THE NEW GRAVITATIONAL CONSTANT

The Principle of Equivalence states that there is no way to measure the difference between the linear acceleration produced by a constant dynamic force and the constant upward acceleration of gravity measured at the earth's surface. If we thus carry this principle to its most logical conclusion we must assume that gravity and inertia are not just equal but identical. This leads us to a simple and easily understood mechanism for gravity that is completely both local and mechanical. We replace the Principle of Equivalence with the Principle of Gravitational Expansion in which the cause of gravity is simply a constant expansion of the dimensions of matter and photons. This leads to a new gravitational constant G_o that is a constant velocity instead of an attraction, an acceleration or a curvature of space-time. This gives us a new interpretation of General Relativity that resolves the paradoxes surrounding gravitational time dilation, the Pound-Rebka experiment, the speed of gravity, orbital revolution and the formation of both galaxies and atmospheric clouds.
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The Earth Falls Up

Gravity is often used as an example of a natural law that almost everyone could agree on at least in terms of what gravity does. When we release a quarter from our hand, there is virtually unanimous agreement that it would accelerate downward until it strikes the floor. This idea, or rather belief, that falling bodies move toward the ground is one of the few metaphysical principles that has been allowed to remain within the standard model of physics.

A metaphysical principle is usually used as the initial premise of a physical theory. It is an idea that has great universal appeal but by its very nature is not subject to any kind of experimental verification. This is particularly true when it comes to quarters "falling" to the floor because every physicist knows that such an event would be impossible to measure. If they were to place an accelerometer on the quarter as it was released, it would show no downward acceleration at all. In fact, air resistance would cause it to show a slight upward acceleration. If they were to place another accelerometer on the floor beneath the falling coin, it would show that it was the floor that was accelerating upward toward the quarter. In fact, with their entire array of sophisticated measuring instruments, no experimental physicists have ever been able to show that "falling" objects undergo any changes in motion toward the ground. Faced with this dilemma they quickly embrace the metaphysical Principle of the Equivalence of Gravity and Inertia. This allows them to discard the results of their measuring instruments in favor of what everyone "knows" to be true. When a coin falls, it moves downward to a stationary floor. Some physicists will even tell you that the Equivalence Principle has been proved by experiment to many decimal places, but in each case their "proof" is in the form of a null result. This is because Equivalence is a purely negative principle that states that no instrument is capable of directly measuring the change in a body's motion produced by gravity. The logic here seems to be that if our instruments show a falling coin to be absolutely motionless then we have "proved" the Equivalence Principle absolutely.

Why not just discard all of this metaphysical mumbo jumbo? At least we should allow ourselves to consider the possibility that our instruments are right when they show us that the coin remains virtually stationary, and **the earth falls up.**

The Principle of Gravitational Expansion

If we accept the results of our measuring instruments at face value, then we must conclude that gravity is just what it appears to be, a phenomenon of constant upward acceleration that produces real motion through absolute space. Furthermore, if the earth's surface is constantly moving away from its center, we must conclude that the earth, as well as all the matter and photons in the universe, are constantly expanding in size at a uniform rate and it is this gravitational expansion that causes the phenomenon we know as gravity. The Principle of Gravitational Expansion provides a simple, mechanical and non-field mechanism for

gravity that is derived completely from the results of experimental measurements and is not based on any metaphysical assumptions such as action at a distance or the principle of equivalence.

Once we realize that gravity is the result of expanding matter we must also conclude that the absolute dimensions of our measuring rods as well as our own bodies are also gradually increasing in size. This, in turn, leads us to conclude that the duration of the absolute intervals of time, as we measure them, must also increase in direct proportion to the expansion of matter. To understand how this is so, consider a bullet or a photon traveling through space on an inertial path. After a certain length of time, the bullet and the photon, as well as all measuring rods, will have doubled in length. Since they cannot change their inertial velocity, each will take twice as long to traverse the same distance as measured by the increased measuring rods.

