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Expansion of Universe

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Abstract: The origin of matter remains one of the great mysteries in physics. During the last two decades, cosmology has become a precision observational science thanks (in part) to the incredible number of experiments performed to better understand the composition of the universe. The large amount of data accumulated strongly indicates that the bulk of the universe's matter is in the form of nonbaryonic matter that does not interact electromagnetically. Combined evidence from the dynamics of galaxies and galaxy clusters confirms that most of the mass in the universe is not composed of any known form of matter. Measurements of the cosmic microwave background, big bang nucleosynthesis and many other experiments indicate that ∼ 80% of the matter in the universe is dark, non-relativistic and cold. The dark matter resides in the holes surrounding galaxies, galaxy clusters and other large-scale structures.

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I. Introduction

The accelerating expansion of the universe is the observation that the universe appears to be expanding at an increasing rate, so that the velocity at which a distant galaxy is receding from the observer is continuously increasing with time. In the present investigation, the possible effects of the expansion of the Universe on systems bonded either by gravitational or electromagnetic forces, are reconsidered. The most direct evidence for the expansion of the universe appeared with the first spectroscopic observations of extragalactic "nebulae" by Slipher (1915), which revealed that most of these objects have redshifted spectral features. Subsequent observations by Hubble (1929) put in evidence a relation between the distances of these "nebulae" and the observed redshift in their spectra. An interpretation of these observations was provided by Lemaitre (1931), who showed that an expanding relativistic universe model could account for the observed radial velocity of galaxies and, in particular, explaining the fact that the redshift increases with the distance. Nevertheless, since the discovery of the redshift phenomenon, alternative explanations to the cosmic expansion interpretation have been proposed.

II. Review of Literature

Understanding the Universe:

Man has tried to understand the universe at least throughout recorded history. In the twentieth century, great strides were made in explaining the nature of the universe and its origin. Two important theories from that century were the Big Bang theory and Inflation theory.Big Bang was the dominant model of the universe, and many observations supported it. But, some things were not easily explained by the Big Bang theory, leading to the Inflation theory modification. Today, we have many more tools than ever before to gather data about the cosmos, and some of this new information is beginning to answer our questions and is confirming many aspects of the Big Bang. The Big Bang theory contends that all matter and energy were contained in a gravitational singularity, which was, perhaps, infinitely small. Pressure and temperature may have been infinite as well. For unknown reasons, this singularity began to expand. The Big Bang was not an explosion as the name would imply, but an expansion of space and the universe itself. At first, the universe was extremely hot, but as it began to cool, the laws of physics as we know them started to take shape. In this state the universe was far more symmetric than it is today. It is by the energy, or force, of the Big Bang that the universe evolves, or grows. But in the split seconds after the Big Bang, the particles and the energy related to them were not distinct from one another. The violence of the Big Bang would cause the universe to be asymmetrical in some respects. But in the split seconds after the Big Bang, matter was not yet so dispersed, or fragmented, that different forces of different subatomic particles were needed to hold it together. Hydrogen and helium atoms were formed and pulled together by gravity to make gas clouds, stars and galaxies. It is difficult to talk about the singularity because the laws of physics as we understand them did not apply to the singularity. For that reason, it is also difficult to talk about time before the Big Bang. In fact, time as we understand it is considered to have begun with the Big Bang.

Interstellar Clouds:

An interstellar cloud is the generic name given to an accumulation of gas, plasma, and dust in our and other galaxies. Put differently, an interstellar cloud is a denserthan-

average region of the Interstellar medium. Depending on the density, size, and temperature of a given cloud, the hydrogen in it can be neutral (H I regions), ionized (H II regions) (i.e. a plasma), or molecular (molecular clouds). Neutral and ionized clouds are sometimes also called diffuse clouds, while molecular clouds are sometimes also referred to as dense clouds.

Nebula:

A Nebula (Latin for cloud, plural-nebulae) is an interstellar cloud of dust, hydrogen, helium and other ionized gases. Originally, nebula was a name for any diffuse astronomical object, including galaxies beyond the Milky Way.

Stars:

Stars are hot bodies of glowing gas that start their life in Nebulae. They vary in size, mass and temperature, diameters ranging from 450x smaller to over 1000x larger than that of the Sun. Masses range from a twentieth to over 50 solar masses and surface temperature can range from 3,000 degrees Celcius to over 50,000 degrees Celcius.Thecolour of a star is determined by its temperature, the hottest stars are blue and the coolest stars are red. The Sun has a surface temperature of 5,500 degrees Celcius, its colour appears yellow. The energy produced by the star is by nuclear fusion in the stars core. The core collapses in less than a second, causing an explosion called a Supernova, in which a shock wave blows of the outer layers of the star. (The actual supernova shines brighter than the entire galaxy for a short time). Sometimes the core survives the explosion. If the surviving core is between 1.5 - 3 solar masses it contracts to become a tiny, very dense Neutron Star. If the core is much greater than 3 solar masses, the core contracts to become a Black Hole.

