the general science journal

5 May 2023

Kenneth Paul Hoffman ©

On the Gravity Incompleteness Theory Assigned to Inertia and Space©

Abstract

The Ignored Energy of Space Plays the Key Role in the Mystery of Gravity

This paper suggests that a standard physics concept be broadened to include a wider perspective on Newton's Force Laws, to include a modification of the concept of inertia based on Newton's own words on the theory of gravity to give a "physical mechanical" explanation on how Universe manages the mystery of gravity. Space's response to accelerating objects is the missing ACTION factor in the emergence of the mystery of Gravity. An inertia response plays its biggest role in an Accelerating Reference Frame. These are not fictitious forces. They are responses of Space to the changing velocity of an Inertial Mass. This paper investigates Newton's work from a different perspective to give a new understanding that includes the participation of a non-recognized energy field of Space itself.

What is Inertia?

Inertia as the Response of Space to a Change in Velocity, an Acceleration

"An object at rest remains at rest, and an object in motion remains in motion at constant speed and in a straight line unless acted on by an unbalanced force". [1]

"An object will continue its current motion until some force causes its speed or direction to change. The term is properly understood as shorthand for "the principle of inertia" as described by Newton in his first law of motion." [2] Physics theory currently holds that this principle of inertia is confined to Inertial Reference Frames (IRF). Newton's 3rd Law: "whenever one object exerts a force on another object, the second object exerts an equal and opposite on the first." [1]

Work, in the physics of mechanics as generally understood by physicists' is "motion against an opposing force." [3] When an object experiences an unbalanced force as in an acceleration, the resistance to change is inertia. That resisting opposing force can come even from the energy of Space. How this is seen depends on the Reference Frame (RF) used. From the Earth's RF an object in a circular path around the Sun is subject to a centripetal force towards the center. The reaction force to this centripetal force is an imaginary centrifugal force away from the center in terms of Newton's 3rd law as experienced by the object from its rotating non-Inertial RF. It is believed not to be a real force, but it does have a real effect as seen in a centrifuge or riding in a car around a curve.

This phenomenon offers a strange twist when considered with respect to Gravity. In the weirdness of Gravity, objects will fall with the same acceleration even though their mass is different. Physics attributes this to the objects falling within the restrictions assigned by the gravitational field without any additional detailed explanation. However, amazingly, even objects of different masses moving in a horizontal plane accelerating around a curve are also observed to have the same acceleration, as noted by Stephan. [4] This unique behavior is not restricted to just falling objects. What is going on? The current distinction, a distraction, given to the interpretation of forces being real or fictitious depending on the RF is a result of failing to include the energy of space being real and a part of the system that contains the mystery of Gravity.

Physics has mostly been in denial when it comes to Space. The universe is made of objects that have mass that move through a mostly empty vacuum void designated as Space. The classical Newtonian physics of mechanics is to focus on a world of objects moving through but without any contribution from Space; it is just a void. Einstein's Theory of General Relativity provides a complex mathematical formula for an object's path in both Space and Time that tells us mass directs space where to curve and space directs matter where to move without any explanation of how this mechanics is physically accomplished. These mathematical curved paths would collide with each other if existing in real space, so to avoid that problem space is joined with time and space becomes the illusion that Einstein and current physics would have it be.

But the current state of physics tells us there is no world of objects as our perception deceives us; rather these objects are energy, both particle and wave, strong, weak, and electromagnetic energy fields assembled as localized elemental atomic and molecular energy fields.

This paper proposes that the empty void of Space that these energy objects move through is also a sea of energy fields. And when viewed from that perspective together with Newton's own theory provides a possible explanation to the strange behavior of a constant acceleration for objects of different masses as they move with an increasing velocity as discussed above.

Newton's Force Laws

An Examination of Newton's Laws

The standard practice is to set the force equations equal, given by $F = m_2a$ and $F = GM_1m_2/R^2$, and then cancel out the falling mass (m_2) and then solve for the acceleration 'a' obtaining the known standard value of 9.8 m/sec^2.

Here the equations are examined to ask if the force of Gravity is more real than the illusion offered by the mathematical fantasy of Space-Time. Although the Inertial Mass of a body is very close in magnitude to its Gravitational Mass, are they equal?

Falling Elephants and Mice

The mass seems to be Irrelevant**.** It is understood and accepted that all objects fall at the same rate of acceleration even when considering elephants and mice where there is a large difference in mass since, as physics explains, this is because all objects experience the same Gravitational Field Strength (GFS) from Earth regardless of their mass. Thus, the Force/mass ratio is constant. That is, the acceleration 'a' is a constant of 9.8 regardless of the falling mass. How is this possible?

