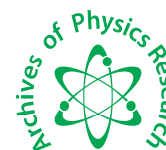




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A new approach to understand the fundamental cause of gravity and time dilation in special and general relativity

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ABSTRACT

In present article, the 'space' is considered as a physical entity, and the gravity is discussed as a consequence of equal and opposite interaction between 'mass' and the 'space' around every mass. In order to explain the cause of gravity, a very new concept of root force is introduced as a fundamental nature of 'mass' and the 'space' both. The unit of root force is $(\sqrt{m}\sqrt{kg/s})$ or square root of newton. It is learnt that may be, it is a root force which gives mass to every particle and make existence possible. The exact nature of root force is beyond current understanding of physics. Another new concept of super-vacuum (absolute emptiness) is also introduced in this paper. This concept is essential to understand the importance of the 'space'. It is concluded that 'mass' and 'space' shares equal and opposite interaction, which causes gravitation. And magnitude of root force causes time dilation.

Keywords: Gravity, Root force, the 'space', Super-vacuum

INTRODUCTION

Gravity is the most fundamental phenomenon of our universe, and still it is one of the most elusive concepts to understand [1, 2]. Even greatest minds in physics have failed to explain the cause of gravity. The reason for this elusiveness of gravity is probably lies in our ignorance. Something very special, something very fundamental is being ignored.

Right from the beginning of human understanding, it is assumed that the 'space' around us, or in which every mass moves, is infinite, and is there forever. We think that the 'space' around us, around every object, is inert and it has no special role to play. It is a human nature — more common, more ordinary is a thing — less we think about it. The 'space' around us, around every mass is extremely ordinary thing, and therefore we do not think about it at all. We take this 'space' granted. We ignore the concept of the 'space'. And as a result, we failed to understand the importance of it.

If we think our universe as a beautiful painting; the 'space' is a *paper* or a *canvas* on which the creator created his painting. Without paper/canvas or any two dimensional surface, one cannot create a painting. Similarly, without the concept of three dimensional 'space', the universe cannot be created. The 'space' itself is one of the most essential constituent of our universe. It is the 'space', which provides the ultimate structure to our universe. The 'space' is there so that 'mass' can move inside it. The 'space' is there so that 'mass' can stay in state of 'mass' inside it. We failed to consider the 'space' as a physical entity. Probably it is our ignorance towards the 'space' because of which we do not comprehend the most fundamental force of nature — Gravity.

2. A NEW APPROACH TO UNDERSTAND THE CAUSE OF GRAVITATION

2.1 ROOT FORCE

Root force is a very new thought for physics. It maybe something which makes existence possible.

Root force is an inherent property or fundamental nature of 'mass' and the 'space' both. Normally, force exerted by one mass over other mass is regular force which is measured in newton. This regular force is seen as a movement or deflection of one body or both bodies. However, force exerted by 'mass' over 'space' – and – 'space' over 'mass' is a root force. Unlike regular force, we cannot see or feel root force but it is there. It is probably a root force which gives mass to every particle and makes existence possible. The exact nature of root force is beyond current understanding of physics. The unit of root force is $\sqrt{m}\sqrt{kg/s}$ or square root of newton (\sqrt{N}).

Root force can be classified into two kinds:i) mass force and ii) space force. In order to understand the nature of mass force and space force, at this point, it is assumed that every mass itself is a 'mass force' and the 'space' itself is a 'space force'.

2.2 FIRST LAW FOR GRAVITATION

Every 'mass'– and the 'space' around every mass, exerts equal and opposite root force on each other.

This equal and opposite interaction between 'mass' and the 'space'— is fundamental cause for universal gravitation.

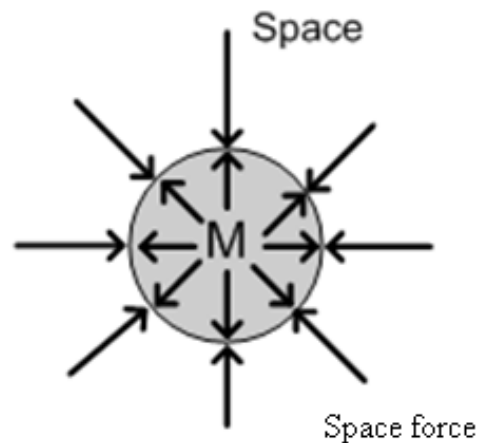


Fig 2.1

Every 'mass' exerts internal root force i.e. mass force in outward direction. The 'space' around that mass however, always exerts equal amount of root force i.e. space force in opposite direction. The result this equal and opposite interaction — is gravity.

