International Journal of Multidisciplinary Research and Development
www.allsubjectjournal.com
ISSN Online: 2349-4182 ISSN Print: 2349-5979
Received: 17-06-2023, Accepted: 04-07-2023, Published: 19-07-2023
Volume 10, Issue 7, 2023, Page No. 50-51

Standard model of cosmology (SMC)

Nadwah Jasim Abdulzahra
Kerbala University, Kerbala, Iraq

Abstract
The subject of the (Standard Model of Cosmology) (SMC), commonly referred to as the (Cosmological Compatibility Model) or (ΛCDM-model), deals with the Big-Bang, which created the universe on its own from pure energy. It now composed of about (5%) ordinary-matter, (27%) cold dark-matter, and (68%) dark-energy which is cosmological constant. The dependence of the expansion rate is on the types of matter as well as the energy in the universe, and there is a specificity and effect of the total density, which is known as the critical density.

Keywords: SMC, dark-matter, and ΛCDM-model

Introduction

The SMC is depended essentially upon 2-theoretical models represented by the Standard Model of Particle Physics (S.M.P.P) [1], which related with the physical properties of the very small in terms of (quantum-mechanics), and the General Theory of Relativity (G.T.R) [2], which related with the physical properties of the very small in terms of (classical-mechanics), its dependent upon many additional-assumptions. There is a successful classic model of cosmology, and the discovery of the cosmic microwave background radiation is the most amazing, while the softness of the radiation (CMB) leads to a big problem that needs to be solved. During the 1970s, attention and focus was focused on pure baryonic models, but it turned out that there were great challenges in interpreting and knowing the formation of galaxies, despite the variation of small properties in the (CMB) (upper bounds at that time). While at the beginning of the 1980s of the last century, it was known that the possibility of developing an appropriate solution for the cold dark matter that is considered to be the dominant of the baryons, the theory of cosmic inflation led to the stimulation of models that have a critical density. Many researches have also focused on dark matter, which is cold and has a critical density in matter estimated at about (95 % CDM), and (5 % baryons). Astronomical research has also shown success in the formation of galaxies and their clusters, despite all of this, problems remain. The Hubble constant showed important observations in astronomy between (1988-1990), which showed clusters of galaxies on a large scale, much larger than expected. There are many theories and equations that are based on the expansion or contraction of the universe, depending on some initial parameters, including the mass of energy present in the universe. Robertson [3], and Walker [4] documented the theory even further and demonstrated that only the (F.L.R.W) scale is particularly and iso-tropically homogeneous.

Hubble-Tension and Big-Bang Results

It is widely known that the Hubble tension in cosmology is related to the main problem of the ΛCDM-model [5, 6], as the cause of the Hubble tension paradox is inherently unknown. However, when the cosmological principle fails, it is necessary to review the current interpretations of the Hubble constant and the Hubble tension, and the related problems will be solved. There are three components resulting from the Big-Bong are shown in figure (1) below:

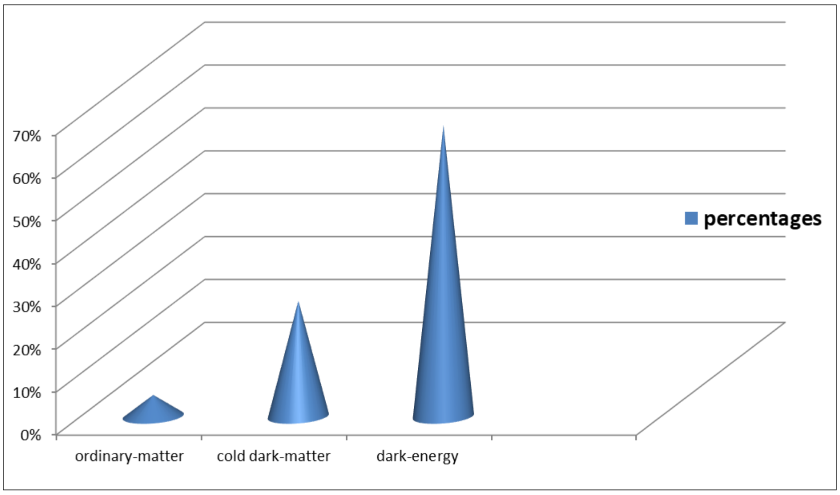

Fig 1: schematic representation of to show the percentages of ordinary-matter, cold dark-matter, and dark-energy (cosmological constant), (5 %, 27 %, 68 %) respectively.

Around 1929, by Hubble, it was discovered that the light from distant galaxies was red-shifted, meaning that they were receding from Earth. Hubble observed and distinguished the linear relationship between the receding radial velocity of the galaxy from the earth and its real distance from the earth, as the constant of proportionality was known here as the Hubble constant.

Therefore, the (International-Astronomical Union) decided that the expansion that occurs in the universe is referred to as the Hubble-Lemaitre law [7]. On this basis, the expansion of the universe is represented by a number of things, summarized as follows:

1. Expansion solutions to the Friedman-equations are only allowed as proper solutions to the expansion of the universe.
2. The universe must have had a dense beginning characterized by being extremely hot. Noting that Friedman's solutions and equations in the expansion of the universe considered that space is expanding by itself, and that the galaxies, in their reality, are in a state of dormancy within this continuous expanding space. Therefore, the redshift that occurs for each galaxy is due to the wavelength of light resulting from the expansion of space.

Dark matter

Dark matter is the default form of matter and it is believed that this matter is responsible for approximately 85% of the matter of the entire universe [8], Dark matter is called by this name because it does not seem to interact with the electromagnetic field in the universe, this means that it does not absorb electromagnetic radiation It does not reflect or emit it, and for this reason it is difficult to detect it. A number of astrophysical observations, including gravitational effects that so far cannot be accurately explained, have indicated the presence of dark matter in the universe, leading most experts to believe that dark matter is abundant in the universe and has a strong influence on both its structure and evolution [9].

Dark energy

In cosmology and astronomy, dark energy is an unknown form of influence on the universe on the largest necessary scale. The first observational evidence of this is that the universe does not expand at a constant rate, but rather it expands at a relative acceleration [10, 11] and that the evolution of the universe requires knowledge of its conditions in full and the beginning of its formation. Prior to all these important observations, a number of scientists believed that all forms of matter and energy in the universe slow down the expansion that occurs over time. The cosmic microwave background measurements (CMB) also indicated that the hot big bang is the beginning of the formation of the universe, and through it the general theory of relativity was explained in the evolution and large-scale movement that resulted later. Without another new form of energy, there was no way to explain the acceleration in the expansion of the universe. Since the 1990s, the prevailing view has been that dark energy is the most acceptable hypothesis in explaining the accelerating expansion of the universe [12].

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