Time

The Equivalence of Inertial and Gravitational Mass

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Abstract

Inertia, the force you feel pulling on you as you accelerate, and gravity – the force that attracts all. Are two separate and distinct phenomena, yet they share an equivalence which has yet to be explained. Starting from first principles and general assumptions we present a heuristic argument that provides an explanation for this equivalence, as well an in-depth understanding of how time is the responsible underlining mechanism and why. To accomplish this, we took a step back and reanalyzed the nature of time, which subsequently led to an undeniable conclusion. A conclusion that leads a way to the reconciliation of gravity with quantum mechanics.

Background and Introduction

For almost four hundred years, from Galileo Galilei to Isaac Newton to Albert Einstein, mankind has endeavored to unlock the enigma of gravity. In 1915, Einstein published his Theory of General Relativity, suggesting that gravity is a geometry in the fabric of space-time. In the paper, "Time – The Equivalence of Inertial and Gravitational Mass", a new methodology is examined explaining the process of what exactly causes inertia and gravity, and introduces the supposition that gravity is not caused by a warping in the fabric of space-time.

So, what exactly is gravity? In the universe objects are moving through time at different rates depending on the mass concentration or spatial velocity of that object. The greater an object's mass concentration or spatial velocity, the greater that object's velocity through time.

In the earth - moon system, the moon is moving through time slower, relative to the earth, because of its lower mass. As such each of the two objects is experiencing its own individual temporal velocity which is imbuing each object with its own unique magnitude of temporal charge, which again is proportional to that object's mass concentration or spatial velocity. The interaction between these temporal charges is creating a temporal differential between the two objects (the two temporal charges), thus creating an attraction between the two bodies, manifesting as the phenomenon we know as gravity.

Which brings us to inertia (or the inertial force). As an object accelerates – its mass, gravitational field, temporal velocity and thus temporal charge increase proportionally to its rate of acceleration, relative to any outside stationary masses. These stationary masses, now moving slower through time relative to the moving object, sense the growing magnitude of temporal charge being produced by the moving object. Hence, these external relative stationary masses are drawn to and pull on the moving object from the opposite direction of acceleration. Therefore, inertia is an accelerating mass increasing its temporal charge, thus creating a rising temporal differential between it and any external relative stationary objects, as its own mass begins moving faster through time.

Therefore, time is the impetus of inertia and gravity, and its equivalence. Both manifestations are caused by objects traveling through time at different velocities, thus imbuing those objects with different magnitudes of temporal charge. This in turn is creating a temporal differential between those objects (temporal charges) and thus the phenomena we know as inertia and gravity.

To measure temporal charge and the attraction it causes between objects with different temporal velocities, we need to identify the absolute temporal velocity of every object. The greater an object's temporal velocity, the greater that object's temporal charge. As such, the higher the magnitude of temporal charge in a system of objects (mass), the greater the temporal differential in the system and thus the attraction between those objects, divided by the spatial distance squared separating them.

To locate this absolute temporal velocity, we need a common lighthouse in time that is the same in all reference frames. For this, we use the Big Bang, as every object in time has an absolute temporal velocity relative to it, depending on the mass concentration or spatial velocity of that object. Therefore, by measuring an object's mass or spatial velocity, we can determine that object's absolute temporal velocity relative to the Big Bang, thus its absolute temporal charge.

So to calculate the absolute temporal velocity for an object, and thus its temporal charge we use the following function. The greater the spatial velocity of an object, or the subsequent spatial velocity needed to escape the gravitational field of an object in question, the greater that object's temporal velocity. Therefore, by measuring either spatial velocity as a function of the speed of light, we can determine the amount of temporal velocity for that object, also as a function of the speed of light. This, in turn, corresponds to the object's absolute temporal velocity relative to the Big Bang, hence its absolute temporal charge, and we denote this value R0 (r – naught). Figure 1.

