

Paper I

The Theory of Dimensional Relativity

*A Mathematical Investigation
of
Time, Energy and Dimension
relating to
Gravitation, Inertia
and
Other Phenomena*

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'As far as the laws of mathematics refer to reality, they are not
certain; and as far as they are certain, they do not refer to reality.'
Albert Einstein.

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A Mathematical Investigation of Time, Energy, Dimension, Gravitation and Inertia

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One of the difficult concepts which Albert Einstein presented to the world was that of space-time, which is a fourth dimension concept. We can easily imagine three dimensions because that is where we live, and the passage of invisible time is difficult to incorporate into that which we can observe in three dimensions to arrive in the fourth.

We find it incomprehensible to call up an image in the fifth dimension. Perhaps mathematics can throw some light upon this problem by establishing a relationship between the dimensions.

Einstein's famous $E = mc^2$ is a third dimension equation describing mathematically the relationship between mass and third dimension energy equivalent. This relationship has been experimentally proven with the development of nuclear energy. Einstein considered that the speed of light, c , was invariant, that mass, m , was invariant and that time, t , was variable in proportion to the velocity of an observer and /or gravitation. Mass is a form of energy, but is time a form of energy also?

Let us begin by making some Assumptions for the mathematics (but subject to scrutiny).

Assumptions for the Mathematics

Hypotheses

- 1. Mass remains invariable in all dimensions.**
- 2. The velocity of light remains invariable in all dimensions.**
- 3. The relationship of time to energy is reciprocal, $1/t^n$.**
(Analogous to reciprocal distance and force, $1/r^n$ in Newtonian physics.)
- 4. The mathematical relationship between the energy of a dimension and the next higher dimension is a mathematical integral of the former.** (This is the case in the first three dimensions, so it may be a reasonable assumption to make for the others.)

Table 1

Dimensional Energy Formulae

Dimension (n)	Mass (m)	Velocity (c)	Integral Constant(i_k)	Dimension Constant (n_k)	Time (t)	Multiple	Factored Multiple	Difference Multiple Previous Dimension	Physical concept	
1	m	c^0	-	-	-	$m.c^0$	m	-	mass	
2	m	c^1	1	1	-	$m.c^1.1.1$	mc	c	momentum	
3	m	c^2	$\frac{1}{2}$	2	t^0	$m.c^2.\frac{1}{2}.2.t^0$	mc^2	c	energy	
4	m	c^3	$\frac{1}{6}$	4	t^{-1}	$m.c^3.\frac{1}{6}.4.t^{-1}$	$\frac{2mc^3}{3t}$	$\frac{2}{3} \frac{c}{t}$	light cones	
5	m	c^4	$\frac{1}{24}$	8	t^{-2}	$m.c^4.\frac{1}{24}.8.t^{-2}$	$\frac{mc^4}{3t^2}$	$\frac{2}{4} \frac{c}{t}$	no concept	
6	m	c^5	$\frac{1}{120}$	16	t^{-3}	$m.c^5.\frac{1}{120}.16.t^{-3}$	$\frac{2mc^5}{15t^3}$	$\frac{2}{5} \frac{c}{t}$	"	
7	m	c^6	$\frac{1}{720}$	32	t^{-4}	$m.c^6.\frac{1}{720}.32.t^{-4}$	$\frac{2mc^6}{45t^4}$	$\frac{2}{6} \frac{c}{t}$	"	
8	m	c^7	$\frac{1}{5040}$	64	t^{-5}	$m.c^7.\frac{1}{5040}.64.t^{-5}$	$\frac{2mc^7}{315t^5}$	$\frac{1}{7} \frac{c}{t}$	"	
9	m	c^8	$\frac{1}{40320}$	128	t^{-6}	$m.c^8.\frac{1}{40320}.128.t^{-6}$	$\frac{mc^8}{315t^6}$	$\frac{4}{8} \frac{c}{t}$	"	
10	m	c^9	$\frac{1}{362880}$	256	t^{-7}	$m.c^9.\frac{1}{362880}.256.t^{-7}$	$\frac{2mc^9}{2835t^7}$	$\frac{2}{9} \frac{c}{t}$	"	
11	m	c^{10}	$\frac{1}{3628800}$	512	t^{-8}	$m.c^{10}.\frac{1}{3628800}.512.t^{-8}$	$\frac{4mc^{10}}{14175t^8}$	$\frac{4}{10} \frac{c}{t}$	"	
General expression		$c^{(n-1)}$	$2^{-(n-1)(n-2)...(n-...)}$	$2^{(n-2)}$	$t^{-(n-3)}$					

The General Formula for calculating the Dimensional Energy could be written as:

$$E_n = \frac{m c^{(n-1)} i_k n_k}{t^{(n-3)}} \quad \text{Equation 1} \quad \text{or more generally, } \boxed{E_n \approx \frac{m c^{(n-1)}}{t^{(n-3)}}}$$

From *Table 1*, the difference multiple between the energies of consecutive time dependent dimensions appears to be of the factor c/t in each case. The numerical constant multiples also show a mathematically orderly progression of fractions. This is not unexpected given the integration process between each dimension, but it does yield the *Equation 1* which is a general formula. This formula holds for all dimensions above the 2nd, where t becomes a factor.