When the 'space' exerts equal and opposite root force on mass (as a reaction to mass force),it creates a *gravitational slope* around that mass. When other mass enters in gravitational slope (or sloped space), follows the direction of slope. This notion is quite similar to the *gravitational field*. However, this paper intends to give cause for such gravitational field/slope. Mechanism of gravity is explained in section 2.4 in this paper.

The first law can be interpreted as follows...

The Space completes the mass,
And the Mass completes the space.

2.3 SECOND LAW FOR GRAVITATION

Root force exerted by the 'space' on any 'mass' from any given point in space (point relative to given mass) is directly proportional to that mass and inversely proportional to the distance between the mass and that *space point*.

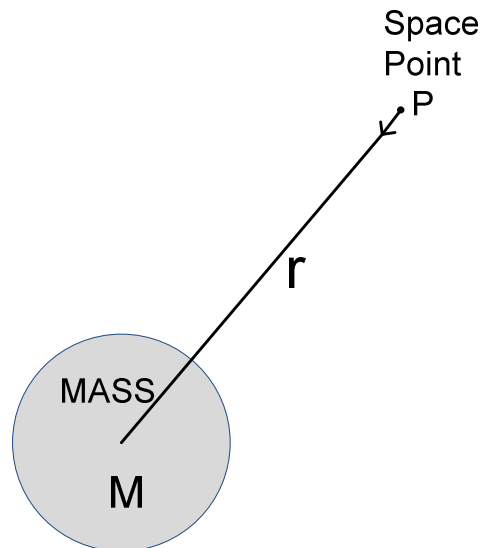


Fig 2.2

Let's have any mass **M** in the 'space', and *space point P*, any point in space at relative distance **r** from that mass (fig 2.2).

Therefore, root force/space force ($f\sqrt{N}$) at point P is given by

$$f\sqrt{N} \propto \frac{M}{r}$$

$$f\sqrt{N} = \frac{SM}{r}$$

Where S is constant for space force ... $S = 8.169 \times 10^{-6} \text{ m}^{3/2} \text{ kg}^{-1/2} \text{ s}^{-1}$... (Square root of G)

2.4 MECHANISM OF GRAVITY

2.4.1 WHY THINGS FALL DOWN?

The 'space' around the earth exerts equal and opposite root force on earth as a reaction to earth's mass force. When the 'space' exerts root force on earth, it creates a gravitational slope around the earth. This gravitational slope of the 'space' can be assumed as a flow of water. A piece of a paper thrown in flowing water will follow the direction of water. (Not exactly but) In somewhat similar manner, when other body enters into this gravitational slope, it follows the direction of the slope. The direction of this slope is the direction of root force exerted by the 'space' i.e. towards the center of earth. It is the 'space' itself because of which things fall down and earth has no direct relationship with it. Whenever physicists encounter the term \sqrt{g} or $\sqrt{-g}$ in their equations, probably they are dealing with this gravitational slope i.e. root acceleration of the 'space' itself. Gravitational slope of the 'space' on surface of earth is directly proportional to square root of mass of earth and inversely proportional to radius of earth. On surface, its value is about $3.13 \sqrt{m/s}$. There is no need of another body to understand the gravity.