The Pound-Rebka Experiment

The Pound-Rebka Experiment is quite complex in its technical details but in principle it is very simple. Photons of a precisely determined wavelength were emitted at the top and bottom of the 22.5-meter-high Jefferson Tower on the Harvard campus. When the photons from the top of the tower were measured at the bottom, their wavelengths were decreased by a small amount; and when photons from the bottom were measured at the top, their wavelengths were increased by the same amount.

Proponents of the theory of General Relativity all make the claim that the results of the Pound-Rebka Experiment offer a "proof" of the Equivalence Principle even though nothing in these measurements suggests any need for the Equivalence Principle.

Both General Relativity Theory and the Principle Gravitational Expansion predict that atomic clocks tick faster at high altitudes than they do at sea level by the same amount. The difference in the two theories is that the Principle of Absolute Motion shows the difference in clock rates to be a simple Lorentz Transformation time dilation. The mechanism by which clocks run slower at the bottom of the tower is the increased mass caused by the higher escape velocity (V = 11,178.86275 m/s). The lower escape velocity (V = 11,178.84301 m/s) at the top of the tower makes the internal parts of the clock have less mass and the clock runs faster by a proportionate amount. The time dilation is equal to the standard formula ($t = 1/\sqrt{1-V^2/C^2}$). General Relativity predicts the same amounts of clock slowing but accounts for the different rates as a difference in the metaphysical and therefore immeasurable concept of gravitational potential.

It is this slowing of clocks by gravity that causes the effect measured in the Pound-Rebka experiment. Gravity causes clocks, as well as all other atomic processes, to run slower at the bottom of the tower than clocks at the top. This causes the emitter to take more time to produce a photon and thus increase its wavelength by 2.5×10^{-15}. The faster clock at the top of the tower makes the emitter produce its photons in shorter time intervals and with shorter wavelengths.

When a photon that is measured to have a wavelength of ($\lambda = 1$) is produced at the bottom of the tower it will still have a wavelength of ($\lambda = 1$) when it reaches the top. However, because the observer's clock at the top of the tower runs slightly faster, he will measure the photon's wavelength to be increased by 2.5×10^{-15}. Also the faster clock at the top of the tower makes the emitter produce its photons with shorter wavelengths but the observer at the top measures them to have wavelengths of ($\lambda = 1$) because of his faster clock. The observer at the bottom measures the shorter wavelength photons from the top at their correct shortened wavelength.

Global Positioning System Clocks

The changing in the rates of clocks caused by gravity as demonstrated by the Pound-Rebka experiment has since been well documented to a high degree of accuracy. Measuring the rates of orbiting atomic clocks is a highly developed science necessitated by the need to maintain the accuracy of the atomic clocks in the satellites of the Global Positioning System (GPS). The clocks in many different satellites must be designed to run as synchronously as possible with clocks on earth. This is difficult because a clock's rate is influenced by both the kinetic time dilation of its orbital velocity and the gravitational escape velocity at the orbit's distance from the earth's center. The clocks in the lowest orbits like the standard Space Shuttle orbit (1.046

radii) run the slowest because both their combined orbital and escape velocities are greater than those of either the earth's surface or of the higher orbits. Clocks speed up as they are placed in higher and higher orbits because they must be decelerated to both lower orbital velocities and lower escape velocities. At an orbit of 1.5 $_{e}R$, orbiting clocks run at the same rate as clocks on the surface and then in all higher orbits they run faster and faster to a maximum rate at absolute photon rest.

GPS satellites are placed in orbits of 4.175 earth radii so that they will circle the earth exactly twice each day. In order to synchronize the clocks in the GPS constellation, technicians must first synchronize the cesium clocks to be put in orbit with an identical cesium clock on Earth. They must then calculate the increased rate at which the GPS clock will run when it is placed in its desired orbit. Since an orbit's escape velocity and its orbital velocity are always at right angles to one another, the time dilation velocity is the satellite's actual vector of the combination of these two velocities through gravitational space.

$$({}_{td}V^2 = {}_{ob}V^2 \times {}_{es}V^2)$$

The time dilation velocity squared is equal to the orbital velocity squared times the escape velocity squared.