The Integral constants (i_k) are simply those obtained through the normal integration process. It has the general formula $i_k = 2^{-[(n-1)(n-2)\dots(n-...)]}$

The Dimension constants (n_k) come from the space dimensions, that is, point, line, area, volume being a raising of the dimension of the point, and has the general formula $n_k = 2^{(n-2)}$.

Each higher dimension has an additional raising of space dimension as well as raising the time dimension.

The slightly vague fourth dimension image of the light cone, demonstrating past, present and future with anything outside the cones not available for consideration, places limits imposed by the dimension itself. It may be that the fifth dimension looks outside the boundaries of the fourth dimensional light cones, they being contained within the fifth dimensional light cones.

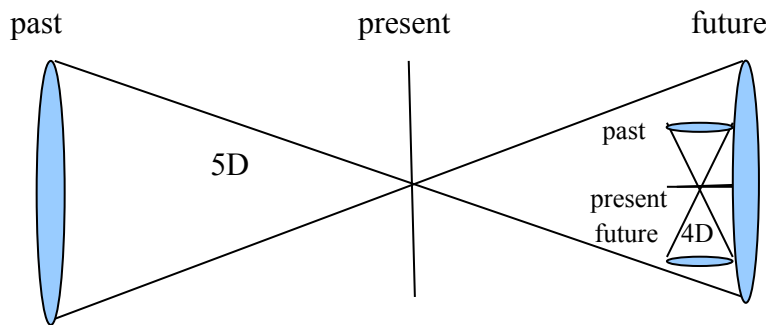


Diagram 1

The 5th dimension has 3 additional space dimensions and an additional time dimension more than the 4th, and contains all of the 4th dimension. It can be difficult to comprehend with the diagrammatic limitations. The mathematics points to the relationship of c/t as the difference in mass-energy between consecutive time dependent dimensions.

It may be suggested that the higher the dimension the more energetic it is and the mathematics seem to support that.

If, in *Diagram 1*, there was a large mass in the 'future' section of the fifth dimension, just outside the fourth dimension 'past' light cone, it would not be visible to us in the fourth dimension but its gravitational pull could have an influence on adjacent masses visible to us in the fourth dimension 'past' light cone. This could explain the effects of so called 'dark matter', some of the effects of which we think we can observe although we cannot see the dark matter itself.

One could speculate that the violent event horizon of a black hole is a connection between dimensions. The other side of the black hole is beyond our light cone. That would suggest that c/t is an extremely energetic function. If that is so, then mathematically t may be a very small number as we know that $c = 3 \times 10^8$ metres per second. Note that a 'second' is only something we have created to measure time, and it is not necessarily related to the intrinsic numerical value of t . We still have no definition of t even

though we have been measuring it by its relation to something regular, such as the period of a pendulum, for millenia. The 'second' is the unit of time measure in the SI system.

A more fundamental measure was arrived at by Max Planck, who evolved a measure of units based purely on the physics of free space and not subject to human influence. These are:

Table 2

$\hbar$ = the reduced Planck constant ($= 1.054571726 \times 10^{-34} \text{Js}$) $= \hbar/2\pi$

G = the gravitational constant ($= 6.67384 \times 10^{-11} \text{ m}^3\text{kg}^{-1}\text{s}^{-2}$)

c = the speed of light in a vacuum ($= 2.99792458 \times 10^8 \text{ m s}^{-1}$)

k_e = the coulomb constant ($= 1.054571726 \times 10^9 \text{ kg m}^3\text{s}^{-2}\text{C}^{-2}$)

k_B = the Boltzmann constant ($= 1.3806488 \times 10^{-23} \text{ J K}^{-1}$)

From these the most fundamental measure of time, Planck time, is calculated as

$$t_p = \sqrt{\frac{\hbar G}{c^5}} = 5.39106 \times 10^{-44} \text{ seconds} \quad \text{Equation 2}$$

This equation is telling us that time can be expressed as a function of the Planck constant, the Gravitational constant and the Speed of light.

