



Mysteries of the Dark

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Though, the supposition given by George Lemaitre that the universe began with a big bang is essentially conclusive, nonetheless it's purely an inclusive depiction of the origin of the universe. Today, particle physicists have more consistent deductions about the creation of the universe, with experiments on particle accelerators, that can simulate events producing enormous amount of energy equivalent to the conditions persisted all through the big-bang. Efforts are underway to bring forward **quantum theory of gravity** to enable us to comprehend the gravitational field & compactness of the primordial universe. We may, perhaps, figure out those events that resulted into the creation of universe.

million years, in which clumps of gases amassed together to form the first stars & galaxies, whose energetic ultraviolet light ionized and destroyed most of the neutral hydrogen). Merely 4.6% of the universe is, hitherto, composed of regular matter, which encompasses stars, planets and other celestial bodies. 23% of the entire creation comprises some inexplicable & undetectable mass that exerts a gravitational pull on regular matter and is known as dark matter. One hypothesis states the mystifying stuff could be formed by exotic particles that do not interact with light or regular matter and, for that reason, it is difficult to detect.

The nascent universe experienced an incredible burst of inflation (for the first 380,000 years, when the universe was basically too hot for light to shine) and an era of recombination (380,000 - 400,000,000 years, when the universe was sunk into darkness, since no stars or celestial objects were formed), followed by an age of reionization (400 million years, when the universe began to come out from the cosmic dark ages - a period that lasted for 500

About 5 or 6 billion years after the Big Bang, the expansion of the universe steadily slowed down as the matter in the universe pulled on itself owing to gravity. Thanks to the discovery of **cosmic microwave radiation** by Arno Penzias & Robert Wilson, this revealed that the inflation of universe was not receding, rather accelerating. The mysterious force driving up the pace of expansion is dark energy. Dark energy is thought to be a strange force that draws the cosmos apart at an ever-





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increasing speed; nevertheless it remains undetected and shrouded in mystery. The existence of this elusive energy, which makes-up to 73% of the universe, is one of the biggest brainteaser in cosmology.

How long will the universe go up depends on two antagonistic forces - its rate of expansion and the pull of gravity. The strength of the pull, in question, is largely based on the density of matter in the universe.

If the density of the universe exceeds a specific critical value, then the universe is closed and positively arched like the surface of a sphere. This means light beams that are at first parallel will converge slowly, eventually cross and come back to their starting point. If so, the universe is akin to the area of a spherical surface, which is not infinite but has neither start nor end. The universe will stop inflation in due course and begin to recoil on it.

If the density of the universe is less than the critical density, then the geometry of space is open and negatively curved like the surface of a saddle. If so, the universe has no limits and will inflate eternally.

If the density of the universe precisely equals the critical density, then the geometry of the universe is flat with zero curvature like a sheet of paper. If so, the universe has no bounds and will inflate forever, but the rate of expansion will gradually come close to zero after an infinite period. Recent researches suggest that the universe is flat with only 2% margin of error. However, the possibilities that the universe has a more complicated shape like that of a torus or doughnut with a different curvature cannot be ruled out.

Further, there could be a scope of another universe in the vicinity. Gravitational drag exerted by dark energy; movement of celestial objects & their subsequent disappearance into the black hole indicate its possibilities beyond the black hole. Cosmic microwaves further corroborate this fact on the basis of a cold zone noticed at one end of the universe. It is assumed that this end might be converging with another universe and the intense gravitational pull, generated by the alien universe, draws the outer space objects towards it.