GRAVITY - GRAVITATION

New Interpretation of Gravitational Force Theory

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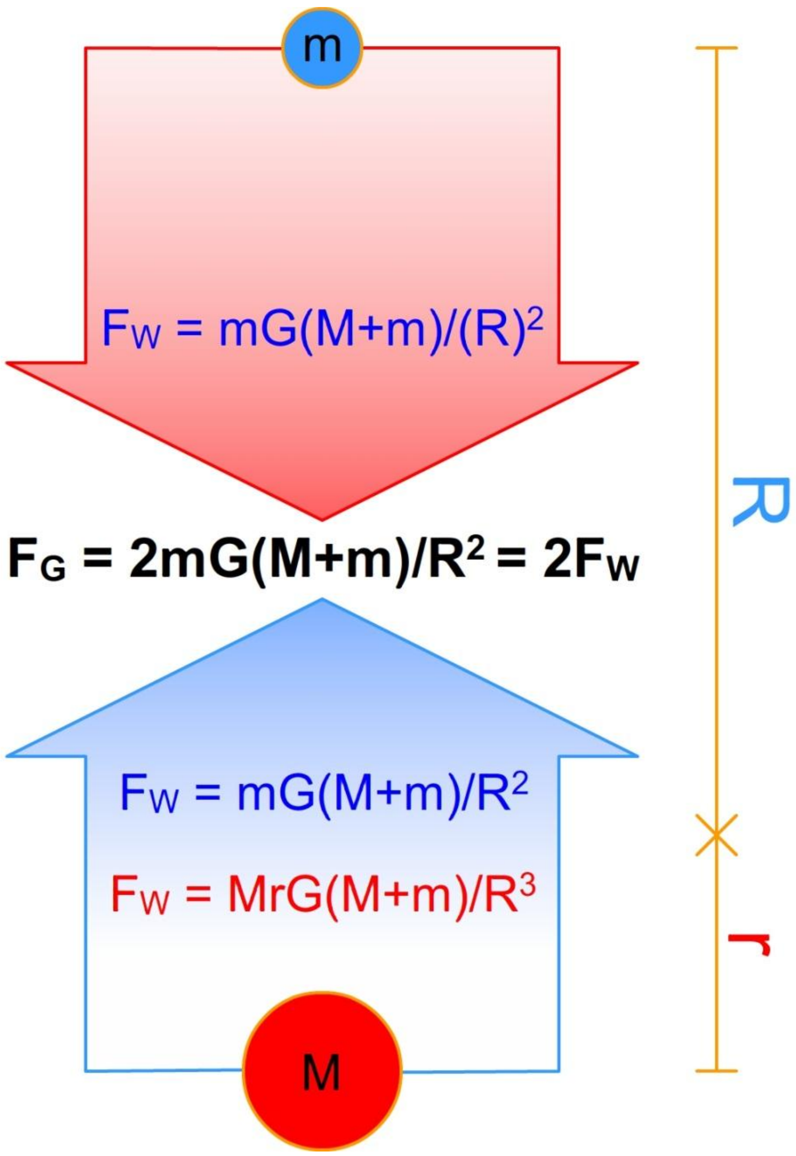

INTRODUCTION

Do physics professors know physics? Equivalence principle, Dark matter and energy, Matter tells space how to distort, Space to matter how to move, and many other "bends" are sold to us for "easy money" by "physics professors". "Physicists", "physicists", you poor "Physics"! Take a look at your physics and astrophysics textbooks: they are all polluted by the same image with two bodies and two opposing forces and a "formula":

$$F_g = F_1 = F_2 = \frac{GM_1M_2}{r^2}$$

In what Universe is this "formula" mathematically correct and physically correct? What is F_g, what is F_1 and F_2 and what is GM_1M_2/r^2? If $F_1 = F_2$ then $F_g = 0$, then how much is GM_1M_2/r^2?

Sir Isaac Newton said that gravity is a force between masses and is proportional to those masses and inversely proportional to the square of the distance between them. This force is expressed by the formula, which is supposed to describe the observations of Tycho Brahe and Johannes Kepler:

$$F_G = m\frac{GM}{r^2} = m\,a = F$$

and that's all, and no longer need. Kepler and Newton are gravity studied on the basis of astronomical observations, but it tells us nothing about the masses of the body but only about their relationships and equilibrium states - orbits. The bodies in the universe behave as harmonic oscillators but the time of their rotation does not depend on mass but on the distance that is at the same time and measure of their potential and rotational energy. When Newton realized that Kepler's laws were derived from his formula, individual masses and the amount of constant G no longer mattered to him, since they in all laws of equilibrium come as a product "GM". But now our professors, "smarter" than Newton, come in and "perform" the above "formula," and there is nothing doubtful about that??

THE LAW OF FORCE

"Physics professors" explain to students that force F=ma and that's it! A force, they say, gives a mass (m) an acceleration (a) and that's it! But they don't say anything about where that Force came from! They just say it's a vector! And what did Newton actually tell us about this?

Newton didn't just say F=ma! He also said that this Force acts according to three principles (laws):

1. Principle of symmetry: Every "action" force is opposed by an equally strong "reaction" force $|F_a|=|F_r|$. Mass always resists the force of changing its state (inertia) with an "equal force". (Newton's Third Law!).

2. Principle of balance: The amount of energy transferred to a body is equal to the energy lost by all other bodies! When the sum of all forces of action and reaction on a body is equal to zero, the body is in energy balance (at rest or in uniform movement)! $Sum(F_a) + Sum(F_r)=0$. Mass preserves its energy - inertia. (Newton's First Law!).

3. Principle of change: The energy at a point of the continuum can only change if the energy of all other points of the continuum changes equally in absolute amount. Each change in the energy of a body requires a double absolute change in the energy of all bodies! Acting Force F_{Work} (energy change force) must always do double work compared to the work of the Action or Reaction Force ($F_{Work}=|F_a|+|F_r| =2F_a$!). Energy always preserves symmetry and balance. (Newton's Second Law!).

Energy is transfered and supplied or removed by symmetrical distribution of impulses and moments!

The Law of Force together with the three principles of Force are one law that interprets the "structure of the Universe" for us! These are not any "Laws of movement" as wrongly taught to children by "physics professors"! Therefore, the Force cannot appear "out of nowhere" as today's "physics professors" interpret it! Force always acts according to Newton's Second Law: Force is where one form of energy is converted into another form of energy and/or where energy moves - it moves from one mass to other masses! Force is a "mechanism" by which energy is moved (distributed)! Force is the "cause and effect" of the Law on Conservation of Energy. Energy behaves like an ideal fluid!