Therefore to put c/t into perspective, we have $c/t = 1 / 5 \times 10^{-44} \text{seconds} = 2 \times 10^{43}$

($c = 1$ in Planck units and $t = 5 \times 10^{-44}$ seconds as Planck time equivalent in the SI system)

This says that, from *Table 1*, the energy difference between the 4th and 5th dimensions is 1.3×10^{43} , and between the 5th and 6th dimensions is 1×10^{43} .

Returning to the Dimensional Energy Formulae, assuming the mass = Planck mass ($= \sqrt{\frac{\hbar c}{G}}$
 $= 2.17651 \times 10^{-8} \text{ kg}$), for the time sensitive dimensions (4 and up) we have:

Table 3

<u>Dimension</u>	<u>Formula</u>	<u>Planck value</u>
4	$\frac{2mc^3}{3t^1}$	1.3×10^{36}
5	$\frac{mc^4}{3t^2}$	6.6×10^{79}
6	$\frac{2mc^5}{15t^3}$	2.6×10^{123}

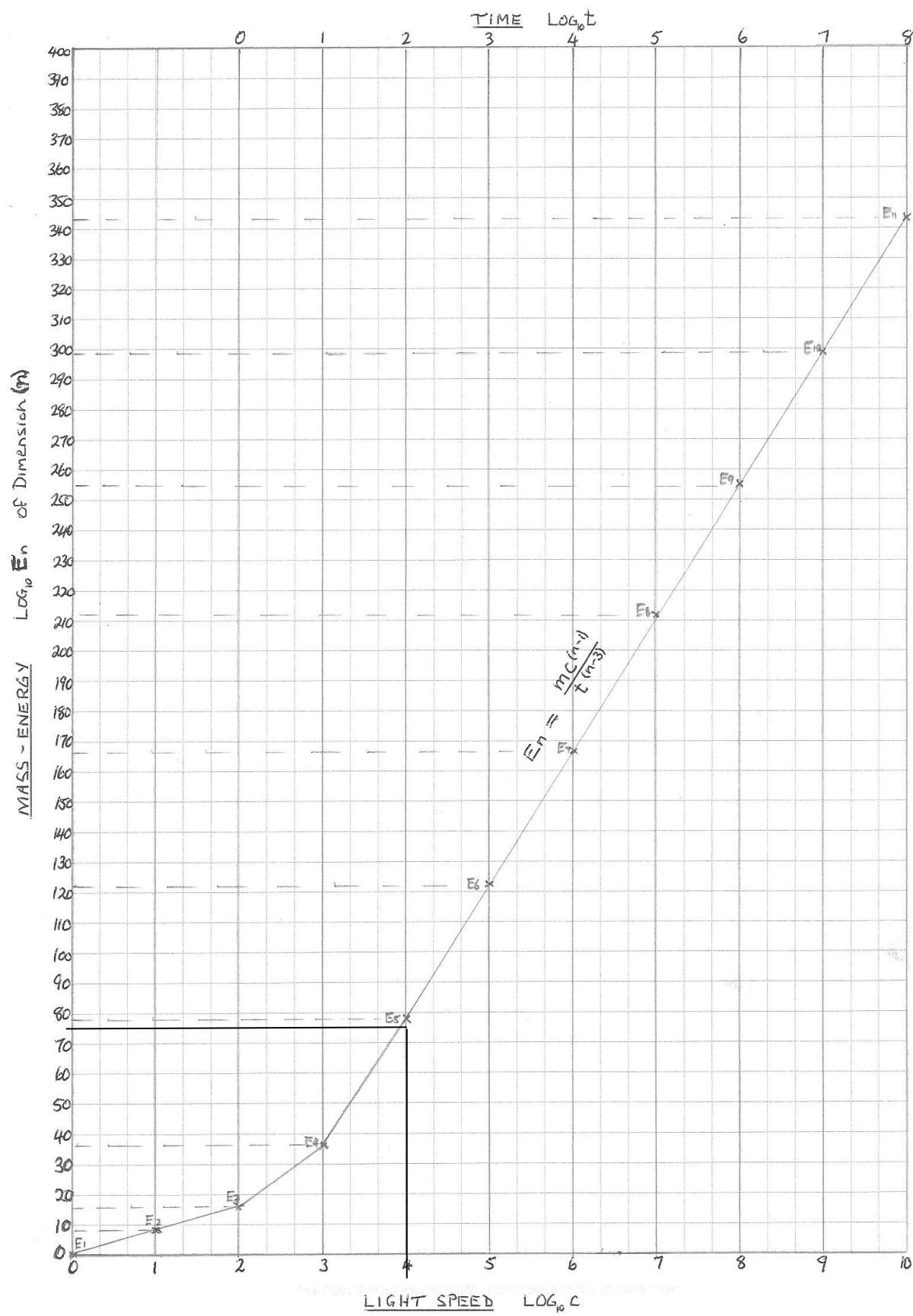
and so forth.