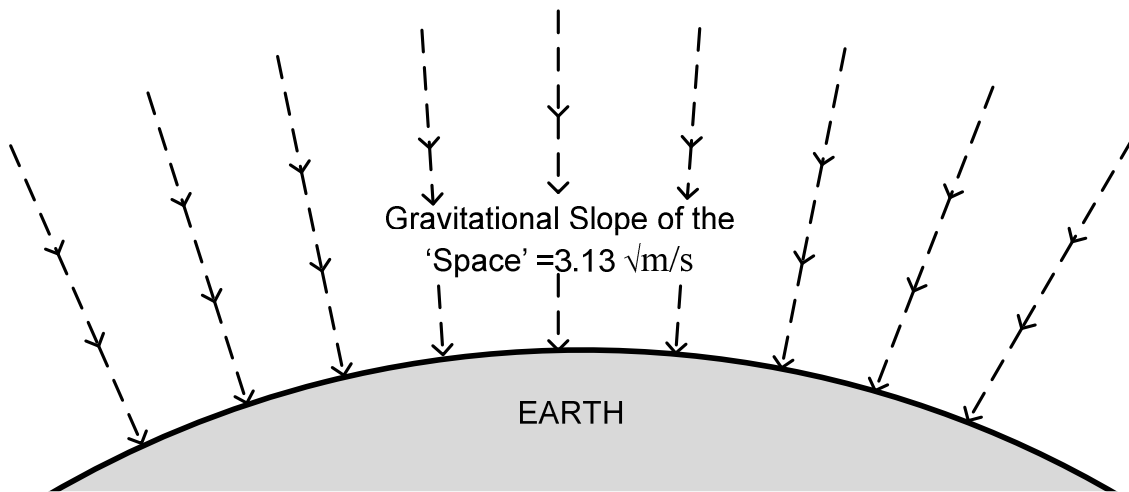


Fig 2.3

2.4.2 EXPLANATION FOR NEWTON'S LAW

Let's have two masses m_1 and m_2 in the 'space' separated by distance ' r ' (Fig 2.4). The 'space' around those masses exerts equal and opposite root force on those masses as reaction to their mass forces. While exerting root force, the 'space' creates gravitational slope around those masses. As both masses are in gravitational slope of each other, the sloped 'space' pushes them towards each other. It is the 'space' itself brings both masses closer.

By second law of gravitation: root force on body m_1 at distance r is-

$$f_1 \sqrt{N} = \frac{Sm_1}{r}$$

Root force on body m_2 at distance r is-

$$f_2 \sqrt{N} = \frac{Sm_2}{r}$$

Therefore combine force i.e. gravitational force (F_N) on these two bodies is given by