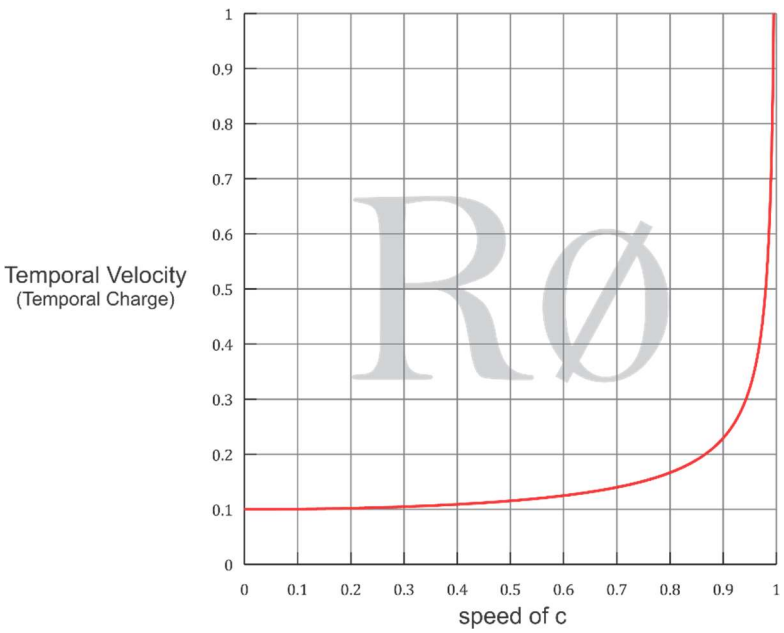


Figure 1. R0 (r – naught)

$$R\emptyset = 1 - \sqrt{1 - {}^{v^2}/_{c^2}}$$

Where

v = velocity from 0.0 – 1.0 (speed of light)

c = 1 (speed of light)

R0 = amount of temporal charge measured as 0.0 – 1.0 (1.0 = temporal charge of a black hole)

The closer an object's R0 value is to 1.0, the higher its temporal charge, thus its temporal velocity. Additionally, as mass and time are intrinsically woven together, we define mass in a new equation incorporating time and its interaction with mass in the following term. This equation signifies how mass increases proportionally to R0, which is the amount of temporal charge present within mass.

$$m = \frac{\left(\sqrt{2R\emptyset - R\emptyset^2} \cdot c\right)^2 r}{2G}$$

Where

R0 = amount of temporal charge measured as 0.0 – 1.0 (1.0 = temporal charge of a black hole)

c = 299792458 (speed of light in meters)

r = radius of object in meters

G = gravitational constant

m = amount of mass in kg

Sample Equations

1. To find the R0 of earth, we convert its escape velocity to a percentage of c. 11186 / 299792458 = .0000373125 % of c, we then input this value into the equation for R0.

$$.0000000007 = 1 - \sqrt{1 - \frac{.0000373125^2}{1^2}}$$

Given earth's R0 and radius, we can calculate its mass in kg

$$6.006*10\text{^}24 = \frac{\left(\sqrt{2_{.0000000007 - .0000000007^2}} \cdot c\right)^2 6.371*10\text{^}6}{2G}$$

2. To find the R0 of a neutron star, we again convert its escape velocity to a percentage of c. 125000000 / 299792458 = .416955119 % of c, we then input this value into the equation for R0.

$$0.0910729244 = 1 - \sqrt{1 - \frac{.416955119^2}{1^2}}$$

Given the neutron star's R0 and a radius of 10 km, we can calculate its mass in kg

$$1.170*10\text{^}30 = \frac{\left(\sqrt{2_{.0910729244 - .0910729244^2}} \cdot c\right)^2 10000}{2G}$$

3. Using the formula for gravitation, we can calculate the gravitational force (in newton's) between the two bodies when they are a distance of 1 million meters apart.