The *Table 3* calculations between dimensions 4 and 5 and 5 and 6 do correlate (see Dimensional Energy Graph, p.5) - an order of magnitude of 10^{43} , which is the previously calculated order of magnitude value for c/t , confirming that the dimensional energy formulae seem consistent.

The mathematics indicate that mass-energy equivalence increases enormously with the step to a higher time dependent dimension. In the standard model of cosmology dark energy accounts for 73% of the total mass-energy of the universe, and dark matter 23% of the total mass-energy. An estimate from other sources of total mass-energy in the observable universe is 4×10^{69} , which, if contained in dimensions 1 to 4 and is 4% of the total mass-energy of the universe, the other 96% could easily be contained by the 5th dimension according to *Table 3*.

This suggests that the universe's estimated total mass-energy could be contained in five dimensions from an energy viewpoint, if the standard model of cosmology is correct.

Dimensional Energy Graph



Summary

Time (t):

It is possible from *Equation 1* to express time in terms of E , m , and c . In the case of the 4th dimension, $E = \frac{2mc^3}{3t}$, therefore $t = \frac{2mc^3}{3E}$ which means the unit of time is $kg.m^3/J.s^3$

In the case of the 5th dimension, $E = \frac{mc^4}{3t^2}$, therefore $t = \left(\frac{mc^4}{3E} \right)^{1/2}$ which means the unit of time is $(kg.m^4/J.s^4)^{1/2}$.

From the foregoing units, time is apparently a form of energy, but more fundamental, as we cannot mathematically eliminate the time unit (seconds) from the above time units in the 4th dimension and higher because of the speed of light expressed in SI units. Similarly, we cannot eliminate time mathematically from the Planck equations. Time seems to be a fundamental quantity but connected with the speed of light by relating space (distance) to time. Space-time.

1. When considered as Planck time, t_p , where c is deemed to be 1, the 4th dimension equation becomes $t_p = 2m/3E_4$, the 5th dimension equation becomes $t_p = (m/3E_5)^{1/2}$, and the 6th dimension equation becomes $t_p = (2m/15E_6)^{1/3}$. These numbers are not SI units, but imply that the *value of Planck time is constant in different dimensions*, indicated by order of magnitudes 10^{-44} , 10^{-43} , and 10^{-43} respectively as dimension number, n , increases. The differences are only rounding errors.
2. Also notable is that while the unit of time appears to vary with different dimensions as can be seen in SI units above, calculations for $t_p (= t/c)$ from *Table 1* in each case have an equal order of magnitude, 10^{-44} sec.between successive dimensions. It appears that *Planck time does not significantly vary with dimension while the constant, c , is deemed to be 1 in those dimensions*.

There seems to be no anomaly in orders of magnitude between points 1. and 2. **It was Einstein who proposed that time was not a constant.** Modern experimental evidence supports the proposition, which could mean that the speed of light can vary with the different energy levels of different dimensions when observed from our dimension. This is analogous to the different speeds of sound in air and in water. It is faster in water when observed from air. This is a Relativistic view of light speed. There is further discussion of this concept below. From page 2., **Assumption 2.** *'The velocity of light remains invariable in all dimensions'* appears to be correct *only if Planck time is also constant*. The foregoing ratio of c/t mathematically supports the above caveat on Assumption 2.

Mass-Energy (E_n):

There is a mathematical consistency between the mass-energies of different dimensions, the time dependent dimensions (4th and above) having a calculated difference in mass-energies as a multiple of c/t and of the order of 10^{43} . In Planck units, c/t becomes $1/t_p$ which is 10^{44} and is the same as c/t in SI units when multiples are accounted for. This means that $E_n / E_{n-1} \approx 1/t_p$. *The reciprocal of Planck time is the approximate energy ratio between consecutive time dependent dimensions.* (The expansion of Einstein's $E = mc^2$ to include higher time dependent dimensions (n) is of the form

$$E_n \approx \frac{m c^{(n-1)}}{t^{(n-3)}} . \quad \text{The full expression of Einstein's equation should be } E_3 = \frac{m c^2}{t^0} \text{ which}$$

yields the same result. This may be more applicable to the realm of space-time than the three dimensional form as espoused by Einstein, and a more universal expression of the **mass–energy–time** relationship.)