ACTING FORCE

If we were to say that $F_a+F_r=0$, then we would be saying that the forces are in balance and that there can be no change! But if we see the change, then there must be another Force - the acting force F_{Wk} that makes that change! The acting force F_{Wk} must also do double work by means of action and reaction forces! If the force did not always do double work, then the Law of Conservation of Energy would not be satisfied! We cannot know which is the Force of action and which is the Force of reaction because they act "simultaneously and symmetrically" (Newton's Third Law and First Law)! That's why the real acting Force $F_{Wk}=F_a+F_r$, due to $F_a=F_r$, is equal to $F_{Wk}=2F_a$!

$$\frac{dE}{dt} = F_a - F_r + F_{Wk} = 0, \quad balance: energy\ movement\ only!, \qquad F_{Wk} = 0, \quad F_a = F_r,$$

$$\frac{dE}{dt} = F_a - F_r + F_{Wk} > 0, \qquad F_{Wk} = F_{wa} + F_{wr} = 2F_{wa}, \qquad input, output\ or\ energy\ conversion!$$

The acting force F_{Wk} must also always be the sum of the action and reaction forces! An acting force always does double work! Due to the symmetry in this natural phenomenon, we have always "perceived" only half of the phenomenon - the force of action:

$$F_{wa} = \frac{d(mv)_{wa}}{dt} = \frac{1}{2}\frac{dE}{dt}, \qquad 2\frac{d(mv)_{wa}}{dt} = \frac{dE}{dt}$$

while we neglected the symmetrical reaction force! And in fact, the real acting force is always twofold. The total effect of energy in each change (work) is always double. In order for the cannon to eject the bullet, the cannon needs to be supplied with twice as much energy as the bullet carries! Energy always moves and is distributed symmetrically (Newton's Third Law!, Law of Conservation of Energy).

This applies to every Force! In Nature, the Force can act so that one mass exchanges its moment (mv) with another mass $F_{Wk}=0$ or as Gravity when the gravitational field of one mass (m) attracts the gravitational field of another mass (M), and vice versa, so the actual Acting Force of Gravitation will be: $F_G=2F_W$!

Now comes the most interesting part! We not only neglected to interpret the Forces of action and reaction together, but we also neglected their individual and joint acceleration! We measured the joint (relative) acceleration and called it "g". We know from experience that to lift a load (m) against the force of Gravity, we spend energy mgh, so the acting force is $F_G=mg$! If $F_G=2F_W$ then what is the absolute acceleration of the force Weight F_W? So it is then equal to $F_W=mg/2$, that is, g/2 is the absolute acceleration that acts on the body at rest (on the scale)!

Newton gave us the General Law of Force F=ma (actions and/or reactions) and the "General Law of Weight" for one body $F_W=mGM/r^2$ from which it follows that the "General Law of Gravitation" between "TWO BODIES" is equal:

$$F_G = 2F_W = 2G\frac{mM}{r^2} = mg, \qquad g = \frac{2GM}{r^2}, \qquad F_W = \frac{mg}{2}$$

From there it follows that $gr^2=2GM$, $g/2=GM/r^2$, and that is the absolute acceleration to the body M. This relative acceleration g should be equal to the sum of the absolute accelerations that prevail in both gravitational fields: $g=(a_m+a_M)/2$. Product mass and absolute acceleration of gravity is called Weight, and the product of mass and relative acceleration of gravity is called Gravity! According to Newton's Third Law, Gravity must be the result of the action of two twice weaker forces of Weight (two forces from two gravitational fields):

GRAVITY – WEIGHT

Our "physics professors" nonchalantly "teach" children that the Force of gravity on a body is equal to the "weight" of that body. And then they put "their definition" in Newton's mouth! But Newton by never saying! Newton spoke of Gravity as an "attractive force" between "two bodies" that is proportional to each mass, and inversely proportional to the distance between the masses, and that "acts at a distance" without the masses touching.

As Newton's formula shows it is the result of action between "two bodies"; "m" and "M" and therefore the same law would have to apply to the body "M" and to the body "m". So it is about two symmetrical gravitational attractive forces that we call Weight, and the sum of which is called Gravity:

$$F_{WM} = G\frac{mM}{r^2} = F_{Wm}, \qquad F_{WM} + F_{Wm} = 2G\frac{mM}{r^2}$$

In other words, if body "m" has weight F_W in the gravitational field of body "M", then body "M" in the gravitational field of body "m" has the same weight F_W! The total "acting force of attraction" between the two bodies "m" and "M" must be equal to the sum of the individual forces (F_W) of each field (F_G=2F_W)! That is why the correct definition of "Gravity" according to Newton's Law of Force (F=ma) and the Law of "Weight" (F_W=GmM/r^2) should be written:

$$F_G = 2F_W = m\frac{2GM}{r^2} = mg\,, \qquad g = \frac{2GM}{r^2}, \qquad \frac{g}{2} = \frac{GM}{r^2}$$

If the force F_W acts from each end of this "gravitational spring", what is the acceleration "a" of the action of that force? We measure and perceive this acceleration as "g". But we forget that "g" appears as the result (sum) of the "absolute" action of two forces (2F_W). Therefore, if in mutual action two different masses have the same weight F_W then their "individual" absolute acceleration "a" must be equal to the "individual" ratio of Weight force to mass (a_M=F_W/m, a_m=F_W/M, (ma_M =Ma_m)/2)!

The relative acceleration between two bodies is therefore the sum of the absolute accelerations of each body! The relative acceleration (g) between two bodies is the result of the action of two same forces (F_W) and different masses, so it is independent of which mass we use as a reference.

The gravitational field of each mass has the Force of Gravitational Attraction F_W and we called it Weight. In the case of two bodies, we perceive gravity as the mutual attraction of both fields F_G=2F_W and we call this force Gravity. We actually mistakenly call Force 2F_W both Weight and Gravity. Weight is only 1/2 of the Force we call Gravity!

Gravity/mass = relative acceleration between two gravitational fields! [N/kg]=[kgm/s^2]/[kg]=[m/s^2]. It is the same for all gravitational fields (for all masses!)! That's why all bodies in every gravitational field fall at the same speed!

$$\frac{Gravity}{mass} = a_{rel}\;(on\;free\;fall), \qquad \frac{Weight}{mass} = a_{abs}\;(on\;a\;scale)$$

What distinguishes different bodies in a gravitational field is their weight. Weight manifests itself as 1/2 the force between two gravitational fields (two masses). Each mass has a Weight in the gravitational field of another mass! Two masses interacting with each other must have the same weight because the 3rd and 2nd Laws of Newton dictate that! Gravity is a spring on the ends of which two equal forces (F_W) are acting! Gravity is therefore the sum of these forces! $F_G=2F_W$! Each mass makes a proportional contribution to the interaction of two masses - GRAVITY IS THE DRIVING FORCE OF CONSERVATION OF MATTER AND ENERGY!

