Topical: Dark Energy, Dark Matter and Dynamics of the Universe

Dark side of Special Relativity and Space-Time

Abstract

Space-Time and special relativity theory of matter generation and matter destroying explain the universe how to origin and evaluation as well as why it is happening. It explains the dynamics of the universe especially expansion and compression and how it is happening. How the power for the universe created by matter generation and matter destroying. It also explains the inflation and collapse of the universe. It explains the universe's constitution of matter, anti-matter, energy, and dark energy. As well as it explains how the universe structures of galaxies and stellar and how those are evolved. Therefor ultimate fate describes by matter generation and matter destroying is nothing, expanding, flat, compression, nothing, and yet another universe to begin again.

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1. Space Architecture of Energy, Matter, Dark Energy, Dark Matter

The General Relativity solution for the scale factor R is given by the Friedman equation as follows.

$$\ddot{R} = -\frac{4\pi G}{3} R\left(\rho + \frac{3P}{c^2}\right) + \frac{\Lambda}{3} R \qquad \text{(Force Equation)}$$

$$\dot{R}^2 = \frac{8\pi G}{3}\rho R^2 - kc^2 + \frac{\Lambda}{3} R^2 \qquad \text{(Energy Equation)}$$

where P is the pressure and Λ is the cosmological constant, k is the curvature. Energy density changes in the universe (Fluid equation) as follows.

$$\dot{\rho} + 3\frac{\dot{R}}{R}\left(\rho + \frac{P}{c^2}\right) = 0 \qquad \text{(Fluid Equation)}$$

Albert Einstein's theory of special relativity that expresses the fact that mass and energy can be interchanged into each other. $E = mc^2$, in the equation, the kinetic energy (E) of that body is equal to the increased relativistic mass (m) of body times the speed of light squared (c^2).

Consider an initial stage with no matter in the universe and nothing all over. Then according to the fluid equation (ρ) + ($P= -\rho c^2$) can be generated without effect to the equation. Then $P = -\rho c^2$, Which is explained as the pressure of vacuum energy, where cosmological constant dominates the universe. In the fluid equation, it was written as (ρ) + ($[-\rho * c^2]/c^2$)

According to the special relativity, it explains as

density ρ + negative density(-ρ) * expand speed c * compressed by speed c

=> density ρ + dark energy($\Lambda= -E= -\rho c^2$) * compressed by speed c

=> density ρ + anti-matter(-ρ)

The anti-matter(-ρ) can identified as dark matter.it is comparable with special relativity energy -> mass transformation.

0 = E - E {initially Energy and Dark Energy}

=> $0 = (E/c^2) * c^2 + (-E/ c^2) * c^2$ {divide by c^2 and multiply c^2}

=> $0 = \rho * c^2 + (-\rho) * c^2$ { $E = mc^2 \Rightarrow m=E/c^2$}

=> $0 = \rho + ([-\rho * c^2]/c^2)$ {equivalent to fluid equation, $P = -\rho c^2$}

It can explain as positive density can generated with negative density expand by speed of light and apply compression of speed light again. This expansion of speed of light apply, since the opposite force to compression of energy by speed of light.

It explains how the initial mass generated as positive density and dark energy compressed by the speed of light. Not the positive density expands by speed of light nor the positive mass and anti-matter. It also explains dark energy as negative pressure and universe origin as:

density ρ + dark energy($\Lambda= -E$) * compressed by speed of light

Apply the initial ρ and $P = -\rho c^2$ to Friedmann force equation, give initial $\Lambda = -8\pi G$. Also applying $\Lambda = -8\pi G$ for Friedmann energy equation, give initial scale factor R=c (initial curvature k=-1 for open universe in big bang inflation). Which also comparable for the expansion of speed c given by fluid equation.

Therefore inflation is start with scale factor R equals to speed of light(c). Initially generated matter gets nearly equivalent speed of light, hence generated as radiation matter. This process is the power generation process to universe to expand.

This will refuse the concept of initial high density soup, alternatively can consider origin from nothing or origin from Energy and Dark Energy soup and then it had transform to Matter and Dark Matter. This will useful for future Dark Energy and Dark mater searches as well as determine physics of Stellar and Black Holes. Also this concept provide mechanism to how the universe Inflation, Expansion, Steady State, Compression and Collapse. This will provide the possible answer to how the universe work does.