Assumption 3. *'The relationship of time to energy is reciprocal'* appears to be correct.

Dimensions (n):

It is possible that dark energy and dark matter exist in the 5th or higher dimensions, and drive the expansion of the universe against the pull of gravity. Calculations indicate that the 5th dimension is 10^{63} times more energetic than the 3rd, and the 4th is 10^{20} times more energetic than the 3rd. Manifestations of a different dimensional energy in our everyday existence may include the unlimited energy from a permanent magnet and the continuous electric field between the terminals of a battery or electret which continue indefinitely to radiate electro-magnetic energy so long as the dipole is not destroyed. It may be worth noting that these fields are not force fields unless they interact with mass, ($F = ma$) and if mass is zero so is the force field. They are, rather, a potential, coming freely and endlessly from elsewhere. Similarly, gravity appears to come freely and endlessly from objects possessing mass, and is also only a potential unless interacting with other mass, whence it becomes a force field. Endless energy must come from somewhere. Given the consistency with which the figures for time and energy have indicated the Assumptions 2 and 3 to be correct, it **remains to be ascertained** through research and deduction whether **Assumption 4** 'The mathematical relationship between the energy of a dimension and the next higher dimension is a mathematical integral of the former' is correct for higher time dependent dimensions. It is mathematically correct in the cases of the first three dimensions, and there is as yet no evidence to the contrary for the others. There is no evidence to contradict **Assumption 1**. 'Mass remains invariable in all dimensions' given that mass-energy equivalence includes mass energy such as kinetic energy as part of the mass, i.e $E = mc^2 = m_0c^2 + E_k$. Rest mass differs from total mass.

More on Time and Energy

It may be illuminating to consider c/t in SI units. The unit for that ratio is metres/second/second which is the unit of acceleration. This suggests that $1/t_p$ which equals c/t , as established above under Mass Energy (E_n), is an acceleration also. This implies that E_n / E_{n-1} is an acceleration. So the energy of the 5th dimension divided by the energy of the 4th dimension is an acceleration of approximate numerical value $1/t_p$, or 10^{44}m/s^2 . Evidently, to accelerate a Planck mass (10^{-8} kg) at 10^{44} m/s^2 requires a force of 10^{36} newtons to drive that mass into the next dimension given $F = ma$. That may not be possible if the speed of light is an absolute, which seems likely within any given dimension. Alternatively, only massless particles such as photons can make that transition.

The Mathematics and the Cosmology

The foregoing mathematical reasoning summarized in *Table 1* also appears to provide a map of the development of the universe, without giving clues as to its final state. If the universe continues to accelerate, energy levels increase and perhaps at critical levels of energy, more dimensions emerge. Dimension 1 is at the point of the 'singularity' prior to the 'big bang'. There is no time and there is no space. The only quantity represented is mass, that is, highly condensed energy. The equation is $E_1 = m$.

Dimension 2 is at the point of the 'big bang'. There is no time or space. There is mass and velocity (which we call momentum). The equation is $E_2 = mc$.

Dimension 3 is after the 'big bang' at the beginning of time and space. There are three spacial co-ordinates, mass, energy, and time has commenced. The equation is $E_3 = \frac{mc^2}{t^0}$.

Dimension 4 is a continuing picture of the change in Dimension 3 after time has elapsed. The three spatial co-ordinates change in magnitude at the change in the co-ordinates of the fourth, which is time. Acceleration increases the rate of change of spatial co-ordinates. The equation is $E_4 = \frac{2mc^3}{3t^1}$.

Dimension 4 is mathematically and energetically equal to Dimension 3 multiplied by $\frac{2}{3}$ times c/t which is an acceleration of $0.66 \times 10^{44} \text{ metres / sec}^2$.

Dimension 5 has an additional 3 spatial and 1 time co-ordinates. It contains the 4th dimension which also has 3 spatial and 1 time co-ordinates. So, in total, the 5th dimension has 6 spatial and 2

time co-ordinates. There is an acceleration outside of an acceleration. The equation is $E_5 = \frac{mc^4}{3t^2}$. Refer to Dimensional Constant ($n_k = 8$) *Table 1*.

Dimension 5 is mathematically and energetically equal to Dimension 4 multiplied by $\frac{1}{2}$ times c/t which is an acceleration of 0.5×10^{44} metres/sec². It commences where acceleration takes velocity beyond c_4 , or light velocity of the 4th dimension.