G = gravitational constant

$$4.688*10\text{^}32 = G\frac{(1.170*10\text{^}30)\ (6.006*10\text{^}24)}{1000000^2}$$

Time is a two-sided coin with time dilation and temporal velocity each being one side of that coin. From an external point of view, if time is running slowly for an object that is seemingly experiencing time dilation - then time is running faster in the external universe for that object from its internal point of view – thus the object is moving faster through time. These two seemingly different points of view are depicted and are reconciled in the following graph. Figure 2.

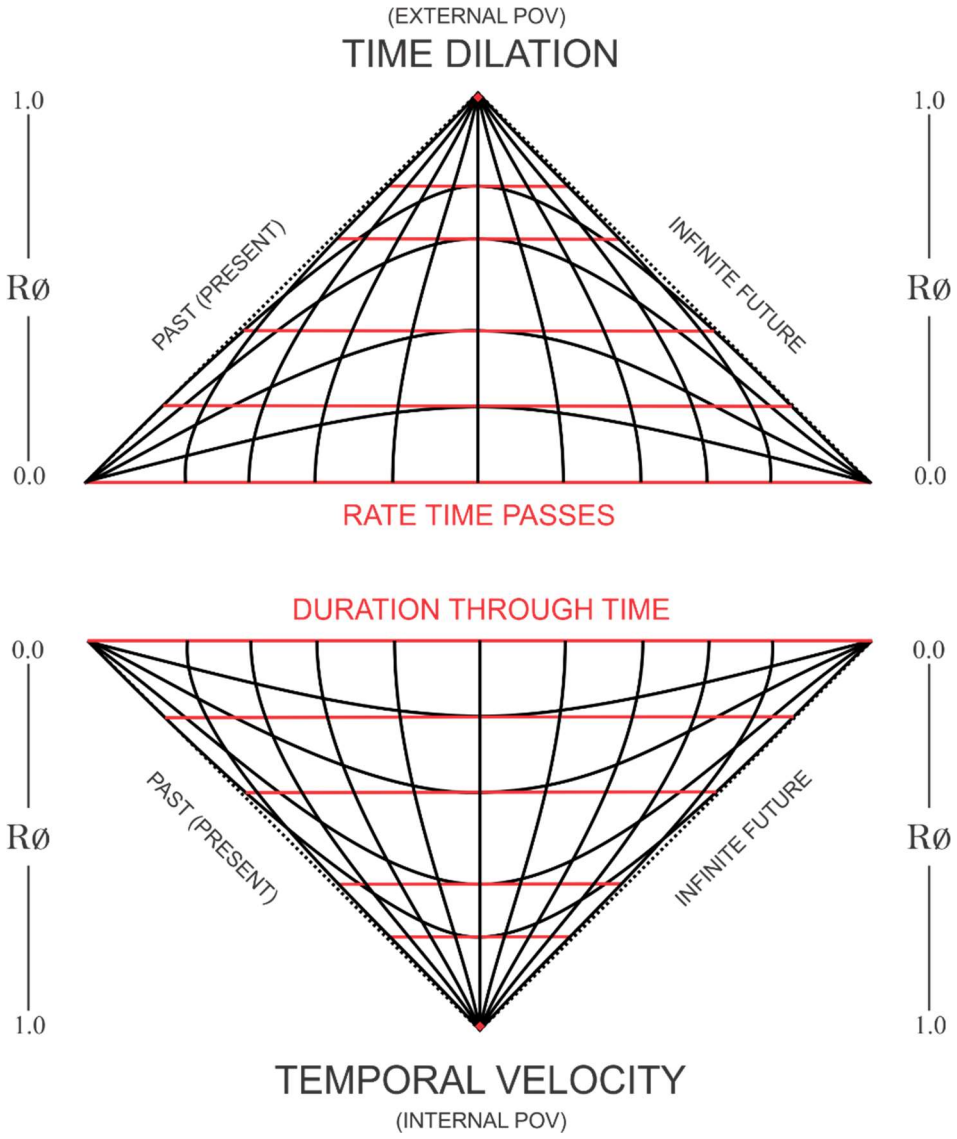


Figure 2. Time Dilation - Temporal Velocity

From an external POV, if an object is viewed as experiencing time dilation, the rate that time passes for that object decreases (top red lines) as the mass concentration or spatial velocity of that object increases - as its R0 value increases to 1.0.