In order to be able to explain this result of the interaction of two masses, we first need to reduce our problem to a unit, that is, define how each mass acts on a "unit mass", and then determine the contribution of each mass in that interaction. Newton showed us beyond doubt that the acceleration of Gravitation, around any mass, changes according to the law G/r^2. In general, the balance between the "two bodies" will always be:

$$Law\ of\ Balance:$$

$$G\left(\frac{1}{r^2}\right) * M = a_{G1} * M = 1 * a_{GM} = 1 * G\left(\frac{M}{r^2}\right)$$

$$If\ we\ replace\ the\ "unit"\ with\ m, it\ will\ be:$$

$$G\left(\frac{m}{r^2}\right) * M = a_{Gm} * M = m * a_{GM} = m * G\left(\frac{M}{r^2}\right)$$

$$The\ acting\ force\ of\ Gravity\ will\ be\ the\ sum\ of\ the\ right\ and\ left\ sides\ of\ the\ scale:$$

$$F_G = \frac{2GMm}{r^2}\ , \qquad a_G = \frac{2GM}{r^2}\ , \qquad F_G = ma_G$$

This expression for "Gravity" is correct provided Newton's expression for "Weight" GMm/r^2 is also correct.

But what does the scale measure? The scale only measures the balance of forces, it knows nothing about mass or acceleration. By convention, we have connected 9.81 N with 1 kg of mass, and based on this, we distinguish bodies by their mass. In free fall, the same acceleration acts on each unit of mass (all bodies fall at the same speed!). On the scales, an attractive force also acts on a body at rest with constant acceleration! We measured the acceleration of free fall and called it $g=9.81\ m/s^2$. "g" is obviously the relative acceleration between two bodies and is the result of the action of two opposing forces. So what is the absolute acceleration of attraction of two bodies $a=g/2$. So, if the body is at rest (on the scale) it is acted upon by an absolute acceleration of g/2, and if the body is falling freely, it is acted upon by a relative acceleration of g. This means that our convention for mass 9.81kg=9.81N is completely wrong! The exact expression for weight on the Earth's surface is: $F_W=m\bullet 9.81/2$. Every "mass" that we have measured with a scale so far must be divided by 2 to get the exact mass!

If $F_W=mg/2$ then $F_G=2F_W=mg$. Why does one and the same phenomenon manifest itself in two ways; as Weight and as Gravity? Because we are misusing perceived relative acceleration (g) where we should be using absolute acceleration (g/2)!

As according to Newton's third and second law, the force of gravity must be $F_G=2F_W=2mg/2=mg$. Therefore, "mg" is really equal to the gravitational force between two bodies, only our masses are wrongly measured!

So far we have wrongly defined Weight as F_W=mg, so based on that the Force of gravity between two gravitational fields would have to be F_G=2F_W=2mg! What's wrong here?

So what is "g" then? "g" is the relative acceleration between the two gravitational fields. We stated earlier that the ratio of force Weight and mass represents the absolute acceleration of a body (m) in the gravitational field of another body (M) and vice versa:

$$\frac{F_W}{m} = g_M\,, \qquad \frac{F_W}{M} = g_m\,, \qquad \frac{(g_M + g_m)}{2} = \frac{g}{2} = \frac{F_W(m+M)}{2mM}, \qquad F_W = G\frac{mM}{r^2} = \frac{mg}{2}$$

$$\frac{g}{2} = \frac{F_W(m+M)}{2mM}, \qquad \frac{g}{2} = G\frac{(m+M)}{2r^2}\,, \qquad g = G\frac{(m+M)}{r^2}, \qquad g = 2G\frac{M}{r^2}\,, \qquad F_G = 2F_W$$

$$\frac{F_G}{m} = a_M\,, \qquad \frac{F_G}{M} = a_m\,, \qquad \frac{(a_M + a_m)}{2} = g = \frac{2F_W(m+M)}{2mM}, \qquad g = G\frac{(m+M)}{r^2}, \qquad F_G = mg$$

$$F_W = \frac{mg}{2} = G\frac{m^2 + Mm}{2r^2}\,, \qquad g = \left(G\frac{M}{r^2} + G\frac{m}{r^2}\right), \qquad g = (Ma + ma) = aM_+\,, \qquad a = \frac{G}{r^2} = \frac{g}{M_+}$$

The absolute acceleration of Weight "g/2" is equal to half of the sum of the absolute accelerations of each unit of mass in interaction. Why half? Because the absolute accelerations "a_n" acting towards each other, create a double apparent relative acceleration "2a_n", which is the result of the action of the absolute acceleration "a" on each unit of the total mass M_+.

Since Newton noticed from astronomical observations that in the gravitational field of the body "M", the body "m" when orbiting has Weight - "attraction": F_W= GmM/r^2, which is only half of the natural phenomenon we call Gravity (F_G), that the correct equation for the relative acceleration (g) and the gravitational force of attraction (F_G) will be:

$$F_W = G\frac{mM}{r^2}, \qquad F_G = 2F_W = 2G\frac{mM}{r^2} = ma_G, \qquad a_G = \frac{2GM}{r^2}, \qquad \frac{a_G}{2} = \frac{GM}{r^2}, \qquad F_W = m\frac{a_G}{2}$$

$$if\ a_G = g\ \ then\ which\ of\ these\ formulas\ for\ "g"\ is\ correct?\ : \quad g = \frac{2GM}{r^2} \quad or \quad g = G\frac{(m+M)}{r^2}$$

To answer this question, it is necessary to imagine a "thought experiment" (model) that describes the problem of "orbit" and "gravity" between "two bodies" in the simplest way. Let's imagine two equal bodies (of equal mass) whose common mass is M=M/2+M/2, and which orbit around the common center of gravity in r/2. Gravitational "attraction" - The weight of each of these bodies will be:

$$F_W = \frac{\left(G\left(\frac{M}{2}\right)\left(\frac{M}{2}\right)\right)}{\left(\frac{r}{2}\right)^2} = \frac{\frac{GM^2}{4}}{\frac{r^2}{4}} = \frac{GM^2}{r^2}$$

It follows from this solution that if we assume that the general common mass is M_+ = M+m, then both formulas for "g" are identical:

$$g = G\frac{\frac{2M_+}{2}}{r^2} = \frac{GM_+}{r^2} = G\frac{(M+m)}{r^2},$$

$$i.e. instead\ of\ GM\ it\ is\ more\ accurate: G(M+m) = GM_+ = constant$$

Only that: $g/2=GM/r^2$ applies to the Weight of one body, while $g=2GM/r^2$ applies to the Gravity between both bodies. Well, Newton's "General Law of Weight and Gravitation" for masses "m" and "M" reads more precisely:

$$F_W = m\frac{GM_+}{r^2} = m\frac{g}{2} = maM_+ , \qquad a = \frac{G}{r^2} , \qquad F_G = 2F_W = mg = 2maM_+$$

where "r" does not represent the distance between two bodies but represents the distance of the mass "m" to the center of gravity of the system "M+m". In fact, if we write more precisely:

$$F_W = m\frac{GM_+}{r_m^2} = M\frac{r_M}{r_m}\frac{GM_+}{r_m^2} = M\frac{GM_+}{r_m^3}r_M, \qquad m = M\frac{r_M}{r_m} , \qquad F_G = m\frac{2GM_+}{r_m^2} = M\frac{2GM_+}{r_m^3}r_M$$

We should be careful which mass we take as the reference (conventionally we always calculate with the smaller mass "m").

