The Dark Universe

As we look out at the night sky, we can see the Moon, stars, planets, constellations, and galaxies. When we see these celestial objects, we can't help but ponder the vastness of the universe. How do you even begin to understand even a single "light year" - the distance light travels in a year or ***5.88 trillion miles?*** Our brains begin to swim with the largeness of it all.

Now consider this: All of it - every planet, star, galaxy - the entire visible universe which spans **93 billion light years across**, is only a fraction - approximately 5% - of the Universe which is believed to actually exist. That's because of forces called Dark matter and Dark energy. And, while we're at it, let's take a giant leap further, and consider that our Universe may be only one in an infinite sea of other Universes - the Multiverse. I don't know about you, but it's about this point in the conversation that my head starts to hurt!

What are dark matter and dark energy? In a nutshell, we just don't know. The existence of these two forces of nature is entirely mysterious to science, which is why they are referred to as "dark". We know of their existence based on the gravitational effects they exert on the fabric of the Universe, but we have no idea what they are. They don't seem to directly interact with the 5 % of the Universe that we know in any way that we can measure or detect, yet we know they are there based on the influence they exert on matter and gravity. These two mysterious forces demonstrate their influence on scales both big and small. They influence your body, the chair you're sitting in, and the coffee you may be drinking in the same way they influence our Sun, the Milky Way Galaxy, and everything else in a radius of at least 93 billion light years.

You may be thinking this is all ridiculous. How can forces we can't see, can't measure, and have no idea what they are, be so profoundly and directly connected to the Universe? That is a great question, and the answer is, frustratingly, "we just don't know".

Here's a little background:

The existence of dark matter was first proposed by Swiss astronomer Fritz Zwicky in the 1930s. Zwicky noticed discrepancies in the movements of galaxies within the Coma Cluster, a large group of galaxies, suggesting that there must be some unseen matter causing the gravitational effects, based on the visible mass of the cluster. In the course of his research, Zwicky found that the galaxies were moving so fast that they should have been flying apart if only the visible matter (stars and gas) was present. This led Zwicky to propose the existence of unseen "missing mass" or "dark matter" that provided the extra gravitational pull needed to hold the cluster together.

Despite his significant contribution, Zwicky's idea was not widely accepted at the time. It wasn't until the 1970s and 1980s when further observations of galaxy rotation curves and the dynamics of galaxy clusters provided additional evidence for the existence of dark matter.

Today dark matter is a central concept in cosmology and astrophysics, although its exact nature remains one of the greatest mysteries in modern science. Numerous experiments are underway to directly detect dark matter particles or indirectly infer its existence through its gravitational effects. Much of this research is being conducted at universities and research centers around the world, including the European Center for Nuclear Research, (CERN) near Geneva, Switzerland. A link to CERN is provided below, and it is well worth checking it out to see some of the amazing, mind-bending work this organization is working on.

Dark energy was discovered much later. In 1998, observations of distant supernovae by two independent teams, the Supernova Cosmology Project, and the High-Z Supernova Search Team, led by Saul Perlmutter, Brian Schmidt, and Adam Riess, revealed that the expansion of the universe is accelerating. This discovery implied the existence of a mysterious force, now known as dark energy, driving the universe's expansion.

Suffice it to say, there's a lot of math and science that further describes these brief descriptions of the discoveries of dark matter and dark energy. Information that could fill shelves of books. But the important part is that, while the existence of dark matter and dark energy are still mysterious and theoretical, they are the best explanation science has for the movement and composition of the substance of the Universe.

But what do these incredible discoveries mean for humanity on a day-to-day level? Isn't it all just scientific mumbo-jumbo that a bunch of people at Harvard or M.I.T. talk about over dinner and drinks?

Not at all. Again, take a moment to consider that dark matter and dark energy comprise 95% of everything in the known universe. That means, as you look at the world or the night sky, in every direction for virtually infinity you're only able to comprehend on any level, 5% of what is actually there.

Finally, what does the existence of dark matter and dark energy mean for us in the Cosmic Citizens Committee?

That is a larger question, and much like the dark forces themselves, the answer is largely unknown and wide open to speculation. Because we can't even begin to understand the properties of The Dark forces, what they may be and how they influence our lives is a mystery. However, we can speculate honestly that energy and consciousness, along with physical matter, may exist on planes that have been largely left to the realm of spirituality and conjecture. Perhaps (big speculation here) the cosmic phenomenon we refer to as "aliens" may be consciousnesses that exist in another plane, that are cloaked within the forces of dark energy and dark matter, and which emerge periodically to interact with humanity in ways we simply don't understand, at least at this point in our evolution.

Perhaps, after 13.8 billion years since the Big Bang, and 200,000 years since the emergence of modern mankind (Homo Sapiens Sapiens) we are just beginning to glimpse the complexity and vastness of the Universe/Multiverse.

Maybe we are only in the infancy of our Cosmic evolution.

Below are a couple links that may be of interest for further study.

www.home.cern

https://science.nasa.gov/universe/dark-matter-dark-energy/

Shows that provided information for the report - all on the **Science Channel**.

"How the Universe Works"

"Nasa's Unexplained Files"

"Space's Deepest Secrets"