$$F_N = f_1 \sqrt{N} \times f_2 \sqrt{N}$$

$$F_N = \frac{Sm_1}{r} \times \frac{Sm_2}{r}$$

$$F_N = \frac{S^2 m_1 m_2}{r^2}$$

$$F_N = \frac{Gm_1 m_2}{r^2}$$

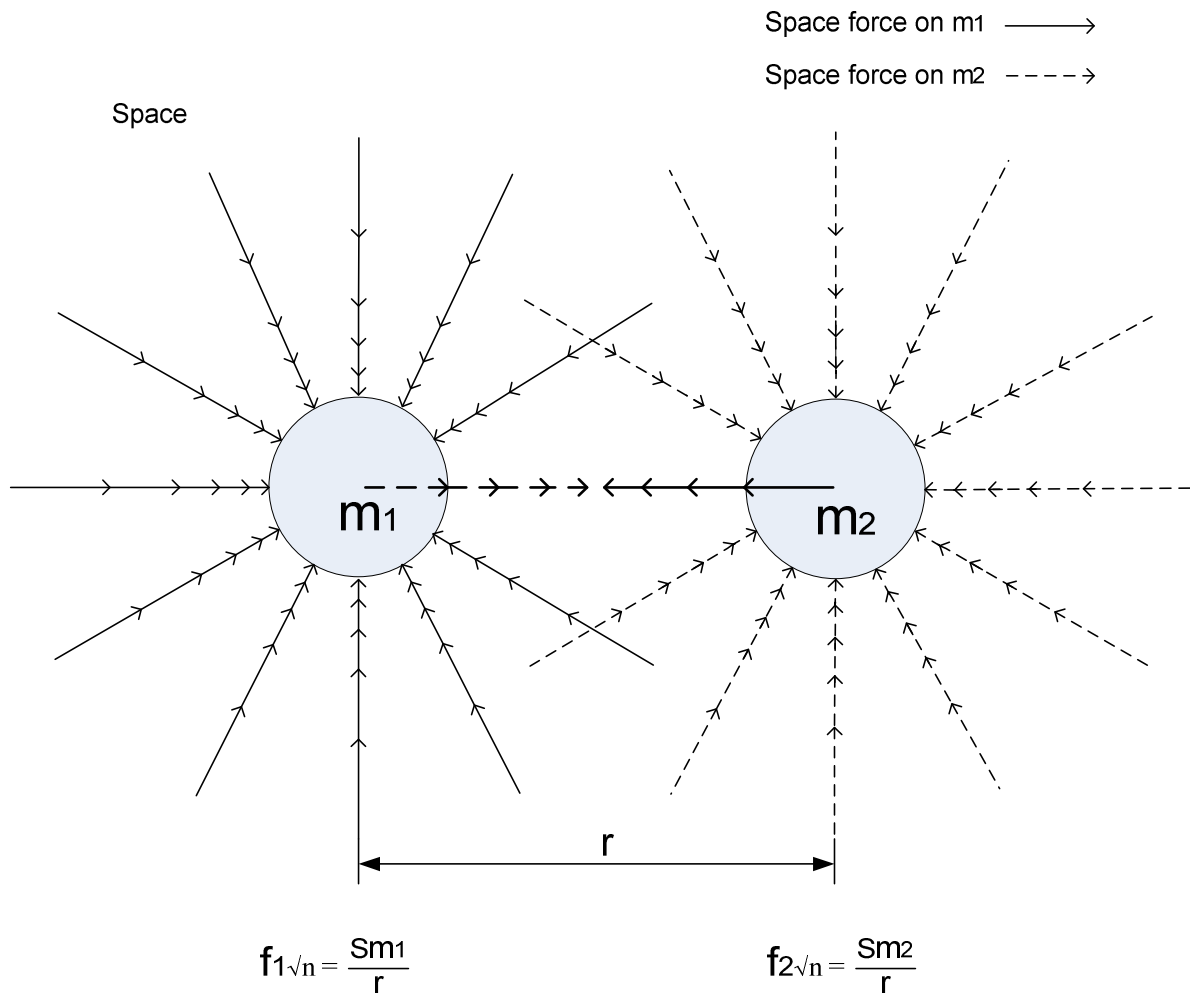


Fig 2.4

3. SUPER-VACUUM AND BIG BANG.

3.1 SUPER-VACUUM

Super-vacuum is a thing where root force exerted by the 'space' (i.e. space force) is absent. In other words: *Super-vacuum is an absolute emptiness*. It is a thing or a place where even the 'space' does not exist. The perception of super-vacuum is essential for one very special reason —it tells us importance of the 'space'.

3.2 BIG-BANG, SINGULARITY AND MASS-SPACE CONVERSION

The big bang theory is a widely accepted theory for the origin and evolution of our universe. It proposes that the universe expanded around 13.8 billion years ago from an extremely hot and dense state known as singularity. In this section, the probable cause of expansion of singularity is discussed shortly.

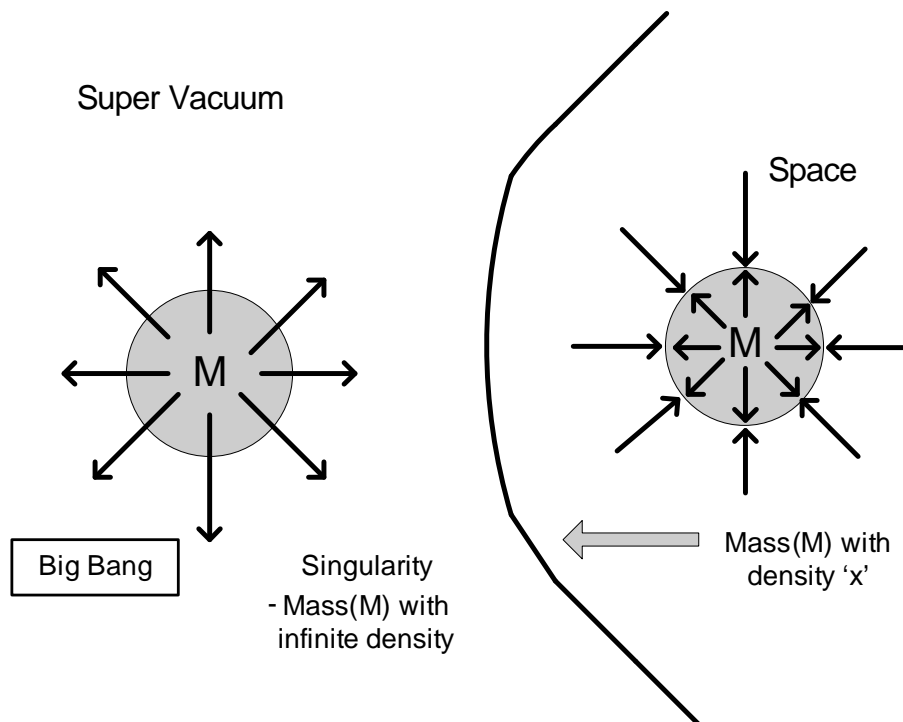


Fig 3.1

When any mass in the ‘space’(fig 3.1- at right) enters into super-vacuum (left in fig 3.1), as there is no ‘space’ in super-vacuum, volume of that mass becomes zero, and therefore density of that mass becomes infinite. This is a state of singularity. As there is no space force to prevent the mass force exerted by mass, the mass expands with great speed, and gives a birth to new universe. As the ‘space’ is also created with an expansion of mass, probably mass and the ‘space’ both are forms of the same thing (energy), and may be are inter-convertible.