The Higher Dimensions increase in complexity each with $3 + 1$ more spatial and time co-ordinates and higher energy levels, all of which can be calculated. They contain the lower dimensions. It is unknown how many dimensions there may be, but all are accelerations, which may explain why the universe appears to expand despite the opposing force from gravity. It does suggest that more energy is in the form of non-mass than as mass. The universe would only contract when there was sufficient mass for gravity to overcome the accelerations. We live within the infolded dimension, rather than the converse which String Theory suggests.

The Relativistic View of the Speed of Light

The foregoing, under Summary Time(t), indicates no departure of values for Planck time from the theoretically expected values of *Table 1*. Einstein predicted the variation in time for an observer travelling at high velocity, or put another way, having a higher level of energy (as momentum) than an observer at rest. In a thought experiment, the higher energy observer experiences a slowing of time compared to the lower energy observer, as seen only by the lower energy observer. The mathematics point to a higher energy level in a higher dimension, and, using the same logic, a slowing of time. The speed of light, c , is deemed to be constant, and if time is slowed, light will travel more metres in the slower 'second', as seen by the observer at rest, effectively increasing the value of c as seen by the observer at rest. Again, in an analogy with the speed of sound, it travels faster in a denser medium such as water when observed from (the different dimension) air. The Special Relativity Theory did not consider a different dimension with a different energy level, where the speed of light is constant in that dimension only, and different in the next when observed from the first. It may be that c equals 3×10^8 metres per second when observed in the 4th dimension only, and has higher values in higher dimensions, when observed from our 4th dimension. ***If c/t is constant (as indicated by the maths above), and t is not constant (as proposed by Einstein), then c is not constant.*** How to observe another dimension is problematic, but perhaps it can be done indirectly using some form of deduction or from dimensionally independent means such as quantum physics as later discussed.

Black Holes

The phenomenon of a black hole, quite extensively studied by Penrose, Hawking et al., appears to be a highly energetic and mass intensive region from which there is apparently no return. Is it possible that it is an entry to a higher dimension? These black holes often appear at the centre of galaxies as is the case with our own Milky Way, where localized energy levels are much higher than elsewhere in the 4th dimension, perhaps equal to the energy level of the 5th dimension. It may be that when the energy levels of the 4th and 5th dimensions are equal or exceeded, a black hole, or a connection between the two dimensions, is established. The massive stars which are consumed by them (given that energy cannot be created or destroyed) transfer mass-energy-time from a lower to a higher dimension and may become, to us, dark matter and dark energy as we can no longer observe them with the limited vision of the 4th dimension.

The Ether (as seen by Tesla)

The physicist Nikola Tesla's view was that mass constantly absorbed energy from the environment to power the spin of the subatomic particles of which it is constituted, and that the sun, for example, absorbs energy as well as produces it. Space energy accelerating through mass creates a gravity field, and mass accelerating through space energy creates an inertia field. These two represent a different view of the same thing. (This view does not violate Einstein's *equivalence principle* on which General Relativity Theory is based.) The speed of light is limited by space energy density much as the speed of sound is limited by air. Tesla saw space energy, (or energy from another dimension) as the 'ether' which was long hypothesized but never detected, (as was the

case in the Michelson-Morley experiment,) and also as the medium which allowed light to behave as a wave. If the 'ether' is indeed energy from another dimension, it exceeds the speed of light and the Michelson-Morley experiment was bound to fail to detect it. The experiment does not prove the 'ether' does not exist, it just doesn't provide a frame of reference. If Tesla's view of mass absorbing energy to maintain the energy for the spin of its subatomic particles is correct, then it may imply that there is a constant cycling of energy from higher to lower dimensions, and a return of that energy from lower to higher dimensions via mechanisms such as black holes.

The Origin of Gravity

Tesla's intuitive view above helps to provide the missing clue as to gravity's origin. Scientific experiment has not been able to violate the Equivalence Principle, which says that different masses are accelerated by the same amount in the same gravity field, cannot be distinguished from inertial acceleration and Gravitational mass is the same as Inertial mass. If mass accelerating through space energy (inertia) is related to space energy accelerating through mass (gravity) how can we accelerate energy through mass? The above section on The Mathematics and the Cosmology indicates that the energy of the 5th dimension is a maximum acceleration of approximately 0.5×10^{44} metres/sec² compared with the 4th dimension. The 4th dimension is contained within the 5th dimension, and therefore that acceleration, or 5th dimension 'virtual energy', passes through the mass within the 4th dimension. That satisfies Tesla's condition for the gravitational field we experience in the 4th dimension. **The Gravitational Field arises as a consequence of 4th dimensional mass and 5th dimensional energy.** *No wonder it has been so difficult to find the source, 5th dimension energy is not detectable from the 4th dimension.* Calculations using the gravitational acceleration and masses for both the earth and the sun indicate that the value of gravitational acceleration is of the magnitude 10^{-24} metres/sec²/ kg mass. The effect is additive where there is a conglomeration of mass, and according to Newton's Law of Gravitation when there is distance between masses. The gravitational field loses its potential at the same rate as the electric field, a function of $1/r^2$. The effect of energy accelerating through mass is to create a potential field (gravity), similar to a magnetic field created by electricity moving through a conductor. Both are potentials until they interact with mass, whence they become force fields. The converse is mass accelerating through energy creating a potential field (inertia) which becomes a force field when it interacts with mass, analogous to a conductor moving through a magnetic field to create electricity.

