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Dark Matter: An Enigma of Our Universe

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Even before the Big Bang had occurred some 13.7 billion years ago, dark matter should have existed, for it has been accepted by the large scientific mainstream that more than 64% of the universe contained only dark matter, a concept still left to be discovered as to what it could be. actually Dark matter is estimated to constitute 84.5% of the total matter in the universe, while dark energy plus dark matter constitute 95.1% of the total mass–energy content of the universe [Ref.1-6]

Introduction

Dark matter is a hypothetical kind of matter that cannot be seen with telescopes but would account for most of the matter in the universe. The existence and properties of dark matter are inferred from its gravitational effects on visible matter, radiation, and the large-scale structure of the universe. It has been established that dark matter particles do not carry any electric charge, for otherwise they would have interacted with any part of or whole of the electromagnetic spectrum. So, they do not form a part of the electromagnetic spectrum. They are therefore not Baryons, which sometimes emit electromagnetic radiation. Brown dwarfs, white dwarfs, dense heavy elements are all Baryonic matter [Ref. 7]. The 'dark matter' does not interact with matter (solid, liquid, gas and plasma) is another known conclusion. Dark matter has been further classified into cold, hot and mixed dark matter. Weakly Interacting Massive Particles (WIMPs), axions and Black holes, also known as (MACHOs) are some of the theoretically surmised 'cold dark matter'[Ref. 8]. Hot dark matter consists of particles that have a free-streaming length much larger than that of a proto-galaxy. An example of hot dark matter is already known: the neutrino. They were first postulated in the 1930's and they were detected in 1956. Neutrinos only interact with normal matter via the weak force making them very difficult to detect (the weak force only works over a small distance, thus a neutrino will only trigger a weak force event if it hits a nucleus directly head-on).Hence they are known as 'weakly interacting light particles' (WILPs), "Mixed" dark matter is also known as 'hot plus cold' dark matter. Mixed dark matter were proposed to have a composition of about 80% cold and 20% hot (neutrinos) was investigated and found to agree better with observations. Since the Universe is well known to be under an 'accelerating expansion', this theory of mixed dark matter did not hold good later. [Fig. 1]

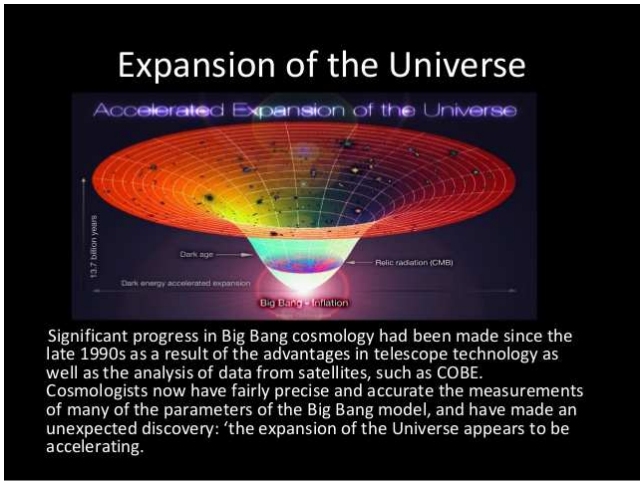

Figure 1. *Accelerating Universe at a fast rate (Courtesy: Wikipedia Images).*

Experiments

The only scientific claim to have detected 'dark matter' is that of the DAMA/NaI experiment and its successor DAMA/LIBRA [Ref. 9].The experimental set-up was located deep underground in Laboratori Nazionali Del Gran Sasso in Italy. DAMA/NaI has been replaced by the new generation experiment, DAMA/LIBRA. These experiments are carried out by Italian and Chinese researchers. But, the 'XENON' dark matter research project operated at the Italian Gran Sasso laboratory is a deep underground research facility featuring increasingly ambitious experiments aiming to finally detect long sought after dark matter particles seems to counteracting the DAMA/NaI experiment. Several universities and research institutions are carrying out dark matter research using Xenon100, Xenon10, and Xenon1 T and are bringing out reliable results [Ref. 10-11]. The predicted sensitivities are increasing in every new method. The much sought after debate about the 'Big Bang' theory seems to be still lingering in the minds of scientists. Most of us understand the Big Bang as the idea that our entire universe came from a single point, what astrophysicists call a "singularity." But we might not need a singularity to have a Big Bang, according to a new study by Ahmed Farag Ali in Egypt and coauthor Saurya Das in Canada. The catch – according to astrophysicist Brian Koberlein – is that, without the singularity [Fig. 2].

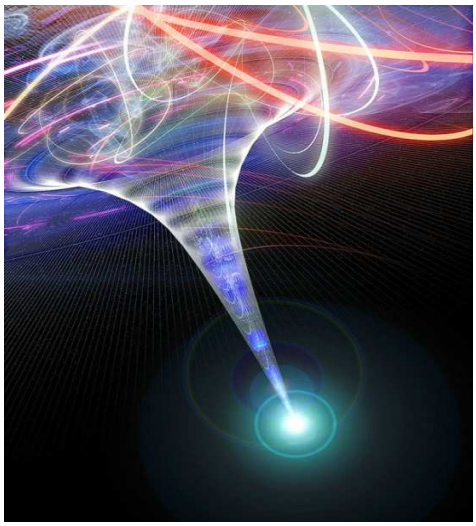

Figure 2. *Big Bang from 'singularity' theory (courtesy: Wikipedia).*

this model predicts that the universe had no beginning. It existed forever as a kind of quantum potential before collapsing into the hot dense state we call the Big Bang.

Conclusion

When such theories are yet to be settled, it is needless to say that with the shortcomings of the human intelligence and the existing superior instruments, it seems to be difficult to reach the dark matter and its origin. When I begin to think about the shortcomings of human intelligence, I also think positively sometimes about reaching the unreached (dark matter).If there is a limitation on the instrumentation and perhaps, over a period of time this is bound to improve a lot. However, it will take hundreds and thousands of years to produce an intelligent human being, thinking and hence to develop instrumentation to find the origin of dark matter. We must realize that we (human beings) came into existence only few million years ago as a result of 'evolution' of life. But we do carry a lot of information in our respective 'genes' which tell us about our history .In fact, a DNA strand the average human body is made up of around 37.2 trillion cells and most human cells contain tightly coiled DNA strands. DNA is used as a blueprint in the replication and functioning of cells. It has been estimated that if every single strand of DNA in an average human body was unwound and laid end to end they would stretch over 10 billion miles, or more than double the distance between Earth and Pluto. [Ref. 12].

The majority of this DNA would come from mitochondria, which are organelles within cells that can reproduce themselves and carry a unique genome. While single mitochondria have much smaller amounts of DNA than a cell nucleus, there can be up to 2000 mitochondria in a single human cell. Not all human cells contain DNA. Red blood cells, for example, lack a cell nucleus altogether and are produced in the bone marrow. It has been estimated that around 8% of human DNA originates from retroviruses that inserted themselves into our genetic code over millions of years of evolution. I would like to emphasize on

this point once again. Almost 5,000 strands of DNA would have to be laid side by side to compare with the width of a single human hair. So, therefore, an intelligent research into DNA/mitochondria/retroviruses, etc. will fetch more information about our past and who knows, it may even trace back our history to millions and millions of years in the past, perhaps. I fondly hope that it surely will throw some light into the invincible "dark matter's origin. Perhaps this is another way to reach the 'hitherto unknown' dark matter.

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