The time dilation at the GPS orbit is more than one-third less than it is at sea level. As a result, the GPS technicians must calibrate the clocks to be put in orbit to record time at a slower rate than the sea level clocks by 4.479 parts in ten billion. In this way, all clocks in the system will run at the same rate and maintain the single simultaneous reference time necessary for the proper operation of the system.

Both General Relativity and the Principle of Gravitational Expansion predict the same rate of time dilation for clocks under the influence of both motion and gravity. It is just that they use opposite gravitational assumptions to create the effect.

The Duality of Time

By accepting the Principle of Gravitational Expansion, we arrive at our final conclusion that gravity is not an attraction, an infinite field, an action at a distance, a curved space or impinging sub-particles from outer space. Rather, it is a simple mechanical, local and constant physical expansion of electrons, protons, and photons. This is a process of great Synchronicity in which the non-local character of gravity is revealed by the ability of all particles in the universe to maintain the same exact rate of expansion regardless of their individual velocities or other local conditions. The only flaw in this exact Synchronicity is that negatively charged matter (electrons) expands gravitationally slightly faster than positively charged matter (protons). This is a very slow process that drives the evolution of the universe by changing the properties of the atoms over cosmological time. This rate of change is measured through the Hubble constant, which is a direct effect of the changing mass ratio between the proton and electron. The Hubble constant is a measure of time and not distance.

Physical time must be divided into the dichotomy of inertial time and gravitational time. Physical time is the measured relationship between inertial time and gravitational time, and metaphysical time is the dimensionless ideal principle common to both. Time is the idea used to define the motion of matter. Matter moves in two distinct ways; inertial motion and gravitational motion. Each generates a separate flow of time that is measured by opposite means. A pendulum clock measures gravitational time by recording the constantly changing motion of the acceleration of gravity and an inertial clock such as sundial measures inertial time by monitoring the constancy of angular momentum through the motion of the earth rotating on its axis.

Since gravitational time is driven by the gravitational expansion of matter, it is gravitational time that is the primary form of absolute time in the universe. Inertial time just follows along behind. When the earth expands to twice its size, the rate of the pendulum clock slows to one-half. In order to conserve angular momentum the doubled earth must slow its rotation to one half. Time is not some separate entity that coordinates the motion of matter. Rather it is the motion of matter that gives us two separate ways quantifying the idea of metaphysical time by dividing it into intervals.

The ultimate standard for inertial time is the speed of light and the ultimate standard of gravitational time is the speed of gravity as determined through the measured value of the Gravitational Constant (G).

The New Gravitational Constant G_o

Gravity is simply a constant outward velocity from the center of matter. Space and time are mere ideas with no existence in physical reality except as a means to quantify the absolute physical reality of mass. As the absolute values of matter's mass and size constantly change with gravitational expansion, the rate at which we measure time also changes at a proportionate rate. The true gravitational constant is thus not a force per unit of mass and space as defined by Newton, but instead it is characterized by the escape velocity at the radius of a particular body of matter such as the hydrogen atom at the Bohr radius.