GRAVITATION WITHIN MASS?

And what about gravity inside the mass? To solve this we have to take the scale again. Thought experiment: imagine a mass in the form of a flat plate 2r thick, which will have an acceleration g on its surface, respectively, - g. If the scale on the surface of the plate measures 1 kg of weight, then in the center, at a depth r where g = 0, it will measure the weight of 0 kg, because the scale measures mg. This thought experiment tells us that within each mass there must be an equipotential surface with g = 0, that is, a weightless state.

Second thought experiment: Imagine two balls of mass M at distance L and among them mass m at any distance between masses M. The question is where will mass m go in freefall? Our teachers say towards the center of gravity of the masses. Common sense says "toward the nearest mass"! The center of gravity mass is in a state of unstable equilibrium! Who's right? Until now, reason has always been right.

$$\frac{2GmM}{(r-dr)^2} > \frac{2GmM}{(r+dr)^2}$$

If we now extend the above thought experiments by displaying them in spherical coordinates wrapped around a center, then the conclusion immediately arises that every spherosymmetric body must have a surface of weightlessness somewhere between the surface and its center, which divides the body into the first enveloping mantle and core, and which can then be further infinitely divided by the same principle (Bošković?):

$$R^3 - r^3 = r^3, \qquad 2r^3 = R^3, \qquad r = \sqrt[3]{\frac{R^3}{2}}, \qquad r_1 = \frac{R}{\sqrt[3]{2}} , \qquad r_n = R\left(\frac{1}{\sqrt[3]{2}}\right)^n$$

$$\frac{1}{\sqrt[3]{2}} = factor\ of\ equal\ mass\ distribution\ in\ spherical\ mass\ = 0{,}7937$$

$$R = \sum_{n=1}^{n\to\infty} R\left(1-\left(1-\frac{1}{\sqrt[3]{2}}\right)^n\right), \qquad H_n = R\left(1-\left(1-\frac{1}{\sqrt[3]{2}}\right)^n\right)$$

This could be a picture of the distribution of potential in a homogeneous spherical body of constant density, while the picture of the distribution of gravitational potential in a body with different density will be different according to the local density, that is, assuming that the density of inhomogeneous bodies will also change in accordance with this phenomenon. Where is the evidence for this claim? Well in the "Universe", between each planet and the moon there is a point where $F_G = 0$, and images of distant galaxies clearly demonstrate this phenomenon: a galaxy consists of a multilayered nucleus and a shell with arms that are a direct consequence of this phenomenon, and these arms of galaxies demonstrate this phenomenon both axially and radially. The strong axial flattening of the galaxy is probably due to the same phenomenon. It is to be assumed that the same image applies to stars and planets.

Why is that so? Because gravity is a symmetric central force (induced by the presence of mass) whose acceleration has two symmetric directions. Totally similar to gravity is the central force induced by the rotation of the body, that is, the moment of rotation, which is called the centrifugal (F_C) and centripetal force. When these forces, ie, accelerations, act on a body of mass m, the body moves along a path we call a trajectory. When these forces are in equilibrium ($F_W = F_C$), then the body moves in a path we call the orbit.

ORBIT – HARMONIC OSCILLATOR

In order to present Gravity, the Two-Body Problem, and the Law of Orbital Motion as clearly and accurately as possible, let's go back to our simple "thought experiment". In the case of two equal bodies (of equal mass) $M_+/2+M_+/2=M_+$ orbiting around a common center of gravity, the Weight "F_W" of each of these bodies will be:

$$F_W = \frac{\left(G\left(\frac{M_+}{2}\right)\left(\frac{M_+}{2}\right)\right)}{\left(\frac{r}{2}\right)^2} = \frac{\frac{GM_+^2}{4}}{\frac{r^2}{4}} = \frac{GM_+^2}{r^2}$$

Since Newton derived his formula for gravitational attraction from astronomical measurements for one body (a planet), it is clear that "r" in that formula is the distance to the center of gravity of the two bodies (r/2), so it will be:

$$1\ body\colon\ F_W = \frac{GM_+^2}{r^2} = \frac{M_+ g}{2}, \qquad 2\ bodies\colon\ F_G = 2\frac{GM_+^2}{r^2} = M_+ g, \qquad where\colon\ g = \frac{2GM_+}{r^2} = \frac{2v_{orb}^2}{r}$$

And in the case of orbital motion (rotation around the center of mass!) the force of weight must keep the balance with the induced centrifugal force (two centrifugal forces and two weights due to two bodies! At a distance of the center of gravity of r/2):

$$2F_W = 2F_C, \qquad \frac{GM_+^2}{r^2} = \left(\frac{M_+}{2}\right)\frac{v_{orb}^2}{\left(\frac{r}{2}\right)} = M_+\frac{v_{orb}^2}{r}, \qquad abbreviated, \qquad v_{orb}^2 = \frac{GM_+}{r}, \qquad v_{orb} = \sqrt{\frac{GM_+}{r}}$$

Here we see that it is more practical and accurate in the equation for gravitational attraction to use the total mass of the two interacting bodies (M_+). And experience (NASA) shows that the speeds of v_{orb} satellites are actually somewhat higher than the classical equation predicts!

If we now apply all the results of our thought experiment, we get a slightly different Kepler's law:

$$v = \frac{2r\pi}{T}, \qquad v_{orb}^2 = 4r^2\frac{\pi^2}{T^2}, \qquad \frac{GM_+}{r} = 4r^2\frac{\pi^2}{T^2}, \qquad GM_+ = 4r^3\frac{\pi^2}{T^2}, \qquad Kepler$$

$$T = 2\pi\sqrt{\frac{r^3}{GM_+}}\,, \qquad g = \frac{2GM_+}{r^2}\,, \qquad T = 2\pi\sqrt{\frac{2r}{g}}\,, \qquad g = \frac{8r\pi^2}{T^2}\,, \qquad v_{orb}^2 = \frac{GM_+}{r} = \frac{gr}{2}$$

In its simplest version, Kepler's law is actually the equation of a harmonic oscillator!

GRAVITATIONAL POTENTIAL

In order to explain to us the potential of a body (mass) in a gravitational field, we must once again use a "thought experiment" with two symmetrical bodies of total mass $M_+=M_+/2+M_+/2$. Experience tells us that the potential energy (M_+gh) of both bodies will be ($h=r/2$):

$$?\left[E_P = \frac{M_+\, g\, r}{2}, \qquad g = \frac{2GM_+}{r^2}, \qquad E_P = \frac{GM_+^2}{r}\right]!$$

We got two completely contradictory formulas for potential energy. One says that potential energy increases with distance while the other says that it decreases with distance! We are clearly misinterpreting what "potential energy" is! In everyday practice, we call our "Work of lifting some mass" ($W=mgh$) that we "store" in the gravitational field, as gravitational potential energy! It is obvious that we are talking about two similar concepts at the same time; "potential" and "potential energy".

