was 2.5 million years ago.



The whole universe is littered with galaxies just like the Milky Way and Andromeda, and using our most powerful telescopes we can see light from galaxies that has taken more than 13 billion years to reach us!

Since a photon of light left one of these galaxies, life sparked into existence and evolved. Dinosaurs ruled the Earth. Humans appeared, developed tools, art, science and technology, built the Hubble Space Telescope, put it into orbit and finally stopped that poor photon on its 13 billion year journey!

The universe is about 13.8 billion years old, so any light we see has to have been travelling for 13.8 billion years or less – we call this the 'observable universe'.

However, the distance to the edge of the observable universe is about 46 billion light years because the universe is expanding all of the time.

Imagine that a photon of light is emitted from a point on the edge of our [observable universe](#).

While that [photon](#) has been travelling through space, the universe has expanded. We have moved away from the point where the light was emitted, and it has moved away from us!

Though the light might have only travelled for 13.8 billion years, the distance from us to the point it came from is, at present, 46 billion light years!

So how big is our [universe](#)? Well we don't really know, but it's big. So big that even light hasn't had time to cross it in nearly 14 billion years! And it's still getting bigger all of the [time](#).

This article first appeared on [ScienceNetwork Western Australia](#) a science news website based at Scitech.

Provided by Science Network WA

Citation: How big is the universe? (2015, October 5) retrieved 3 May 2024 from <https://phys.org/news/2015-10-big-universe.html>

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