With even large differences in mass, the F/m ratio remains a constant leading to the notion that the force must be changing to maintain this constant for the force divided by the constant mass. How does this F/m ratio remain a constant for different falling masses?

Why/how do objects experience the same GFS if the GFS changes with radius. The further from Earth, the weaker the GFS. Of course, the mass is not changing with an insignificant small non-relativistic velocity.

Given the mass, m_2 in each equation which, of course, are equal as a given by Einstein's Equivalence Principle and accepted by physics that the Gravitational Mass (GM_G) is not different from the Inertial Mass (IM, m_I). If the GM and the IM are the same, then physics concludes that the Gravitational Force (F_G) is equal to the Inertial Force (F_I). This does give the correct value for the acceleration which is known to have some variation around the Planet due to changes in Earth's mass density and elevation.

$$F_I = m_I a \quad = \quad F_G \;=\; GM_G m_G / R^2 \quad \& \text{ assuming } m_I = m_G$$

Given: Gravitational Constant $G = (6.67408 \times 10^{-11})\ m^3/kg\text{-}sec^2$

Mass of Earth[2] $M_G = (5.9722 \times 10^{24}\ kg)$

Eq. Radius of Earth[2] $R = 6{,}378{,}000\ m$

$$a = \frac{(6.67408 \times 10^{-11})\ m^3/kg\text{-}sec^2 \ (5.9722 \times 10^{24}\ kg)}{(6{,}378{,}000)^2\ m^2}$$

As expected, $a = 9.798\ m/sec^2$

Now focusing on the Forces:

$$m_I = F_I/a \quad = \quad F_G\, R^2 / GM_G \quad \text{gives}$$

$$F_G/F_I \;=\; a\, R^2 \,/\, GM_G$$

$$F_I/F_G \;=\; \frac{(9.8)\ (6{,}378{,}000)^2}{(6.67408 \times 10^{-11})\ (5.9722 \times 10^{24})}$$

$$F_I/F_G \;=\; 1.000159$$

Thus, we of course obtain the Force ratio is close to 1 as expected since it was originally assumed to be equal forces to calculate the acceleration. Any variation from 1 can be attributed to the variation in the acceleration factor and/or the accuracy of the value of G and Earth's mass and radius. What then is really changing to ensure the acceleration of an object, regardless of its mass, remains constant?

How does the ratio F_I/m_I remain a constant for even large different inertial masses such as seen in an elephant vs a mouse? For a falling body $F_I = F_G$ and the variation in falling mass values cancels out. Might the mystery be hidden in the "constant G" as it contains units of distance, mass, and time as suggested by Mathis[5]?

In Newton's time

There was no notion of any energy fields. There was an attempt by many to define some physical mechanical system using tiny high-speed moving particles, gravitons, to explain the gravitational force. Although Newton was part of those conversations, his own words show a remarkable insight into something much more than he could express with the then current understanding of science.

In an explanation of his inverse square law, **Newton wrote**:

> *"…that the descending spirit acts upon bodies here on the superficies of the earth with the force proportional to the superficies of their parts, which cannot be unless the diminution of its velocity in acting upon the first parts of a body it meets will be recompensed by the increase of its density arising from that retardation. Whether this be true is not material. It suffices that 'twas the Hypothesis. Now if this Spirit descend from above with uniform velocity, its density and consequently its force will be reciprocally proportional to the square of its distance from the center.* ***But if it descend with accelerated motion, its density will everywhere diminish as much its velocity increases, and so its force (according to the Hypothesis) will be the same as before, that is still reciprocally as the square of its distance from the center".*** [6]

This last sentence (my bold) could be Newton's key insight to bring Newtonian physics into the 21st century if the 'descending spirit' could be interpreted as a varying aether energy field, a changing unique quantum gravitational energy field that is part of space, independent from the aether energy field used by light to transverse space. A field that is not limited to speed c, but is likely orders of magnitude higher for Gravity to do its work as noted by Van Flandern. [7] A field that is always present but emerges with the detection of changing velocity vector of an energy body.

A field, that according to Newton's theory, has a changing **"energy density"** in response to the increasing velocity of the energy body ***"so its force will be the same as before"…***

Is Newton's varying "energy density" hidden as a unique energy field in G? As per Newton's words, as the particle accelerates the energy density of the field changes to keep the force a constant *'as the square of the distance from the center'*. Does the inertial mass exactly equal the gravitational mass?