To determine the value for this new fundamental constant (G_0) to replace the old gravitational constant (G) we must first determine the ratio between the earth's overall density and the intrinsic density of hydrogen at the Bohr radius (a_o). By coincidence, we find that the density of the Earth (5,518.9 kg/m^3) is very close to the intrinsic density of the hydrogen molecule (H_2) at the Bohr radius (5,432.3 kg/m^3). The density of Earth is 1.015942 ($_mH_2/a_o^3$). We then take the cube root of this value (1.005286) to establish a new parameter of matter called *mass/length* ($_ML$). Mass/length is a unit of mass divided by a unit of length. The mass/length at the Bohr radius is exactly one $_mH_2/a_o$=1.0, the mass/length of the earth at sea level is 1.005286 $_mH_2/a_o$, and the mass/length at the surface of the moon is (.85054 $_mH_2/a_o$). Once we determine the mass/length at a body's surface, we can determine its *intrinsic radius* (R_0) at which the mass-length would be equal to ($_ML$ = 1.0). The intrinsic radius of Earth is ($_ER_0$ = 6,404,995 m) and the intrinsic radius of the moon is ($_MR_0$ = 1,478,486 m). To measure the new constant for gravity we measure Earth's mean sea level gravity to be about (g = 9.807 m/sec^2) and then determine its escape velocity to be about ($_{es}V= \sqrt{2gR}$ = 11,179 m/sec). We then determine the escape velocity at the Intrinsic radius to be ($_{es}V_0$ = 11,149 m/sec) and divide this by the number of Bohr radii in the Intrinsic radius ($_{es}V_0\, a_o/_ER_0$ = 9.2116013 x 10^{-14} m/sec). We thus arrive at the value for the New Constant for gravitational velocity (G_o) = 9.2116013 x 10^{-14} m/sec. This constant is not a force, an attraction or an acceleration. Rather it is the constant velocity of the circumference of the Bohr radius away from its center. The Bohr radius of each atom moves away from its center at the constant velocity of (G_o). This constant is every bit as fundamental and absolute as the speed of light (C). Just as the speed of light is very fast, the speed of gravity is very slow. For the Bohr radius to increase its dimension to one meter would take 10^{13} sec or about 344,000 years. On the other hand, with 10^{17} Bohr radii stacked up between us and the center of the earth, our velocity away from its center is 11,179 m/sec.

With this constant (G_o) we can find a body's value of (g) at any radius (r) with the formulas:

$$G_0 = \frac{a_o\sqrt{2g_0}}{\sqrt{R_0}} = 9.2116013 \times 10^{-14} \text{ m/sec} \qquad g = \frac{{}_mLG_0^{\,2}R_0^{\,2}}{2a_o^{\,2}r}$$

For example, we calculate the gravity of the earth at the North Pole to be (g = 9.852 m/sec^2), at the equator to be (g = 9.786 m/sec^2), and the gravity at the Moon's surface to be (g = 1.6205 m/sec^2). These values are exactly the ones that are measured at these locations.

"The Speed if Gravity"

In his book, *DARK MATTER, MISSING PLANETS & NEW COMETS*, Tom Van Flandern, goes into some detail describing experiments designed to determine the velocity at which the gravitational interaction takes place between heavenly bodies. Newton considered this velocity to be infinite and Einstein believed it to be the speed of light. Observation of the planets in the solar system as well the revolution of binary pulsars show the velocity of the gravitational interaction to be, if not infinite, then at least many orders of magnitude greater than the speed of light.

If we consider gravity to be the result of the expansion of matter then there is no direct "physical" interaction between heavenly bodies and therefore the velocity of the gravitational "interaction" between bodies is infinite because it occurs to each body at the same instant.

Orbital Revolution

The most frequent objection that people had to the principle of gravitational expansion is their inability to visualize the process of orbital revolution.

The first thing that one must realize when contemplating gravitational theory is that the only real difference between the gravitational expansion of matter and time and Einstein's theory of curving space-time is just one of perspective. Since both theories are based on the validity of the equivalence principle, each theory can be viewed as just the mirror image of the other. The Principle of Gravitational Expansion and Einstein's theory of General Relativity are just opposite yet complimentary interpretations of the Equivalence Principle and its various experimental verifications. The mathematics that Einstein used to explain the gravitational dynamics of curved space and time should work equally well to explain the dynamics of the gravitational expansion of matter and time.

Both theories explain gravity in terms of changing geometry. General Relativity explains gravity in terms of curving *space* and *time* and the Principle Gravitational Expansion shows gravity to be an expansion of *matter* and *time* .