The Relationship between Electro-Magnetism and Gravito-Inertia

The difference between electro-magnetism and gravito-inertia is that the former requires an energy velocity while the latter requires an energy acceleration through their respective conductors, suggesting that the relationship of gravito-inertia to electro-magnetism is a function of a mathematical integral between the two, similar to the relationship between acceleration and velocity. This relationship points to the two phenomena being of different dimensions, and lends support to Assumption 4.

In the case of parallel electrical conductors, representing a two dimensional relationship, they attract each other when current flows in the same direction. This may be the case with mass, which is a three dimensional energy conductor. Two masses attract each other, suggesting that the flow of energy acceleration may also be in the same direction, probably toward the centres of mass. If a small mass has a small flow of energy towards its centre, it also has a large inertial resistance and will accelerate toward a bulk mass at the same rate as another larger mass with a larger energy flow and smaller inertia. The Equivalence Principle remains inviolate because of the congruity of gravitational acceleration and inertial resistance. This is analogous to the congruity between electricity and magnetism. The Equivalence Principle points to a consistent energy acceleration through mass, which supports the preceding calculations which resulted in an approximately constant energy acceleration between time related dimensions. The calculations also point to the

gravito-inertia potential being approximately the same in all higher dimensions because the energy acceleration ratio between dimensions remains approximately constant, of magnitude 10^{44} m/sec².

The mathematics supporting the above proposition of an integral relationship between gravito-inertia and electro-magnetism is as follows: Consider the existing formulae for Newtons Law of Gravitation for the radial gravitational force around a mass and the Biot-Savart Law for the radial magnetic force around a conductor of indefinite length.

1. $F = k \frac{m m}{r^2}$, the derivative $dF/dr = k \frac{2 m m}{r^3}$ which is of the same form as equation 2.
2. $B = k \frac{2 i}{r}$, the integral $\int_{-\infty}^{\infty} B dr = k \frac{i}{r^2}$ which is of the same form as equation 1.

These indicate that gravito-inertia is a of a different dimension to magnetism as seen from the 4th dimension. The complication is the force between two electric charges, which is of the same form as the gravity equation, $F = k q q / r^2$ (Coulomb's Law) suggesting the magnetic field is a mathematical derivative of the electric field and is therefore of a lower dimension. The energy conductor acceleration/velocity relationship however remains, as a difference between the source of the fields, and the anomaly is further addressed in the next section on the Electric Field.

The Electric Field

From the anomaly found above, the source of the electric field can be accounted for by the following: $F_g = G m_1 m_2 / r^2$ and $F_e = (4\pi\epsilon_0)^{-1} q_1 q_2 / r^2$ where $G = 10^{-11}$ and $(4\pi\epsilon_0)^{-1} = 10^9$.

So $F_g = 10^{-11} m_1 m_2 / r^2 = mg$, and $F_e = 10^9 q_1 q_2 / r^2 = qE$.

Mass **m** equates to charged mass **q** and acceleration **g** equates to potential difference (voltage) **E**.

If $m = 1$ kg, $q = 1$ coulomb and $r = 1$ metre

then $F_g = 10^{-11}$ and $F_e = 10^9$ and $mg = 10^{-11}$ and $qE = 10^9$.

So $qE / mg = 10^{20}$. From page 9. we know that $g = 10^{-24}$ m/s² per kg of mass, so $qE = 10^4$.

Then, the fields $g = 10^{-24}$ compared with $E = 10^4$ which are then multiplied by mass and charge divided by r^2 respectively to compute Force. The relationship of the electric, **E**, to the magnetic, **B**, fields is $E/v^2 = B/v$ where **v** is charge **velocity** (from J J Thomson's measurements), confirming that **E** is a function of an integral of **B**, and therefore perhaps of a higher dimension, or orthogonal, and that charge **velocity**, and not acceleration is the source of the electro-magnetic fields.

