Dark Matter and Dark Energy Can be Held in the 3-Cosmic Framework of String Theory

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Today's scientific development has reached a very high level, but in the natural sciences, research still encounter bottlenecks. The problems posing the greatest headache for scientists lay with dark matter and dark energy. Dark matter of the Universe is a hypothetical form of matter, which puzzles scientists more than 80 years and no solution yet. Most experts think dark matter is abundant in the Universe and has had a strong influence on its structure and evolution. In the observable Universe, there is no indication that the Universe is expanding at an accelerating rate, and cosmologists have hypothesized the existence of some unknown "dark energy" to explain this phenomenon.

In 2014, after the Planck satellite probe observed the cosmic microwave background radiation (CMB or CMBR), scientists deduced that the Universe is composed of less than 5% of normal matter, such as planets, stars, asteroids, and gases, etc., the remaining 95% is dark matter and dark energy, of which dark matter that does not radiate or absorb light accounts for about 27%, and dark energy accounts for about 68%. Scientists believe that dark energy is the force that tears the Universe apart, but dark matter condenses all things, and that the interaction of these two forces forms the structure of the Universe, as we know it today.

As long as we can understand the assembling speed of the galaxy, we can understand dark matter, also understand the power of dark energy tearing the Universe at the same time. Therefore, dark matter may be the best tool to study dark energy in the end. To understand dark matter now, we will probably get an answer from the most famous “String Theory”.

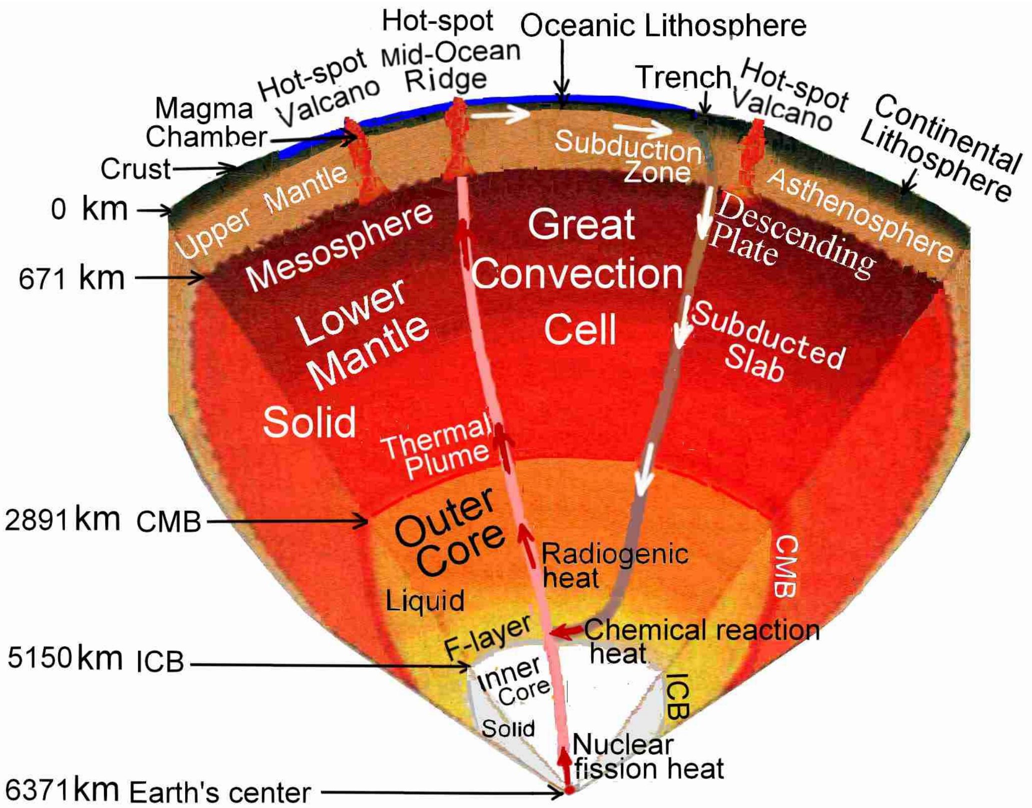
The original string theory is based on nine-dimensional space and one-dimensional time, i.e., a ten-dimensional spacetime, which is considered to universally exist. According to “Causality”, an effect cannot occur before its cause, which means time has a direction and cannot be divided into some different parts. So one-dimensional time is taken as a common standard in order of events in the Universe. Following the “Anthropic Principle”, which is the simple fact that we live in a Universe set up to allow our existence, three-dimensional space and one-dimensional time are taken as one cosmos as our living world. Therefore, the nine-dimensional space can be divided into three portions, and each portion has a common time standard, which means that there is a 3-cosmic framework in the Universe, called the triple cosmoses, i.e., multiverse.

In the triple cosmoses, according to string theory among any cosmoses, there are no basic interactive forces of nature except gravity, i.e., the graviton in the field of gravity can penetrate all the cosmoses; however, the electromagnetic wave (light) cannot. So dark matter may be situated in the cosmoses other than ours; in other words, the triple cosmoses can contain dark matter. The best method of exploring dark matter is to start from the Earth where we live.