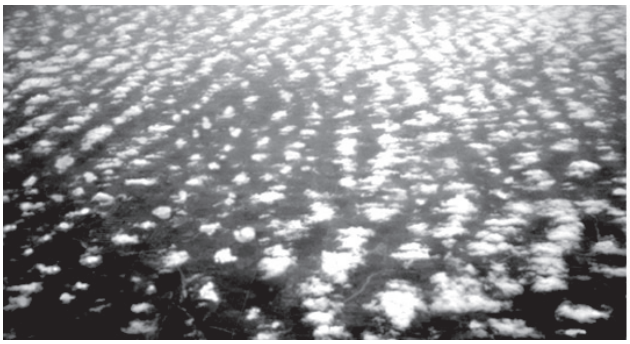
The mechanics of orbital revolution as it is explained by the gravitational expansion of matter is very difficult if not impossible to visualize in the mind's eye. Before I go any further, I must point out that this visualization problem is even more difficult within General Relativity. Orbiting bodies are described as moving in inertially straight lines through "curved space". While it is easy to visualize matter expanding outward into empty and inert space, it is impossible to imagine the curvature of something as intangible as space-time.

For example, consider a cannon being fired at a distant target. We seem to see the cannonball follow a curved path, known as a parabola, as it goes high above the earth and then comes down at the stationary target. However, if we set our intuitions aside and carefully measure the flight of the cannonball with accelerometers, we find that it travels in a straight line and at a constant velocity from the time it leaves the cannon until it collides with the target. Measurements made at the target clearly show that it accelerated upward until it overtook the rising cannonball. If a series of cannonballs are fired with increasingly greater muzzle velocities they will travel farther and farther before "falling" to earth. If a cannonball was fired horizontally from the top of Mt. Everest with a muzzle velocity of 7,905 m/s it would form a circular orbit around the earth were it not for atmospheric resistance.

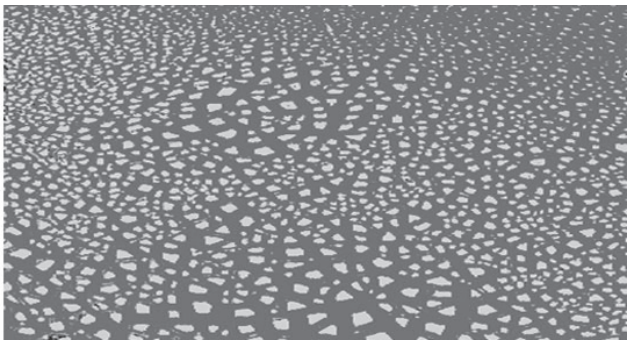
While the paths of the first few cannonballs are easily rationalized from apparent curves to actual straight lines, this task becomes increasingly difficult as they travel farther around the earth. At the point where an orbit is reached, the mind has great difficulty converting its vision of a circular orbit into an inertially straight line. The reason that the mind has such great difficulty with this non-intuitive process is that the fourth vector is nonlinear motion that does not occur within the imaginary three-dimensional Euclidean void that is common to the perceptions of our five senses.

Cloud Formation

The oldest and most ubiquitous of the dark matter enigmas has been completely ignored by all serious theorists. This is the mysterious way in which individual dense clouds of water vapor rapidly form in the earth's lower atmosphere. Perhaps the reason that this effect has escaped scientific notice is because clouds are too close to interest astronomers and to far away for particle physicists. The primary reason for this neglect is that there is no known physical force in the standard model of physics that could make clouds behave this way. Cosmologists are very aware of this same problem as it pertains to the difficulty of explaining how diffuse clouds of hydrogen gas could quickly segment into individual clouds that could then condense into galaxies and then individual stars and solar systems.



Clouds over Texas



Cracked paint on inflated balloon

As the surface of earth expands sideways from the effect of gravitational expansion, it stretches out uniform layers of clouds into many individual segments that are themselves divided into still smaller segments. This segmenting of clouds is almost always apparent whenever clouds are observed for any length of time. This process can be easily demonstrated by spray painting a partially inflated balloon. Once the paint has dried and the balloon is then fully inflated, the paint will crack into segments that form patterns almost identical to the segmenting commonly observed in clouds. These stretch marks in the sky offer dramatic proof that the surface of the earth is constantly expanding in all directions beneath the cloud layer.