Oppositely from an internal POV, as the mass concentration or spatial velocity of an object increases - as its R0 value increases to 1.0. That object's duration through time decreases (bottom red lines), thus that object's velocity through time, its temporal velocity increases.

Conclusions

Thus we have conclusively shown how and why inertia and gravitational mass are equivalent. What gravity is, and how time (temporal charge) is the mechanism responsible for each phenomenon.

The following are conclusions of this theory.

1. Inertia and gravity are caused by a temporal differential between objects possessing different magnitudes of temporal charge. Within the universe there exists a temporal field, as objects move through this field they are imbued with a temporal charge (R0), that is proportional in magnitude to that object's temporal velocity through the field.

2. Gravitational lensing is caused by light's attraction to temporal charges traveling through time. Although light does not experience time internally. Externally, light takes the path of least duration through time, which itself is a medium. Thus the greater the temporal velocity of a temporal charge through time, the greater light's attraction to that temporal charge.

3. Gravitational tidal force are external objects following the temporal field lines of another object's temporal charge.

4. Anything objects experiencing the same temporal velocity also experience the same magnitude of temporal charge.

5. All objects have a given spatially position but also possess a temporal velocity value depending on that object's mass concentration or spatial velocity. For example, if the sun was converted into a black hole. Spatially it would be 149 billion meters away at (x, y, z) coordinates. However, the black hole would be traveling at an extreme temporal velocity through time due its concentration of mass and have an extreme temporal charge as a result. As such, any object in "space-time" should be identified by use of a complex number (value), as space deals with spatial coordinates. While time, a separate dimension from that of 3 – dimensional space, deals with temporal velocities.

6. Gravitational acceleration is the rate at which objects are accelerated to reach the spatial coordinates and equivalent temporal velocity as the temporal charge it is attracted to. On earth, that rate is 9.807 m/s^2. Oppositely, the temporal velocity of any object exiting a gravitational field decreases relative to the temporal velocity of the object (the temporal charge) it is moving away from and thereby loses energy. i.e. gravitational redshift.

7. Gravitational waves are created by accelerating temporal charges (mass), akin to how radio waves are produced by accelerating electric charges.

8. The "warping" of space-time to create gravity does not exist. A notion that Einstein himself did not believe in (Lehmkuhl, May 2014).

$$m = \frac{\left(\sqrt{2R\emptyset - R\emptyset^2} \cdot c\right)^2 r}{2G}$$

9. To reconcile gravity with quantum mechanics, a boson for gravity needs to exist – the graviton. As such, the above equation is significant, given $E = mc^2$, it indicates that temporal charge is energy woven into mass. As such there exists a force mediator between all temporal charges (mass) - a temporal boson.

Acknowledgments

The author gratefully wishes to acknowledge the awesomeness of the entire scientific community, both present, and past. As no scientific advancement can be achieved without the enormous sacrifices of giants that came before, and the accomplishments each has made in the pages of time – thank you.

