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Commentary Article

Who shapes the cosmos - the 'Dark Matter' or God?

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Abstract

The problem: The 'Big Bang' theory about the beginning of the universe and its continuous expansion in an accelerating manner was first suggested in 1927 by Georges Lemaitre, a Belgian priest, mathematician and astronomer. Then, the fact that the universe constantly expanses in an increasing speed was raised by two observations: The first in 1929 by the astronomer Edwin Hubble showing that distant galaxies were moving away from us, as indicated by a red shift of certain wavelengths. Hubble found that the further away a galaxy was, the faster it receded (Ref. 1).

Keywords: *universe; priest; mathematician and astronomer*

Introduction

The problem: The 'Big Bang' theory about the beginning of the universe and its continuous expansion in an accelerating manner was first suggested in 1927 by Georges Lemaitre, a Belgian priest, mathematician and astronomer. Then, the fact that the universe constantly expanses in an increasing speed was raised by two observations: The first in 1929 by the astronomer Edwin Hubble showing that distant galaxies were moving away from us, as indicated by a red shift of certain wavelengths. Hubble found that the further away a galaxy was, the faster it receded (Ref. 1). The other evidence was provided in 1964 by two American radio astronomers (A. Penzias and R. Wilson), who measured a cosmic microwave glowing background produced by a thermal radiation left over from the early incredibly hot and dense universe (Ref. 2). In 1998, two competing research groups (S. Perlmutter from Berkeley and B. Schmidt from Australia together with A. Riess of Johns Hopkins), raised evidence for a continuous increasing speed of universe expansion by using technology developed for studying supernova cosmology (Ref. 3). Despite these discoveries, the forces involved in the non-stop accelerating expansion of the universe have not been clarified although attributed to the so-called 'Dark Energy' that fills the universe, while prevention of the detachment of the expanding galaxies from one another* was attributed to the so called 'Dark Matter'. Moreover, these findings suggest that all galaxies that currently can still be visualized, will move in the future out of our sight due to the expansion, raising questions of whether the amount of Dark Matter and Dark Energy will change in correlation with the enlarged universe.

Facts: The Dark Matter is invisible in that it does not emit, absorb or reflect light and cannot be characterized chemically. It can only be detected by its powerful gravitational effects on Ordinary (Normal) Matter (Ref. 4), and so it has been proposed to act as a 'gravitational glue' that shapes the cosmos.

Therefore, the Dark Matter may be considered a cosmic frame that wraps the galaxies, which raises further questions about how will it function in a much larger universe, or will its content increase. As scientists have succeeded to determine the mass-energy composition of the universe, roughly divided to 68% 'Dark Energy', a mysterious force likely involved in the accelerating expansion of the universe; 27% 'Dark Matter', the invisible compound that prevents separation of the galaxies while moving in the outward direction; and only 5% 'Normal Matter' that includes all visible components (stars and planets). The questions of how Dark Matter and Dark Energy were produced and whether their quantities would change in time remains open.

The easy way: The limited understanding of how the world was created and the worries and fears of people from the unknown and death led them to raise a mystic celestial super-being patron (God), responsible for the entire creation and life on planet Earth (God's reasoning and timing for his creative endeavor never explicated; Ref. 5). This belief along the development of worships led to the establishment of religions and a specific sector of sacred 'priests' 'playing' as mediators between God and humans (Ref. 6). Concomitantly, attempts to elucidate how was the universe created continued and theories and data based on experimental findings accumulated, which led to the Big Bang dominating theory. However, despite this breaking achievement, most of the creational puzzle remained obscure as people could not grasp such an enormous event as well as the forces involved. This limited understanding strengthened the religious approach, as well as the refusal of people to give away their belief. Not only that the religious hold provided an instantaneous solution to the mysteries of the cosmos, it also succeeded in many cases to calm fears of the unknown, while suggesting in parallel a pseudo-divine function for humanity (created in the form of God and selected to control all other animals as well as witness God's greatness; Ref. 7). No wonder, then, that a large portion of humanity still exercises the religious customs, while ignoring the scientific discoveries.

Future prospect: To shed more light on the Dark Matter mystery, breaking technologies that enable early and late views of the universe after the Big Bang event have been established. One is the NASA's Wilkinson Microwave Anisotropy Probe (WMAP) launched in 2001 and replaced in 2010 by the more advanced Planck Spacecraft built by the European Space Agency. This machine measured precisely tiny temperature fluctuations across the cosmic microwave background, enabling evaluation of Normal Matter versus Dark Matter in the very early universe (380000 years after the Big Bang event). These measurements indicated that the Dark Matter quantity exceeded by far that of the Normal Matter, and also provided an exact evaluation of the age of the universe (~13.77 billion years). Another extraordinary development was the Nancy Grace Roman Space Telescope, using gravitational lensing** and capable of measuring with high accuracy universe visible components at much later time (billions of years since the Big Bang) in comparison to the Wilkinson Microwave Anisotropy Probe.

An alternative speculation: In the background of limited knowledge and attribution to the Dark Matter abilities of shaping the universe, would the idea of an additional external gravitational force that affects the accelerating expansion of the universe as well as preventing separation of the galaxies when they move in the outward direction, be a complete overstatement? Moreover, rather than attribution of the pulling force to Dark Energy (why pulling in the outward direction and in an increasing speed), may we assume that the external pulling force is actually a gravitational incredible force originating in a huge black hole located in a 'super-universe' beyond the grasp or detection abilities of present human technology. Such unbelievable force may affect the 'Normal Matter' in universes trapped in its 'event horizon'. Not only that the enormous gravitational forces projected by such tremendous black hole pull the galaxies of our universe in an accelerating manner, they may also prevent dispersion of the Dark Matter that wraps the galaxies in our universe.

*'Dark Matter' was first conceptualized in 1933 by the Swiss astronomer F. Zwicky (see Ref. 2), who noticed that galaxies in the Coma cluster moved too fast to stay together only by the gravitational forces of 'Normal Matter' (visible matter). This observation was strengthened in 1970 by the American astronomer V. Rubin, who observed that stars at the edge of spiral galaxies, were moving too fast to be held undetached only by the gravitation of the 'Normal Matter', and so her conclusion was that much more matter than that observed is involved in holding the stars in orbit (Ref. 8).

**Light that passes by a galaxy cluster bends toward and around it, while producing intensified often multiple images of the background source. This is called gravitational lensing, pointing on a distant cosmic object, that otherwise is almost invisible. As more matter provides a stronger lensing effect, meticulous analysis of gravitational lensing helps in determining the location and quantity of matter in galaxy clusters. However, since all matter in a galaxy cluster is insufficient to create the observed effect, the surplus gravity provided by the Dark Matter that wraps the galaxy cluster contributes to the lensing effect.

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