So what is "gravitational" potential? In physics, mass and energy always move spontaneously from a higher "potential" to a lower one. This means that a mass at infinity must have a constant potential that depends solely on the mass, and which then decreases as the distance between the masses decreases. In other words, the distance from the center of gravity of the M_+ system should be proportional to the potential of the entire system (both bodies)! What force must we overcome to be able to move our "two bodies" against gravity? Gravity - double the Weight!

$$\frac{dE_P}{dr} = 2F_W = 2\frac{gM_+}{2}, \qquad g = \frac{2GM_+}{r^2}, \qquad E_P = \int 2\frac{GM_+^2}{r^2}dr = -2\frac{GM_+^2}{r} + C$$

$$E_P = 0, \qquad r = 1, \qquad C = 2GM_+^2\,, \qquad E_P = 2GM_+^2 - 2\frac{GM_+^2}{r}, \qquad E_P = 2GM_+^2\left(1 - \frac{1}{r}\right)$$

We chose the potential energy scale so that the system at infinity has a potential energy of $2GM_+^2$, while at a distance $r=1$, $E_P=0$. (On the energy scale, we had to take $r=1$, because at $r=0$ we would claim that two bodies occupy one and the same space, which is a geometric absurdity!) Therefore, the absolute energy required to separate two bodies from their center of gravity should be called "potential", while the relative energy (work) that must be expended to move the mass from a point of lower potential to a point of higher gravitational potential should be called "gravitational potential energy"! In fact, we should have correctly stated at the start that both "potential" and "potential energy" grow with distance.

$$\frac{dE_P}{dr} = gM_+, \qquad E_P = 2GM_+^2\left(1-\frac{1}{r}\right), \qquad \frac{dE_P}{dr} = gm, \qquad (E_{P2}-E_{P1}) = W_G = gm(r_2-r_1)$$

So one kilogram of mass (1 kg) would already have an incredibly high potential energy on the surface of the Earth:

$$E_{P01} = 2GM_{Earth}^2\left(1-\frac{1}{R_{Earth}}\right), \qquad E_{P01max} = 2GM_{Earth}^2$$

That is why it is very important to know the exact value of the gravitational constant (G), as well as the exact mass of each system M_+=(M+m). The total energy of the system is the sum of its potential and kinetic energy. If at the same time our system orbits, then the relations of total, potential and kinetic energy are as follows:

$$E_K = \frac{M_+v^2}{2}, \qquad v^2 = \frac{GM_+}{r}, \qquad E_K = \frac{GM_+^2}{2r}$$

$$E_U = E_P + E_K, \qquad E_U = 2GM_+^2\left(1+\frac{1}{4r}-\frac{1}{r}\right) = 2GM_+^2\left(1+\frac{1-4}{4r}\right) = 2GM_+^2\left(1-\frac{3}{4r}\right)$$

$$\left[E_U = E_K\,, \qquad Forbidden!: \qquad 2GM_+^2 = \frac{M_+v^2}{2}, \qquad v^2 = 4GM_+\right]$$

The total energy of the system M_+ changes in the range $3GM_+^2/2$, because $E_{U0} = GM_+^2/2$. Mass can never be without energy! This means that it is possible to introduce the concept of "variable-relative" potential energy (E_{PR}), which can only be converted into kinetic energy:

$$E_{PR} = 2GM_+^2 - \frac{2GM_+^2}{r} - \frac{GM_+^2}{2} = GM_+^2\left(2-\frac{2}{r}-\frac{1}{2}\right) = GM_+^2\left(\frac{3}{2}-\frac{2}{r}\right)$$

An orbit is a place where the potential and kinetic energy of the "two bodies" are in balance! Every body in orbit (equilibrium) maximally resists the change of its total energy! If some action force increases the body's orbital speed, the reaction force will immediately decrease the body's potential energy (the body will descend into a lower orbit). The reverse is also true! Just as we raised the mass of our system into orbit by doing work against the force of Gravity, Gravity can also convert all that potential energy into kinetic energy by free fall:

$$E_{PR} = E_K\,, \qquad GM_+^2\left(\frac{3}{2}-\frac{2}{r}\right) = E_K\,, \qquad GM_+^2\left(\frac{3}{2}-\frac{2}{r}\right) = \frac{M_+v_{max}^2}{2}, \qquad v_{max}^2 = 2GM_+\left(\frac{3}{2}-\frac{2}{r}\right),$$

$$v_{max} = \sqrt{2GM_+\left(\frac{3}{2}-\frac{2}{r}\right)}, \qquad r = \infty, \qquad v_{esc} = \sqrt{3GM_+}$$

The speed of free fall depends on the length of the fall path, while the theoretical "escape velocity" can only depend on the mass! In fact, in the theory of gravity, there is no basis for either the "black hole" theory or the "escape velocity" theory.

This approach of ours is purely theoretical because we calculate the potential energy from the center of gravity of the system where E_P=0 and towards infinity. (Gravitational Potential is the work - energy (work is always positive!) that needs to be done to move two bodies to a certain distance from their center of gravity!) It follows from everything previously derived that there is no potential of only one body in relation to the other, but the potential is a consequence of the mutual interaction of both masses and a common is to both masses. Potential energy and Gravity bind masses in the Universe. For mass to exist at all, it must always have both potential and kinetic energy. (Physically, E_U=E_K does not exist, just as E_U=0 does not exist too!)

However, our "professors" say that the potential energy is the "negative energy" of a body (virial theorem) because its "maximum amount" at infinity is equal to 0 as well as at the center of the planet where r=0!? "Professors" say that the body always has negative energy, which on the surface of the planet has a value:

$$E_P = -\frac{GMm}{r}, \qquad because, \qquad E_U = E_P + E_K = 0 = -\frac{GMm}{r} + \frac{mv^2}{2}, \qquad v_{max} = v_{esc} = \sqrt{\frac{2GM}{r}}$$

Our "professor" calls the obtained maximum "speed of free fall from infinity" "escape velocity" and claims that with this initial speed every body would escape the Gravity of a body of mass M! Why does someone claim this even though we have shown by derivation that a body with free fall velocity has barely enough energy to reach the height of the orbit (r) and nothing else?! Still Newton, with his "cannon", showed that escape velocities and orbital velocities are one and the same. The most interesting application of "escape velocity" is in the theory of "black holes". The absurdity lies precisely in the fact that now the "professor" claims the complete opposite: that it is not possible to escape the gravity of a "black hole" even at the speed of light. (Actually no body, ever, can escape either its own or other's gravity - Law?)

HOOKE'S LAW

If a mass is attached to a spring and the spring is extended or compressed, then the spring will exert a force on the mass that's proportional to the distance that the mass is moved from its "natural" position (the equilibrium position). This fact was discovered by English physicist Robert Hooke, and is known as Hooke's law. At that time, physicists did not yet distinguish the terms: "force" and "energy".