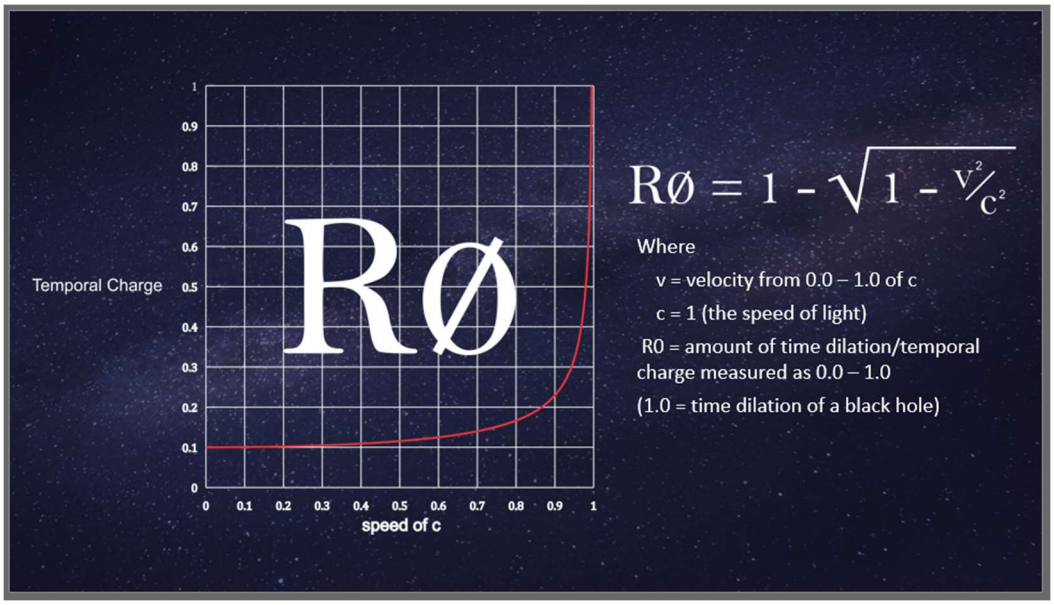
References

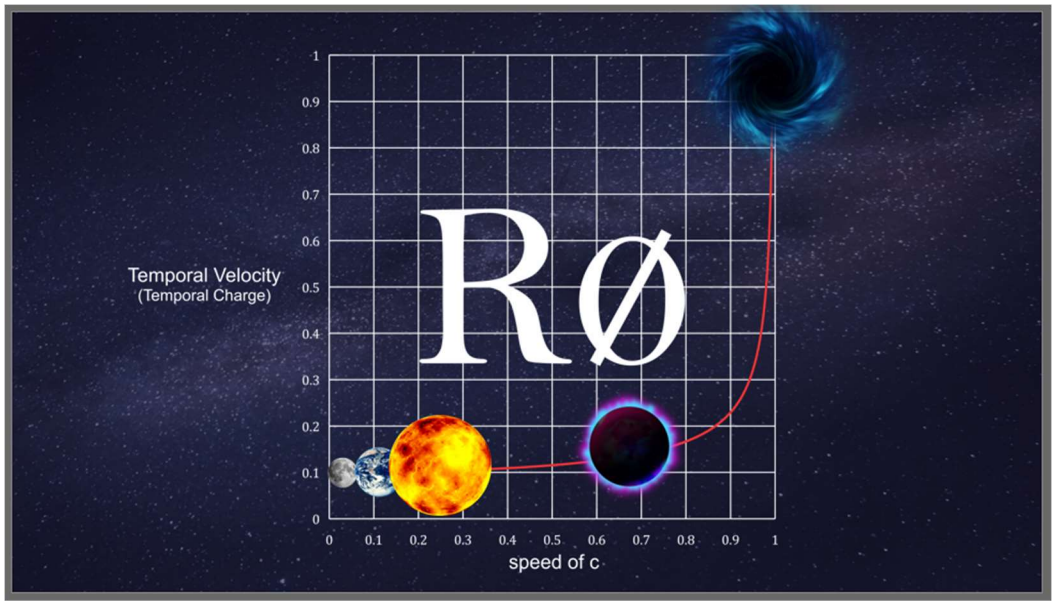
Lehmkuhl, Dennis: philosopher of physics and member of the Einstein Papers Project. Why Einstein did not believe that general relativity geometrizes gravity, ScienceDirect Volume 46, Part B May 2014, Pages 316 – 326

The following is an informal addition to the paper for conceptual clarity.

Conceptual Illustrations

At its core, the R0 equation simply says, the more massive an object is or the greater an object's spatial velocity, the faster that object's temporal velocity. Thus the greater that object's temporal charge.





Black holes are the fastest objects in the universe travelling through time. Thus black holes possess the greatest temporal charge value R0 = 1.0.