Space as a Sea of Energy

If objects are just energy, then viewing Space as a generally unseen and undetected real sea of a potential innumerable quantity of energy fields is a reasonable perspective and Space could be viewed as a possible real energy exchange participant with matter at any time instead of a void or an illusion that only provides a glimpse of its existence when blackholes or neutron stars collide.

Space energy is connected to energy objects with mass down to the smallest scale. Two or more energy fields with mass are accordingly inherently connected to the Space field between them and the strength of that connection depends on those energy fields and the distance between them; and the outcome depends on the momentum and the acceleration. Space establishes a unique energy field that can respond to a changing body's velocity vector in such a manner that results in a constant acceleration. Universe remarkably works to effortlessly establish a Least Action for the kinetic/ potential energy, a conservation of total energy and angular momentum to establish stable collective systems of planets and stars across vast differences that could not be achieved if limited by light speed 'c'.

The Least Action approach with kinetic and potential energy was used successfully to arrive at Newton's equations. But like Newton's equations, that approach is incomplete. A missing Action factor is at work hidden within Universe's secrets to ensure that energy is not wasted, and it can achieve the observed resulting control. It is perhaps more an energy modifier than a force capable of depositing any energy tax into the heat sink as required. Is it dark matter?

Energy Fields

Expanding the Standard Model to Include a "Unique Modified Strong Force"

The STD model always seems to lead to the particles that were initially missed such as the antielectron, the positron with the electron, antiproton, antineutron, antineutrino, the anticolor charges.

Gluons fill in like photons as force exchangers for nucleons and their quarks. This paper proposes that a key feature missing from the STD model is a unique modified version of the strange micro scale Strong Force operating at a macro scale. A type of energy field that exists on the macro scale that would give a "mechanical physical" explanation in response to an increasing object velocity that gets interpreted as Gravity simply by changing its "energy density" to ensure a constant acceleration for any Inertial Mass (IM) object whose velocity is changing due to the presence of a large Gravitational Mass (GM). Perhaps a unique cousin to the mysterious micro scale Strong Force. A possible 5^{th} force. It would exchange energies with the Gravitational and Inertial Masses involved being connected to them and between them in space. This unique quantum energy field is an additional missing ACTION factor employed by nature to control systems across vast distances, not possible if limited by light speed 'c'.

We have the EMF using photons for energy exchange with matter. The strong force involves gluons as the energy exchange particle for quarks that gets stronger as the quarks get further apart, the opposite of the EM fields behavior across distance.

If an energy force field for gluons can vary and get stronger as the quark particles get farther apart, why not an energy field that responds as described by Newton's description of his hypothetical "descending spirit", that is, the "energy density" of a unique aether field (a much weaker, undetectable relative of the Strong Force) that would change as an object's velocity increases due to the GM in such a manner to keep its force a constant, that is *'as the square of the distance from the center'*.

The field length varies, and senses changing velocity motion within it and responds to it. The field's force is within the energy of space and the energy masses involved. All are tied together as one to maintain a constant acceleration within the field of the GM.

Conclusion

The energy of Space is inherently connected to the energy bodies that move through it and Universe makes use of that feature via an additional unique hidden Action quantum energy field to ensure objects move with a constant acceleration to minimize the use of energy and optimally control the movement of celestial objects that is interpreted as the force of Gravity.

Mathematical physicists' attention to Newton's own hypothesis written in the 17th century may very well lead to the approach that might yield an upgrade for his formulas and positive results. Maybe Newton was right all along.

References:

1. https://www1.grc.nasa.gov/beginners-guide-to-aeronautics/newtons-laws-of-motion/
2. https://en.wikipedia.org/wiki/Inertia
3. Atkins, Peter; Four Forces that Drive the Universe; p. 23
4. Mass: Where Spacetime Flows to Die
   https://docs.google.com/document/d/1w859kGNICVV_PWec_riBzPw46zuFCZDJ_poctHlyOQQ/edit
   (C) Copyright 2020, 2021, 2022, by Russell D. Stephan. All rights reserved.
5. The universal constant G, Miles Mathis
   http://milesmathis.com/g.html
6. Pushing Gravity; Edited by Mathew r. Edwards.
   Newton's Aether-Stream Hypothesis and the Inverse Square Law of Gravitation. E. J Aiton M.Sc., Ph.D. page 62.
7. Pushing Gravity; Edited by Mathew r. Edwards.
   Gravity; Tom Van Flandern; page 106