A Christmas Gift to My Family, 2017

How Big Is the Universe & Does God Exist?

As God's creation, we know God is real by taking a good look at the size and complexity of the universe around us. It becomes obvious that God exists because of His creation, not only in us as humans, but the world we live in, the galaxy our world is in, and the universe our galaxy is in. Study the universe and its physical contents and one can better understand the existence of the spiritual universe and reasons why we're here.

Our physical universe contains too much order for our existence to have been created out of chaos. It is complex beyond our imaginations and when you look at such vastness, one can better understand God and His creation. The physical size of the universe is one simple proof of the correctness of our faith and the spiritual universe that guides us. Philosophy says that our existence is based on that which we perceive existence to be. It is even suggested that maybe we do not exist as we think we do here, but on a different plane of reasoning not yet known to us.

So how big is the universe and how does this help us understand the existence of God? Below is first a review of how we measure and know what we do about the universe and then I provide an insightful analogy, from the astronomer Peter Edwards, to help us define the vast size of the universe. However, just as we can't fully grasp the greatness of God, so too are we perplexed by the vastness of the universe. It is in awe that we proceed.

How the Distance Between the Stars is Measured

Using something called "parallax" is how the distance between the stars is measured. Hold your thumb up in front of your eyes and close one of them. Then

open that eye and close the other, and you'll see that it appears to move. Also, an alternative method of measurement is called "Standard Candles". It is the brightness stars emit.

Understanding Distance:

The nearest star to us is **Alpha Centauri A**. It is about 4.22 light-years from Earth, which is around 40 trillion kilometers away, or 24.8548 trillion miles.

Understanding the Speed of Light:

To understand how fast a lightyear is, in one second, at the speed of light, one would circle around the earth 7 times. The speed of light is about 300,000 kilometers per second, or 186,282 miles. So, one lightyear is 9 million, million kilometers. In miles per hour, light speed is about 670,616,629 mph.

The Sky is a Time Machine:

The light from the sun take 8 minutes to get to the earth. Which essentially means we're looking into the past. We're looking back at the sun as it appeared 8 minutes ago. So, the telescope is a time machine. [1]

Our star, the sun, sits inside the Milky Way. The furthest object one can see with the naked eye is a galaxy called Andromeda. The light from that galaxy has taken something like 2 and 1/4 million years to get to the earth.

So, if you use your imagination, and we reverse the scenario, in looking back from Andromeda at the earth with a very powerful telescope, you would see no signs of cities, no signs of civilization, no Great Wall of China. You might be lucky enough to see one or two early humans hunting around on the African plains for their dinner.

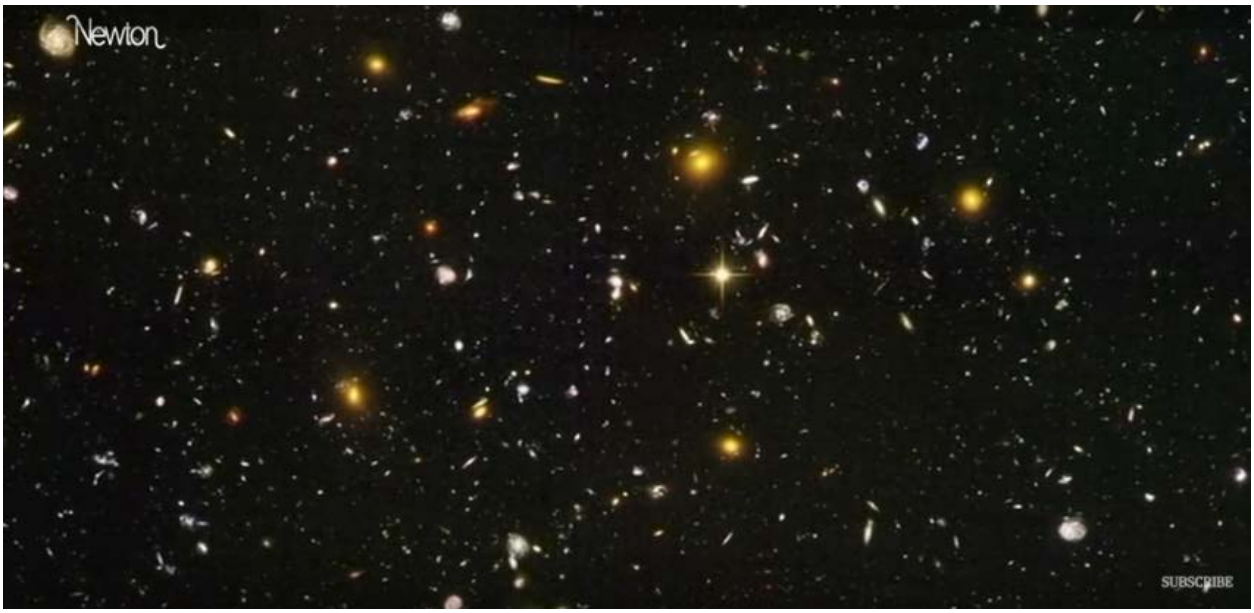
100 Billion Galaxies Times 100 Billion Stars:

When the Hubble telescope was aimed at a patch of dark sky the size of a grain of sand and zoomed in on it, what the telescope saw was incredible. The photo Hubble took is shown below. Every single spec of light in this photo is a galaxy.

---

[1] I have taken the liberty of paraphrasing a lot of what Peter Edwards says in his YouTube video https://youtu.be/AC7yFDb1zOA

This photo revealed “10 thousand galaxies in a patch of sky the size of a grain of sand held at arm’s length.”



If this tiny patch of sky is like every other, then we can calculate how many galaxies are out there, and how vast the universe is.

The visible universe contains about 100 billion galaxies. Each one of those galaxies contains about 100 billion stars. That means that the visible universe contains something like 10,000 million, million, million stars. That means there are more stars in the visible universe than there are grains of sand on the earth. The light from some of these most distant galaxies has taken about 30 billion years to get here. It’s hard to fathom.

“You’ll never, ever get your head around how big the universe is. It is incomprehensible.” - Astronomer Pete Edwards

---

Pete Edward's Illustration to Help Grasp How Big It Is:

Imagine that the earth is a grain of sand.

If that was true, then our solar system, out to the planet Neptune, would be as big as Durham Cathedral.

Now, take our solar system and shrink it down to the size of a grain of sand. Then our galaxy, the Milky Way, would be a thousand time bigger than this cathedral.

So now, take our galaxy and shrink it down to the size of the grain of sand, the cathedral would be the entire visible universe.

“The universe is big. Really big!”

Astronomer Pete Edwards of the University of Durham, England - This was a summary of Edward’s insightful perspective.

Watch the video at *https://youtu.be/AC7yFDb1zOA*.

Enjoy, and Merry Christmas!

Love,

A.L.