In the current Earth model utilized in seismological investigations, such as body-wave travel times, surface-wave dispersion, and free oscillation periods for researching the chemical composition and the density distribution of the Earth, one can analyze some data of the Earth. According to the characteristics of Earth's interior, equitably examining its constitution, composition, density, and pressure from a different view of the core, the special arguments are put forward. It is inferred that the solid rock and the molten rock or the magma change states interactively at the CMB. According to this model, the chemical compositions are similar in both sides of the CMB, and the curve of density distribution is continuous.

In the low viscosity F-layer of the outer core, the high temperature causes some elements and oxides of magma to undergo oxidation-reduction reactions and separate due to its gravity. The great amount of heat is produced from chemical reactions in the F-layer and radioactive element generated nuclear energy in the Earth's interior which serves as the main power source for the geo-dynamo of the great convection cell. It is the great convection cell that the flow of the magma and the solid or molten rock migrating up to the crust and down across the CMB to the lowermost F-layer of the outer core.

Based on the new conception and applying a simplified method, we apply the different density distribution curves of the model in the core to calculate the data of Earth and then compare it with the existing current data of Earth. The insufficient mass and moment of inertia are the missing matter which are taken as the parts of dark matter, and then a suitable new Earth model is developed. Apply the simplified method to evaluate the Earth's mass and moment of inertia, which are found to be only 85.73% and 94.82% respectively of the current data.



A schematic diagram of a great convection cell and heat flow, and the composition of Earth's interior.

By the two insufficiencies of Earth's mass and moment of inertia, formulating the reasonable assumptions, a dark planet inside the earth has been figured out, then calculate gravity and pressure in every depth within the Earth to check suitability or not. Finally, a planet of dark matter, called dark planet, with a radius of 3700.375 km, about 1.33 times of Mars, is reasonably inside the Earth in the extra dimensions of space other than ours. The new Earth model may be confirmed from Chandler wobble and the 3-cosmic framework of the Universe is roughly established [1].

To research dark energy, we apply the eight data of cosmological parameters of Wilkinson Microwave Anisotropy Probe (WMAP) results and Planck Satellite results from 2003 to 2018 for 15 years, to form a table of cosmological parameters from WMAP and Planck Satellite. In the table, the value of dark energy density decreases gradually 4.8%, but the total matter density increases gradually 4.8%. The dark energy loss is equal to the increase of total matter that is consistent with "The Big Bang Theory".

Table of cosmological parameters from WMAP and Planck Satellite

Source / Symbol	WMAP 1st year.	WMAP 3rd year	WMAP 5th year	WMAP 7th year	WMAP 9th year	Planck Satellite 2013	Planck Satellite 2015	Planck Satellite 2018
H_o	71.0	70.4	70.5	70.2	70.0	68.14	67.31	67.32
Ω_Λ	73.0%	73.2%	72.6%	72.5%	72.1%	69.64%	68.5%	68.42%
Ω_m	27.0%	26.8%	27.3%	27.44%	27.9%	30.36%	31.5%	31.58
Ω_b	4.4 %	4.41%	4.56%	4.58%	4.63%	4.79%	4.9%	4.94%
Ω_c	22.34%	22.39%	22.8%	22.9%	23.3%	25.43%	26.42%	26.64%
t_0	13.7Gyr	13.73 Gyr	13.72 Gyr	13.76 Gyr	13.74 Gyr	13.784 Gyr	13.80 Gyr	13.80 Gyr

Based on The Big Bang Theory, the full energy (100% energy) of the Universe at the first moments of Big Bang has gradually been converted into matter, and after 13.8 billion years at present, 31.58% has been converted to matter Ω_m, and there remains energy Ω_Λ 68.42%, which is called dark energy by physicists. Therefore, we should take the current dark energy as the residual energy of the Universe after Big Bang. Due to the current composition of the Universe, dark energy accounts for 68.42%, which is much larger than the 31.58% of matter. It can be seen that the Universe is still expanding rapidly.

According to the table, cold dark matter density Ω_c gradually increased from 22.34% to 26.64%, that is, an increase of 4.30%, and the baryon density Ω_b that makes up the Universe gradually increases from 4.4% to 4.94%, only by 0.54%, and the ratio of both is 8:1. Because matter transforms from energy after Big Bang, the baryon density increasing value is very small, which indicates energy in our cosmos is so poor that we can label our cosmos as the low-energy-density. On the contrary, the matter in other cosmoses, i.e., the dark matter of our cosmos, has an increase value of 8 times, indicating that dark matter density in the other cosmoses has increased greatly, so we can label the other cosmoses as the high-energy-density cosmoses.

Under the 3-cosmic framework of the Universe, the rate of expansion in the high-energy-density cosmoses will be much higher than that of a low-energy-density cosmos as ours. When the high-energy-density cosmoses expand more rapidly than our cosmos, its matter (i.e., dark matter) will expand at the same pace that will use gravitational force to drag on the stars of our cosmos away at the same pace, the dragging effect of which causes us to observe that the stars in our cosmos are expanding at an accelerating rate [2].

Although the 3-cosmic framework of the Universe and the model of the Earth have been already deduced in the book [3], i.e., the 3-cosmic framework of the Universe can reveal dark matter and dark energy, that is only a preliminary outline. We hope that this can server as the brick thrown to lead the jade, receive the approbation of other scientists, so that talented persons of younger generations will more thoroughly research this topic, with the most rigorous mathematics to interpret, and then use the latest technology to test the truth of the Universe.

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