4. PROBABLE CAUSE OF TIME DILATION IN SPECIAL AND GENERAL RELATIVITY

4.1 TIME DILATION IN SPECIAL RELATIVITY

One of the important properties of the *space* is — it has its own braking mechanism and a speed limit for any mass travelling through it at relatively high speed. Time slows down for the mass which is travelling at relatively high speed. It happens because space exerts more root force on the mass at higher speed. In a reaction to that root force exerted by mass is also increases. This is nothing but relative increase in mass at higher speed (Fig. 4.1)

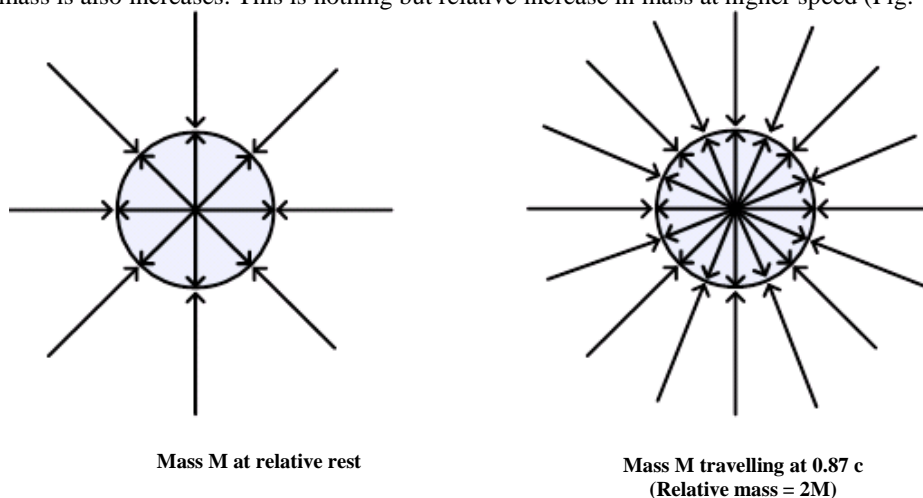


Fig. 4.1

Relative speed of time is inversely proportional to root force exerted by mass and space on each other. It means at more root force time will run more slow. At relatively higher speed, space exerts more root force on mass. The result is reactionary mass force increases and relative time slows down.

Time is equally associated with to mass and space both. Therefore it would be wrong just to use the word *space-time*. Either we should say *mass-time* and *space-time* both, or we use words *mass* and *space* as it is, and assume that *time* is equally and fundamentally associated with both.

4.2 TIME DILATION DUE TO GRAVITY (GENERAL RELATIVITY)

Time will run a lot slower on the surface of neutron star than to the surface of earth. The reason is the same as in special relativity. At more root force exerted, time will run more slowly. The only difference is — in special relativity time runs slow because of root force exerted by space on moving mass, whereas in general relativity time runs slow because of root force exerted by heavy mass on space.

CONCLUSION

Gravity is probably a consequence of equal and opposite interaction between ‘mass’ and the ‘space’ around every mass. When space exerts root force on mass, it creates gravitational slope around that mass. When other mass enters in that gravitational slope, follows the direction of the slope. Therefore, gravity can be defined as *a slope of a space at any given point in the ‘space’*, where the space point is at relative distance from given mass. There is no need of another body to understand the gravity. As the ‘space’ does all the work, mass has no direct relationship with gravity (i.e. things falling down).

I conclude this paper with following cause statements:

- 1) Gravity is *the* fundamental consequence of *existence*.
- 2) Gravity is a result of equal and opposite interaction between mass and space.
- 3) Every mass and space around that mass produce equal and opposite root force on each other. This root force is fundamental cause of universal gravitation. The unit of root force is square root of newton.
- 4) Relative speed of time is inversely proportional to root force exerted by mass and space on each other. It means at more root force exerted by any of the entity (mass or space), time will run more slow.
- 5) Space completes the mass. And mass completes the space.

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