2. Matter and Dark Matter: Space Architecture of Black Hole, Quasars and HI, HII Region

The matter will generate with equivalent anti-matter or dark energy. Dark energy is negative energy and has negative pressure. Consider the properties of anti-matter. It is with negative pressure and compresses by as matter (Dark Matter). And a black hole is like massive anti-matter, which contains all anti-matter of masses of a galaxy.

Quasar is the process of mass generation. It is observed that quasar emits radiation, which is like the generation of radiation matter. Considering the steps of matter generation, it will generate expansion power of the speed of light to the universe by the equivalent amount of matter generation. Consider the mass generation process, which generates radiation matter with Dark Matter. Generation of radiation matter like energy is released in the form of electromagnetic radiation in a quasar.

Since the negative pressure of the massive Dark Matter of Black Hole, positive matter organizing around it and creates and evaluate Galaxies. Cloud in the interstellar medium composed of neutral atomic hydrogen called the HI region. HI region is formed by the generated matter and it contains the neutral atomics. Region of atomic hydrogen that is ionized called as HII region. This HII region is formed from the dark energy and the matter. HII region has ionized matter since the matter gets ionized by the presence of dark energy.

3. Special Relativity and Space Architecture of Matter transformation

According to the Einstein equation, when mass m apply speed of light, transform to the dark energy E, where $E = mc^2$, will get destroy with dark energy –E resulting nothing. This will happen when the dark energy presence.

Steps can be explained as follows.

-E (Dark Energy) + mc^2 (with opposite compression power of c) =0

-E (Dark Energy) + E (Energy) =0

Considering the steps of mass destroying with energy, it needs matter to apply the speed (according to Einstein) or expansion of the speed of light. Possible scenarios are if the universe expanding the speed of light, the matter can get

the expansion of speed of light. Also universe compress by the speed of light, then matter can be travel to the compression point by speed of c.
Also, there is an opposite force for the matter to apply the speed of light, which is the compression power of the speed of light. Therefore matter converting energy will have equivalent compression power of the speed of light to the universe. The matter destroying process is the power generation process to universe to compress.

4. Energy and Dark Energy: Space Architecture of Stellar evolution

Matter converting to energy is the process of starts will generate the power for the universe to compression. For the process of mass transform to energy, there should be Dark energy exist. Then only the matter gets expansion of speed of light. Stars convert matter into energy and emit as light, which has the property of speed of light. As a result of light speed, stars generate opposite compression power of the speed of light.
According to matter-energy transformation, the process of stars needs dark energy to present. If the dark energy present, the matter will expand in the speed of light by creating light energy. Therefore, star formation mechanism is a process of matter gets companion with dark energy. Therefore, star is a special object made up of matter and dark energy. When the presence of dark energy, matter will start nuclear fusion to create energy.
The next step is the process of matter destroying with dark energy. Consider the life cycle of stars. If the star formation gets enough to matter and dark energy, according to the mass, large star or small star formed. If not sufficient dark energy, then results in brown dwarf. After the energy created by destroying mass, stars get the stage of Supernova or Nova. Supernova is a powerful and luminous stellar explosion, which results in a neutron star, a black hole, or completely destroyed. Nova is not a powerful explosion as a supernova and results in a white dwarf or black dwarf. Supernova or Nova is the stage of energy and dark energy get negate by the explosion. Therefore, supernova and nova are the energy destroying steps of matter destroying process. If the star gets the equivalent amount of matter and dark energy, then the supernova will result in nothing and completely destroyed.
If the star has more matter than dark energy, an equivalent amount of matter and dark energy gets destroy and the rest of the matter formed as a dwarf. If the matter quantity larger than the dark energy potion of a supernova stage of the star, remain matter form as a neutron star. The neutron star is very high density, composed predominantly of closely packed neutrons. After a supernova explosion, by the gravitational collapse of the remnant of a massive star, neutron stars will form. Since the nova results only white dwarf or black dwarf, nova form from a star has more matter than the dark energy.
If the dark energy portion larger than the equivalent matter quantity, then form a pulsar (not the black hole). A pulsar is a highly magnetized rotating object that emits beams of electromagnetic radiation out of its magnetic poles. It is like a quasar. Since black hole form only the center of a galaxy, remaining dark energy form as a pulsar.

5. General Theory of Curvature

Friedmann's energy equation explains the conservation of energy and it can rearrange as follows.

$$\frac{1}{2}m\dot{R}^2 = \frac{4\pi G}{3}\frac{mR^3\rho}{R} - \frac{1}{2}mc^2k + \frac{4\pi G}{3}\frac{mR^3\rho_v}{R}$$

K.E. P.E. constant particle E. cosmological constant

Where k is the curvature. Therefore the curvature explains the constant particle energy and depends on the matter change of the university. Energy also expresses as matter from special relativity.