Today's "physics professor" presents Hooke's Law to his students mathematically as: F = –kx, where "F" represents the "force" and "x" represents the distance some "mass" has moved the spring from its equilibrium position. The constant "k" represents the "spring constant" and is a measure of the "extensibility" of the spring, says the "professor" and adds: "k" has dimension [N/m]! Is that correct? Of course not! So much nonsense in one definition!!

A spring is a simple device – an object that can store and release potential energy! Therefore:

$$Hooke\colon\; E_p = Fx, \qquad [E_p] = [N\,m] = [J], \qquad F = \frac{E_p}{x}\,, \qquad E_p = max\,, \qquad F = ma \quad Newton!$$

How much energy is stored in the vertical spring? E_P = mgx/2. Therefore, Hooke's Law is not the Law of force but the Law of energy (work) stored in the spring! In Physics, there can be only one Law of Force - Newton's!

$$E_p = F_s \int dx = F_s x\,, \qquad F_s = \frac{E_p}{x} = \frac{mg}{2}\,, \qquad \frac{F_s}{m} = \frac{g}{2}\,, \qquad E_p = \frac{mgx}{2}$$

But our "physics professor" doesn't give up, so he comes up with "his" definition of potential energy in a spring:

$$E_p = \int kx\,dx = \frac{1}{2}kx^2 \quad instead\ of\ simple: \quad E_p = Fx = max$$

Entire chapters of Physics that are based on the claim that Hooke's Law is the law of force and that the potential energy of a spring is E_P=kx^2/2 are completely wrong and should be rewritten!

NON-HARMONIC OSCILLATORS

The mass on the vertical spring oscillates around the equilibrium position so that part of the potential energy on the path A is converted first into kinetic energy and then again into potential energy and vice versa.

$$E_K + E_p = E_U\,, \qquad E_p = \frac{mg(A-x)}{2}, \qquad E_U = \frac{mgA}{2}, \qquad E_K = \frac{mgA}{2} - E_p$$

$$E_K = \frac{mgA}{2} - \frac{mg(A-x)}{2}, \qquad \frac{mv^2}{2} = \frac{mgx}{2}, \qquad v^2 = gx, \qquad v = \sqrt{gx}$$

$$\frac{dx}{dt} = \sqrt{gx}, \qquad \frac{1}{\sqrt{g}}\int \frac{dx}{\sqrt{x}} = \int dt\,, \qquad \frac{1}{\sqrt{g}}2\sqrt{x} = t + C, \qquad \sqrt{\frac{4x}{g}} = t + C$$

$$for\ v = 0, t = 0, x = -A\,, \qquad C = -\sqrt{\frac{4A}{g}}, \qquad \sqrt{\frac{4x}{g}} = t - \sqrt{\frac{4A}{g}}, \qquad t = \sqrt{\frac{4x+4A}{g}}$$

$$t^2 = \frac{4A+4x}{g}, \qquad x = \frac{gt^2}{4} - A\,, \qquad t = 2\sqrt{\frac{x+A}{g}}\,, \qquad x = 0, \qquad t = \frac{T}{4}, \qquad T = 8\sqrt{\frac{A}{g}}$$

And what if our mass-on-spring system is placed horizontally? Then the energy balance will be:

$$E_p = ma(A-x), \qquad E_U = maA, \qquad E_K = maA - ma(A-x) = \frac{mv^2}{2}, \qquad max = \frac{mv^2}{2},$$

$$2ax = v^2, \qquad \sqrt{2ax} = v, \qquad \sqrt{2ax} = \frac{dx}{dt}, \qquad \sqrt{2a}dt = \frac{dx}{\sqrt{x}}, \qquad \sqrt{2a}\int dt = \int \frac{dx}{\sqrt{x}},$$

$$\sqrt{2a}t = 2\sqrt{x} - 2\sqrt{A}, \qquad 2at^2 = 4x + 4A, \qquad T = 4\sqrt{\frac{2A}{a}}, \qquad if\ a = \frac{g}{2}\,, \qquad T = 8\sqrt{\frac{A}{g}}$$

And the pendulum, what is it? Oscillation is a consequence caused by the free fall by absolute acceleration of mass m from height A:

$$E_p = \frac{mg(A-x)}{2}, \qquad E_U = \frac{mgA}{2}, \qquad E_K = E_U - E_P = \frac{mgA}{2} - \frac{mg(A-x)}{2} = \frac{mgx}{2},$$

$$\frac{mgx}{2} = \frac{mv^2}{2}, \qquad gx = v^2, \qquad v = \frac{dx}{dt} = \sqrt{gx}, \qquad \int \frac{dx}{\sqrt{gx}} = \int dt\,, \qquad \sqrt{\frac{4x}{g}} = t + C$$

$$for\ v = 0, t = 0, x = 0\,, \qquad C = 0, \qquad \sqrt{\frac{4x}{g}} = t\,, \qquad t^2 = \frac{4x}{g}\,, \qquad x = \frac{gt^2}{4} = r - r\cos\theta$$

$$\frac{gt^2}{4} = r - r\cos\theta\,, \qquad \frac{gt^2}{4r} = 1 - \cos\theta\,, \qquad A = r - r\cos\theta_{max}$$

$$if\ v = v_{max}\,, \qquad x = A, \qquad t = \frac{T}{4}, \qquad T = 4\sqrt{\frac{4A}{g}} = 8\sqrt{\frac{A}{g}} = 8\sqrt{\frac{r(1-\cos\theta_{max})}{g}}$$

The same, only much simpler (the process is controlled by the absolute acceleration of Weight (g/2) in the oscillation range (2A)):

$$\frac{dv}{dt} = \frac{g}{2}, \qquad v = \frac{gt}{2}, \qquad \frac{dx}{dt} = \frac{gt}{2}, \qquad x = \frac{gt^2}{4} + C, \qquad t = 0, \qquad x = -A, \qquad C = -A,$$

$$x = \frac{gt^2}{4} - A\,, \qquad t = \sqrt{\frac{4x + 4A}{g}}\,, \qquad x = 0, \qquad t = \frac{T}{4}, \qquad T = 4\sqrt{\frac{4A}{g}} = 8\sqrt{\frac{A}{g}}, \qquad g = \frac{64A}{T^2}$$

The mass on the spring or on the pendulum is in a state of infinite free fall by absolute acceleration of Weight (g/2)! A pendulum and a mass on a spring are one and the same: a gravitational non-harmonic oscillator. Acceleration "g" in the previous formula is not a constant but a function:

$$g = \frac{2GM_+}{r^2}, \qquad T = 8\sqrt{\frac{A}{g}} = 8\sqrt{\frac{A}{\frac{2GM_+}{r^2}}} = 8r\sqrt{\frac{A}{2GM_+}}\,, \qquad T^2 = \frac{64r^2A}{2GM_+}, \qquad GM_+ = \frac{32r^2A}{T^2}$$

$$g = \frac{64A}{T^2} = \frac{2GM_+}{r^2}, \qquad 2GM_+ = r^2 g, \qquad v_{orb}^2 = \frac{GM_+}{r}, \qquad v_{orb}^2 = \frac{rg}{2}$$

By observing mass in orbit or mass on a spring or pendulum, on the Earth's surface, as non-harmonic oscillators driven by gravity, the astronomical "constants" g and GM_+ can be directly determined.