Black Hole:

A Black Hole is a region of spacetime exhibiting such strong gravitational effects that nothing, not even particles and electromagnetic radiation such as light can escape from inside it. The theory of general relativity predicts that a sufficiently compact mass can deform space time to form a black hole.

III. Consequences

Now since dark matter + dark energy affects the expansion of the universe; at its level has three possibilities in future:-

1.Accelerating expansion rate with time.

2.Constant expansion rate with time(becoming after about 20-30 billion years).

3.The best to suppose(the worst you have to imagine): inflating a balloon leads to burst it after a certain limit of filling:in same way after a certain limit universe will :-i.start contracting; drawing a graph with time from then will make a symmetrical parabola. ii.sudden shrink in 10^-35~10^-33 seconds.

IV. Fate of The Universe

1.The Big Rip:

Being sure many of you are familiar with dark energy and, more specifically, the role it plays in the accelerated expansion of the universe. One theory of how the universe could potentially end relies on the assumption that the expansion of the universe will continue indefinitely until the galaxies, stars, planets, and matter (potentially even the subatomic building blocks that comprise all matter) can no longer hold themselves together, at which pointthey rip apart. This theory is called the Big Rip, and it could result in your next door neighbor (or cat) being ripped apart, too.In this model, if the universe's density is found to be less than critical density (the boundary value between open models that expand forever and closed models that re-collapse), the expansion of the universe will continue, as well as the accelerating expansion that is driving the galaxies apart at high speeds. If the density of the universe ever becomes equal to its critical density, it will continue to expand, but the expansion would eventually start to decrease gradually.

2.The Big Freeze:

Another popular scenario for the end of the universe that relies on deciphering the true nature of dark energy is the Big Freeze (also referred to as Heat Death or the Big Chill).In this scenario, the universe continues to expand at an ever-increasing speed. As this happens, the heat is dispersed throughout space while clusters, galaxies, stars, and planets are all pulled apart. It will continue to get colder and colder until the temperature throughout the universe reaches absolute zero (or a point at which the universe can no longer be exploited to perform work). Similarly, if the expansion of the universe continued, planets, stars, and galaxies would be pulled so far apart that the stars would eventually lose access to raw material needed for star formation, thus the lights would inevitably go out for good. This is the point at which the universewould reach a maximum state of entropy. Any stars that remained would continue to slowly burn away, until the last star was extinguished. Instead of fiery cradles, galaxies would become coffins filled with remnants of dead stars.

3.The Big Crunch:

The Big Crunch is thought to be the direct consequence of the Big Bang. In this model, the expansion of the universe doesn't continue forever. After an undetermined amount of time (possibly trillions of years), if the average density of the universe was enough to stop the expansion, the universe would begin the process of collapsing in on itself. Eventually, all of the matter and particles in existence would be pulled together into a super dense state (perhaps even into a black hole-like singularity).

V. Conclusions

1. At universe level, the conformal cosmology cycle continues with birth and death as big bang and big bounce and the cosmos just uses "the nothingness" to complete its cycle without any obstacle. If we place some hurdle to not let complete thic cycle we are at our best maximizing our lifespan for our future intelligent generations.
2. To save our universe it just not need globalization but galaxialization(probably introducing a new term).
3.(my favourite)Negative aspect-we were lucky enough to get great scientists like Newton and Einstein and possibly get one more like them soon. But it is possible that from some galaxies, from some good sustainable planets for living, some intelligent civilizations might have scientists much greater than any other in this universe. a scientists sooner or later will take birth with brain efficiency of about 90~100% would be contributing best of till known in this universe and those advantages will prove to be destructive for this universe(or at least for his planet).
4.(For our MOTHER EARTH)High quantity of Exhaust gases, deforestation, large number of industries, chemical effluents, transportation ,unprecedented construction, secondary pollutants, ruinous agricultural policies, population explosion, unplanned land-use policies are the major elements of environmental damage caused by us to Earth.

We need to understand the fact that we are a part of the interwoven life system on the planet, in such a way that problems like environmental degradation and environmental pollution are certainly affecting us directly or indirectly. Though the disaster is not expected to happen tomorrow or a hundred years from now, that doesn't mean it will never happen at all. So the onus is on us—the most intelligent species on the planet—to make sure that such problems are kept at bay.

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