The Search for Other Earths

NASA's Kepler mission's goal is to conclusively find other habitable planets in our galaxy.

PRACTICAL SCIENCE WITH PHIL FREDA

If you are a Star Wars or Star Trek fan, like me, then you are aware that there seems to be an abundance of habitable planets loaded with humanoid species out there in the cosmos.

NASA's new Kepler mission, NASA Discovery mission # 10, is out to determine if that is the case. According to NASA, there is clear evidence that there are substantial numbers of three types of exoplanets, or planets outside of our solar system.

- **Gas Giants –** We actually have four gas giants in our own solar system: Jupiter, Saturn, Uranus, and Neptune. These planets are large balls of hydrogen and helium that may or may not contain solid cores. Because of inhospitable temperatures, atmospheres and pressures, it is certain that these planets cannot support life as we know it.
- **Ice Giants -** Neptune and Uranus also have large quantities of hydrogen and helium, but also contain substantial amounts of methane, water, and ammonia ices. Because of this, they are called ice giants. Again, these planets are too cold and lack liquid water to support life as we know it.
- **Hot-Super Earths –** A super earth is a planet that is bigger than the Earth but not as large as a gas or ice giant. These planets may be comprised of rock or gas. NASA has found an abundance of these types of planets orbiting closely to their home star and fast rates. Because of the distance to the star, these planets are likely too hot to support life as we know it.

For our purposes of finding extraterrestrial life, it is important to find the fourth type of exoplanet, those that orbit in the "goldilocks" or habitable zone.

It can be said that our Earth orbits in a zone like this. It isn't too hot and isn't too cold.

We orbit at a distance from the Sun to allow for water to remain in the liquid form.

Also, we have a magnetic field produced by our core that allows the deflection of most of the solar wind (high-energy particles) from the sun.

Without the magnetic field, it is likely that our life-giving atmosphere would be stripped away from the intense solar wind.

Needless to say it is like trying to find a needle in a haystack.

So far, it seems that Earth-like planets aren't a dime-a-dozen.

The good news is that we haven't even scratched the surface.

According to NASA, current estimates show that there are a minimum of 100-billion exoplanets in our galaxy!

Out of 100 billion it is a pretty good chance that some of them have the ability to support life as we know it.

How do they do it?

You are probably thinking to yourself, "How can they know if a planet is orbited around a star that may be tens of thousands of light years away?"

That is a great question!

NASA uses something called the Transit Method to determine if a planet is orbiting a distant star.

It is possible to see Venus or Mercury transit, or pass by, our sun. This would look like a small dot passing by the sun.

While the planet is transiting the sun, the light that is given off by the sun will dim slightly.

This doesn't give the distance from the star or the exoplanet's mass, which would determine if the observed planet is a viable candidate to be a goldilocks planet.

The Kepler instrument is fine-tuned to do just this.

By determining how long the planet takes to transit the star, an approximate orbital size and mass can be calculated using Kepler's Third Law of planetary motion, according to NASA.

The size of the planet is determined by comparing how much the star's brightness is dimmed to the size of the star being transited.

Furthermore, from the orbital size and temperature of the star, the planet's characteristic temperature can be calculated.

This data is important to determine if the planet may be habitable to life as we understand it.

Has NASA found any possible Earth-like planets out there?

So far, Kepler has found only a handful, out of more than two thousand exoplanets, that orbit is the habitable zone.

One planet, called Kepler-22b, was recently confirmed to lie in the habitable zone.

According to an article on NASA's website, is about 2.4 times the radius of Earth and orbits its star, a G-class like ours, every 290 days.

There is only one issue.

The Kepler-22 system is about 600 light-years away. It would take 600 years to get there from Earth if you traveled at the speed of light (186,282 miles per second)!

Will we meet E.T. anytime soon?

Unfortunately, it doesn't look like it.

The big issue in space is distance. We humans do not have warp drive, faster than light travel, or hyperdrive.

It would take a whole new school of physics to understand how to defy the laws of general relativity. According to Einstein, nothing can travel faster than light.

In order to reach these planets, we need a way around general relativity.

Maybe someday, we will have the science and technology to buzz around space as you do in your car!

I firmly believe that not only are there habitable exoplanets in our own galaxy, but that extraterrestrial life does indeed exist out there.

Nothing is stopping aliens from visiting us, but let's face it, why would they?

We still engage in warfare, genocide, hatred, discrimination and a host of many other "unenlightened" behaviors.

My theory is, a race capable of traversing the cosmos has little interest in these types of affairs and may see us as ignorant and uncivilized.

But who knows, extraterrestrial life may be hiding just around the corner.

It is important to realize that organized life out there may be extremely different than anything we can fathom.

On our own planet there are microorganisms that thrive without light, organic fuel sources, or hospitable temperatures.

Complex life out in the cosmos may have evolved in such a way and maybe we're looking in the wrong places.

Remember, space is the final frontier!

Think about it!