Our "physics professor" usually describes the oscillating time of a real pendulum as "the oscillating time of a harmonic oscillator". Why? The "Professor's equation" for the oscillation time of a pendulum reads:

$$?\ Oscillation\ time\ of\ the\ pendulum\colon\ T = 2\pi\sqrt{\frac{r}{g}} = \sqrt{\frac{4\pi^2 r}{g}} = \sqrt{\frac{39{,}44r}{g}}$$

While the time of oscillation of the mass on the horizontal spring is supposedly equal to:

$$? \; time \; of \; oscillation: \quad T = 2\pi\sqrt{\frac{m}{k}}, \qquad and \; it \; depends \; on \; the \; mass \; (m)?$$

The professor's formulas describe neither harmonic nor non-harmonic oscillators. The harmonic oscillator in physics is described by Kepler's third law, which states that the oscillation time of a harmonic oscillator is equal to:

$$T = 2\pi\sqrt{\frac{r^3}{GM_+}}, \qquad g = \frac{2GM_+}{r^2}, \qquad T = 2\pi\sqrt{\frac{r^3}{\frac{gr^2}{2}}} = \sqrt{\frac{8\pi^2 r}{g}}, \qquad T = \sqrt{\frac{78{,}95r}{g}}$$

The "Professor's equations" have nothing to do with either the oscillation of a pendulum or the oscillation of a mass on a spring, because they are not harmonic oscillators. These are pure fabrications of "physics professors"! The claim that the oscillating time of the pendulum depends only on the length of the pendulum is also a fabrication! We have previously shown that the oscillation time of non-harmonic oscillators is actually:

$$T = 4\sqrt{\frac{4A}{g}} = \sqrt{\frac{64A}{g}} = \sqrt{\frac{64r(1-\cos\theta_{max})}{g}}, \qquad A = r - r\cos\theta_{max}$$

Whence follows the conclusion that the oscillating time of the pendulum is proportional to the amplitude of the oscillation, which in turn is proportional to the length of the pendulum and the cosine of the maximum angle of oscillation! The error in the thinking of our "professors" stems from the fact that they confuse amplitude by height with amplitude by width; linear and angular acceleration, absolute and relative acceleration, as well as from the wrong definition of the "constant" g and GM.

Although orbiting and oscillating are similar phenomena driven by gravity, is it likely that they obey the same law? Is it possible that the same law applies to the oscillating time of a pendulum (non-harmonic oscillator) and to the oscillating time of a satellite (harmonic oscillator)? What is the average speed of motion of the pendulum, and which of the satellite, "Professor"?

Although we learn about natural phenomena by comparing them with a standard oscillator (clock - time), this does not mean that we cannot and should not distinguish these oscillators!

ASTRONOMICAL CONSTANTS G, GM and "g"

Due to more than clear uncertainty as to what is, and how much, the gravitational constant G actually needs to be re-determined. The only experiment so far conducted of this type is the famous Cavendish experiment, but the following objections can be made to it: (1) Cavendish decided to measure force from one area of physics using force from a completely different area of physics (Gravity-Hook). Torsion theory is as questionable as gravity theory, so both sides of the equilibrium equation are questionable. (2) For a "force measuring instrument" to become a measuring instrument, it must be calibrated by a known force "from the measuring range", and by what force is the Cavendish scale calibrated? (3) A scale is an instrument by which we measure only half of the gravitational force, so the result of the measurement is likely to be half as well. (4) In the experiment, the measuring masses were split into halves (4 bodies), which is not at all in the spirit of measuring the gravitational force between two bodies:

$$Wrong: \quad 2G\frac{mM}{r^2} \neq G\frac{2m2M}{r^2} = 4G\frac{mM}{r^2}, \qquad Correct: \quad 2G\frac{m+M}{r^2} = G\frac{2m+2M}{r^2}$$

For all these reasons, it is still not clear what Cavendish measured. For the above reasons, it is necessary to design the experiment of determining the gravitational constant better and more fundamentally. And what could be more fundamental than measuring the speed of approach of two equal spheres made of material with the greatest possible density (mass)? From the measured "free fall" curve of these balls, the acceleration of Gravity and the gravitational constant G can easily be determined (without the use of a scale!).

And what to say about experiments like this, which try to measure a physical quantity of the order of magnitude 10^{-11} (which is less than the amount of any experimental error on Earth) except that these measurements make no sense at all! That's why we stick, like Newton, to theory, and to astronomy and its measurements!

By observing the mass on the spring or pendulum as non-harmonic oscillators, driven by gravity, the astronomical constants g and GM_+ can be directly determined.

$$g = \frac{64A}{T^2} = \frac{2GM_+}{r^2}, \qquad GM_+ = \frac{32r^2A}{T^2} = \frac{gr^2}{2}$$

But the gravitational constant "G" can only be calculated on the basis of the Theory of Gravitation. As we can see from these equations, oscillation and swinging are completely independent of mass. In these equations, mass appears only as an astronomical term! So what is mass?

MASS - WEIGHT

Mass as a physical term is defined only by Newton's Law of Force and the Law of Weight (Gravity). This paper shows that in physics, quantities such as "force", "mass", "weight", "gravity" and "acceleration" should be strictly distinguished! Total confusion in understanding the concept of "force" and the concept of "acceleration" has also led to confusion between the concepts of "mass, weight and gravity".

In this paper, I claim that Newton's "General Law of Weight and Gravitation" for masses "m" and "M" reads more precisely:

$$F_W = m\frac{GM_+}{r^2} = m\frac{G(M+m)}{r^2} = \frac{mg}{2} = maM_+\,, \qquad F_G = m\frac{2GM_+}{r^2} = m\frac{2G(M+m)}{r^2} = mg = 2maM_+$$

where "r" does not represent the distance between two bodies but represents the distance of the mass "m" to the center of gravity of the system "M+m". These equations show that it is necessary to strictly distinguish between what is Weight and what is Gravity, and especially what is the absolute acceleration of Weight (g/2), the relative acceleration of Gravity (g), and what is the absolute acceleration of the gravitational field of each unit mass ($a=G/r^2$). These formulas describe the relationship between forces and masses, but they do not define what mass is or how much mass it is.