$m = E / c^2$

if the matter space increasing, the universe is open and $k < 0$, if matter increasing only and $k = -1$. If the matter space decreasing, the universe is closed and $k > 0$, if matter decreasing only and $k = +1$. Then curvature k can express as

$k = \underline{(+m) - (-m)} / (+m) + (-m)$, Where (+m) = generated mass in the universe and (-m) = destroyed mass in the universe, mass can be destroyed transforming equivalent energy in star, equivalent $m = E / c^2$ General curvature can be as follows.

$k = m_d - m_c / (m_d + m_c)$, where m_c = matter created, m_d = matter destroyed

when $m_d = 0$, then $k = -1$, open universe.

when $m_d = m_c$, then $k = 0$, flat universe.

when $m_c = 0$, then $k = +1$, closed universe.

6. The Fate of the Universe

Possible scenarios for the evolution of the universe described as the ultimate fate of the universe. For the description of the evaluation of the universe, some major parameters used; ρ – density of matter k, – curvature of the universe, Ω – density parameter, According to the Friedmann equations, the universe describes by various models (Λ=0).

According to the current accept model of Λ CDM, after the origin universe radiation matter (Ω_r) dominated the universe. Then after nucleosynthesis matter gets created and matter (Ω_m) dominates the universe. After that dark energy (Ω_Λ) dominated. According to the matter generation, the first matter generated as radiation matter (Ω_r) and dominated the universe. is the density of anti-matter. Not the dark energy. Therefore early universe Ω_m and Ω_r dominated. Then after nucleosynthesis matter gets created and matter (Ω_m) dominates the universe. After the star formation, anti-matter created. The process of stars reduces the matter (Ω_m) density and anti-matter (Ω_Λ) gets dominated. The fate of the universe describes by matter generation and matter destroying model as follows.

- Inflation(ρ = 0, k = 0, Dark Energy and Energy only)

$$R \propto \exp\left(\sqrt{\frac{\Lambda}{3}}t\right)$$

Since the Λ is negative inflation in dark energy, opposite compression in positive energy makes positive matter.

- Expansion($\rho > 0, k < 0$)

  When k = -1, positive matter and dark energy are equal, then R=-ct
  When -1 < k < 0, since the matter destroying process, Dark Energy > positive matter
  Then R gets complex value. Therefore expansion applies to complex parts of dark energy or anti-matter. Then positive matter gets a relative expansion, that's why positive matter remains the same size without expansion.

- Flat($\rho > 0, k = 0$)

  $R = \exp\{[(8\Pi G + \Lambda)/3]^{1/2} * t\}$
  Since the matter destroying process and all related dark energy of matter destroying process not destroyed, $\Lambda > 8\Pi G$, therefore expansion in the complex part of dark energy. Since the universe is flat
  $R= e^{-xt}$, where $x = [(8\Pi G + \Lambda)/3]^{1/2}$

- Compression($\rho > 0, k > 0$)

  When 0 < k < +1, since the matter destroying process, Dark Energy > positive matter,Then R gets complex value. Therefore expansion applies to complex part of dark energy or anti-matter. Then positive matter gets relative compression, that's why positive matter remains the same size without compression. When k = +1, and if positive matter and dark energy are equal, then R = -ct for complex part of dark energy.

- collapse($\rho = 0, k = 0$, Dark Energy and Energy only) in the last step of the universe

  $$R \propto \exp\left(\sqrt{\frac{\Lambda}{3}}t\right)$$

  Since the Λ is negative, collapse in dark energy, opposite compression in positive energy makes positive matter. Positive matter traverse speed of light, since the compression speed of light, makes positive energy. The last expansion makes all anti-matter portions to dark energy and will negate with positive energy.

7. Conclusion

The special relativity explains how the matter transforms into energy. According to that matter can be generated with negative energy and matter can destroy with negative energy. The negative energy can be identified as dark energy. According to this matter generation is the process of black holes, emitting radiation from the quasar is the evidence. Matter destroying is the process of stars; energy and dark energy get negated in the supernova and nova explosions. Stars emit the light by the speed of light is the evidence of the matter destroying process.
Therefor ultimate fate describes by matter generation and matter destroying by transforming is nothing, expanding, flat, compression, nothing, and yet another universe to begin again.