Einstein's curved space-time theory of gravity is clearly unable to create segmented clouds. In most cases the mathematical equations describing curved space-time are identical to those describing the "curved matter-time" of gravitational expansion. However, this is one case where the predicted dynamics of the two theories are different. In general relativity, it is the space within the cloud that is curving and moving and there is no requirement that any of the droplets to undergo any inertial movement. In General Relativity, it is the "curving" paint that inflates the balloon. In the Principle of Gravitational Expansion, it is matter that is curving and moving through inertial space. As the surface of the earth moves sideways beneath the cloud with real inertial motion, all of the water droplets must be moved one way or another in the process and segmented into smaller and smaller groups. Gravitational expansion inflates the balloon and stretches the paint.

Gravitational Psychology

Perhaps the most fascinating aspect of the Principle of Gravitational Expansion is not the actual physical mechanics of the idea itself but the negative psychological reaction that people have when first exposed to the idea. Even though the idea is a simple and even obvious explanation of gravity it is almost never even considered as an option when gravitational theories are discussed.

It has always been a great mystery to me why Einstein never even appears to have considered the possibility of gravitational expansion before establishing the principle of equivalence as the foundation of General Relativity. To me it seems impossible that any scientifically minded person could even arrive at the principle of equivalence without first considering gravitational expansion and then offering some reason for rejecting it. This is like failing to look both ways before crossing a busy street. It is almost like there is a powerful but unconscious taboo deeply buried at the foundation of human psychology that prevents the idea of gravitational expansion from ever rising spontaneously into the conscious layers of the mind.

I know from personal experience the great power of the negativity that accompanies this idea. Many times during the past thirty years as I have been developing and promoting the Principle of Gravitational Expansion, I have experienced very strong feelings welling up from deep in my own psyche that the idea couldn't possibly be true, even though I have never found any physical evidence that could even be remotely interpreted in such a way as to cast doubt on it. Also, I have never ceased to be amazed by the immediate negative reaction of both scientists and laymen when the idea of gravitational expansion is explained to them for the first time. Disbelief is far too mild a term to describe their immediate and perhaps even involuntary

hostility to the suggestion that their bodies, as well as the earth itself might be constantly increasing in size. Logical arguments and physical evidence are never used to counter the idea. To many the idea is so distasteful and obviously wrong that the issue becomes one of morality as much as intellect. My credibility immediately evaporates when they realize that I am serious and therefore must have some kind of serious mental defect to attempt to promote an idea that even people without any scientific training could immediately identify as totally false. The subject is not even open for discussion because everyone seems to know instinctively that this idea couldn't possibly be true.

I am told that I fail to realize that the real beauty of the Equivalence Principle is that it allows us to transcend the limitations of the physical measurement process and to establish effects beyond their reach. They say something like, "The Equivalence Principle is true because it predicts that a false upward acceleration will be measured at the earth's surface that is exactly equal and opposite to the true acceleration of a falling body that is otherwise undetectable in any way. Therefore we know this measured acceleration to be truly false and this undetectable acceleration to be truly real because they are predicted to be so by the equivalence principle that is thus proven to be true." Its hard to argue with someone when you can't even agree on the distinction between up and down.

Since no experiment has ever yet been able to falsify it, we must accept or at least consider as fact that the upward gravitational acceleration of the earth's surface, as measured by an accelerometer, produces real motion through absolute inertial space that is conceptually and experimentally identical to the changes in motion through space produced when a rocket is accelerated by its motor to an equal accelerometer reading

If experimental evidence could ever be found to invalidate the gravitational expansion of matter, it would also serve as a falsification of the Equivalence Principle, because the Principle of Gravitational Expansion, in effect, demands that the Equivalence Principle be both absolute and unnecessary.

Principle of Equivalence (Einstein)

"In an arbitrary gravitational field no local experiment can distinguish a freely falling non-rotating system (non-inertial) from a uniformly moving system in the absence of a gravitational field."

The Principle of Equivalence is replaced by the Principle of Absolute Motion.

Principle of Absolute Motion

All acceleration measured by an accelerometer produces real change in motion, either acceleration or deceleration, relative to photon rest. All change in motion relative to photon rest, either acceleration or deceleration, is registered by an accelerometer. Deceleration is distinguished from acceleration by the increasing rate of an atomic clock undergoing acceleration and the slowing rate of a clock undergoing acceleration.