Newton told us that mass is a property of a body that is subject to inertia and acceleration. Mathematically and physically, mass is Force/acceleration = F/a! Here we have shown that mass is the cause of two forces: Weight and Gravitation, and also the accelerations associated with these forces. We have also shown that the forces of Weight and Gravity are in a 2:1 ratio ($2F_W = F_G$), as are their accelerations (2g/2=g). We empirically measure the weight of the body with a scale, and by convention we claim that 1 kg of weight is equal to 1 kg of mass (9.81 N = 1 kg)! And is that really so? What do the above equations tell us about mass?

The scale measures only 1/2 of the gravitational force, so if we use the scale to determine the mass, the result (weight) must be divided by 2, because the forces are Gravity : Weight = 2 : 1, as well as the corresponding accelerations, because g = 2g/2, or in other words: 1 kg of mass (gravity) = 1/2 kg weight:

$$Mass = \frac{Weight}{2}, \qquad F_G = 2F_W, \qquad g = \frac{2g}{2}, \qquad gm = \frac{gw}{2}, \qquad 2gm = gw, \qquad m = \frac{w}{2}$$

We attribute weight to the body that is free on the scale, and not to the body on which the scale rests, even though their weights are the same! By convention, we misattributed a weight of 9.81 N to a mass of 1 kg so that we could compare forces and masses. The correct convention should read: Gravitational force of 9.81 N corresponds to the interaction of 2 kg of Weight. (1 kg of weight = 1/2 kg of mass)!

Therefore, all those who have so far "weighed" the Earth determined only the "weight" of the Earth with their experiments! To get the "mass" of the Earth (or anything else!) they have to divide their result by 2!

$$M_E = \frac{M_{WE}}{2}, \qquad 2GM_E = gr^2, \qquad M_E = \frac{gr^2}{2G}, \qquad M_{Earth} = 2.98 * 10^{24}\ kg$$

The question of how much acceleration g is in the limiting case when a mass of 1 kg lies on the Earth can lead us to the same result. Then there is no longer any difference between the acceleration of Gravity and the acceleration of Weight (a_W=g):

$$R = r, \qquad m = 1, \qquad F_W = F_G, \qquad a_W = \frac{2GM_E}{r^2} = g, \qquad M_E = \frac{gr^2}{2G}, \qquad M_{Earth} = 2.98 * 10^{24}\ kg$$

In this case we got the same result again! If the mass of the Earth is wrongly measured, then all the masses in the Universe are wrongly measured, including the gravitational constant G! The exact mass of the Earth M_{Earth} = 2.9871E+24 kg! This value says that the density of the Earth is much lower and amounts to d = 2757.5 kg/m^3.

If we know from astronomical measurements that for the Earth GM_+ = constant = 3.98634E+14 m^3/s^2, then the new value for Newton's gravitational constant is G = $(rv^2)_{orb}/M_{Earth}$ = G = 1.33452E-10 m^3/kgs^2, that is, it is twice as big! With this correction, GM_+ remains, and further, unchanged the fundamental astronomical constant.

CONCLUSION

What has been the "problem" of defining Gravity until now is easiest to understand if we "reduce the problem to a unit", i.e. if we measure - calculate the attraction of two bodies of mass 1 kg at a distance of 1 m. The result for the amount of force Weight in that unit case according to the classical Newton's formula is F_W=G N. As this spring has two ends, each body suffers a force G N, so the total force of Gravitation between two bodies would be F_G=2G N. However, according to the new formula for Weight, the force is F_W=2G N, while then the force of Gravitation is F_G=4G N. It seems that the Universe contains twice "less" mass than we assumed until now, but the interaction between this mass is "twice" stronger.

Based on the results of this work, we can conclude that today's "Physics" is due for a thorough revision of the terms: mass, acceleration, force, weight and gravity. And even this paper is subject to the same revision if its results are applied. For example:

$$F = \frac{ma}{2}, \qquad F_W = \frac{mg}{2}, \qquad F_G = 2F_W, \qquad \frac{g}{2} = \frac{GM_+}{r^2}, \qquad F_W = m\frac{GM_+}{r^2}, \qquad F_G = 2m\frac{GM_+}{r^2},$$

$$a = \frac{G}{r^2}, \qquad F_W = m(m+M)a\,, \qquad F_G = m(m+M)2a\,, \qquad 2a = g, \qquad G(m+M) = konstant$$

These formulas, like Newton's, accurately describe the character of Force and Gravity as a force. The force of Gravitation is not based on Newton's third law, as our professors claim, but on the second (Law of Force: Principle of change): it is the force that arises as a result (sum) of the mutual attraction of two masses. It is a reaction force that enables the existence of potential energy between masses and is a consequence of the Law of Conservation of Mass and Energy. (Newton's third and first laws are actually the shortest versions of the equation of continuity, while the second "law" talks about how much work and the forces of action and reaction are needed to overcome the force of gravity and/or inertia, that is, to change the body's energy). Inertia and gravity can never be canceled or caused by some "force of action" (acceleration) as Einstein wrongly claimed. Gravity and inertia are intensive properties of mass that always exist.

Weight manifests itself as 1/2 the force between two gravitational fields (two masses). Each mass has a Weight in the gravitational field of another mass! Two masses interacting with each other must have the same weight, because this is what the 3rd and 2nd laws of Newton dictate! Gravity is a spring at the ends of which two equal forces (F_W) act! Gravity is therefore the sum of these forces! F_G=2F_W! Each mass gives a proportional contribution in the interaction of two masses - Gravity is the driving force of conservation of matter and energy!

It is a misconception that the potential of the gravitational field decreases with distance, while the work (mgh/2) that we store in the gravitational field as potential energy increases with distance. On the basis of such a misconception, the thesis was created about potential energy as some kind of "negative energy", ie that potential energy is not energy at all? In fact, potential energy is as real as the masses that carry it, as well as the gravity that binds them!

Gravity/mass = relative acceleration between two gravitational fields! [N/kg]=[kgm/s^2]/[kg]=[m/s^2]. It is the same for all gravitational fields (for all masses!)! That's why all bodies in every gravitational field fall at the same speed!

Therefore, our experience is always faced with an equation with two unknowns, while Nature, by means of gravity, always "knows" both unknowns! So let's paraphrase the initial saying of our "professors": The force of gravity tells space how much mass (energy) it contains, and energy (mass) where, which way and how to move and exist.

P.S.

A completely unscientific state prevails not only in mechanics but also in all other fields of physics such as thermodynamics, fluid mechanics, oscillations, not to mention the wrong definitions of "entropy", "ideal fluid", "viscosity", "relativity", "reversibility", "thermodynamic balances", etc., etc. And not to mention astrophysics, geophysics, general theory of relativity and similar disciplines (such as "global warming", "greenhouse effect"), which for the most part do not actually belong to physics but in the "metaphysics" of our professors. If this is the situation in "physics", then what is the situation in the other "sciences", as well as in "philosophy"? That's why young people show an increasing reluctance to study such "sciences and philosophies" because they are actually "useless"! But let's leave that for now, the only important thing for us is to return our physics professors to the "Zero Law of Physics": Nobody can be smarter than Newton! Cheers!

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