The Mathematical Description of Gravito-Inertia

There does not appear to be any quantification of inertia in the current or past physics literature, however inertia is easy to quantify. The relationship between gravitational or any acceleration, **a**, and inertia can be quantified mathematically from Newton's Second Law of Motion, $F = ma$, and the Equivalence Principle which establishes an invariable product between the two. Let us assign the Greek lower case letter **iota**, **ι**, to inertia for algebraic purposes and avoid confusion with other quantities using **I** or **i**.

From $F = ma$, $a = F/m$ from which SI units **a** evidently has units Newtons per Kilogram, (N / kg in addition to the more commonly used m/sec²). From the Equivalence Principle, **a** is proportional to **ι**, and that proportionality is a simple reciprocal relationship $a = 1/\iota$ and $\iota = 1/a$. **ι** has the units kg / N. For example,

1. if a mass of 20 kg has an acceleration of **a** = 10 N/kg, from $F = ma$, the force is 200 N. As $a = F/m$, the inertia $\iota = m/F = 20/200 = 0.1$ kg/N. **a x ι = 1**
2. if a mass of 15 kg has an acceleration of **a** = 1 N/kg, force is 15 N and the inertia $\iota = m/F = 15/15 = 1$ kg/N. **a x ι = 1**
3. if a mass of 40 kg has an acceleration of **a** = 0.1 N/kg, the force is 4 N and the inertia, $\iota = m/F = 40/4 = 10$ kg/N. **a x ι = 1**

Regardless of mass, a $\dot{t} = 1$, which is why different masses accelerate at the same rate in the same gravitational field. Scientific experiment has so far never been able to disprove the Equivalence Principle.

The General Equation for the Equivalence Principle of acceleration and inertia is $\mathbf{a \dot{t} = 1}$

Time and Inertia

It has been established, (p.6) above, that the ratio $\mathbf{c/t = 1/t_p}$ and is approximately the acceleration energy ratio between time dependent dimensions (4th and higher). From the above discussion of the Equivalence Principle, the acceleration $\mathbf{c/t}$ has as its corollary the inertia which equals $\mathbf{t/c}$. In SI units this says that $\mathbf{t/c = \dot{t}}$ kg/N and $\mathbf{c/t = a}$ N/kg (or m/s²). In Planck measure, acceleration equals $\mathbf{1/t_p}$ and inertia equals $\mathbf{t_p/1}$ or $\mathbf{t_p}$. ***Planck time numerically equals Planck inertia.***

From the review of Assumption 2. on page 6:

If Planck time is variable and it decreases, then Planck inertia decreases, and by the Equivalence Principle corollary, Planck acceleration increases.

This is the same conclusion as that drawn by Special Relativity Theory but arrived at from another direction. Special Relativity sees the acceleration as the cause of time dilation rather than time dilation causing the acceleration.

From the foregoing analysis of dimensional energy, it is quite probable that **the enormous difference in energy (acceleration) between the 4th and 5th dimensions for example, represents a very large slowing of time in the 5th dimension when viewed from the 4th dimension.**

This would then support the foregoing proposition regarding the Relativistic View of the Speed of Light on page 8, the validity of the constant $\mathbf{c/t}$ and hence the Assumption 4 on page 2.

The electro-magnetic (E-M) particles of the 5th dimension travel faster than $\mathbf{c}$ of the 4th dimension ($\mathbf{c_4}$) because time is slower in the 5th. The 5th dimension E-M particles are not observable in the 4th because they exceed $\mathbf{c_4}$ in the 4th dimension. They are the 'virtual particles' making 'virtual energy' or 'space energy' as described by Tesla. There may be a direct connection between 4th and 5th dimension E-M particles as before mentioned at a broken symmetry such as electric and magnetic dipoles, the seemingly endless energy exhibited coming from a deceleration of the 5th dimension E-M particles entering the 4th dimension time system at one of the poles where they become detectable as 4th dimension E-M particles, and exiting the 4th dimension at the other pole back to the 5th dimension where they are again undetectable. The observable result we call a '**static**' field because we cannot extract a net energy to do work, although it is in fact dynamic.

From the above relativity analysis it would seem that there are some different quantities to recognize. These are $\mathbf{c_4}$ and $\mathbf{c_5}$, $\mathbf{t_4}$ and $\mathbf{t_5}$, representing the speeds of light and times in dimensions 4 and 5 respectively, as observed from the 4th dimension.

The Relativity of Acceleration, Inertia, Gravity and Time

The equation for the Equivalence Principle and the equivalence of Planck time and Planck inertia suggest an orthogonal relationship between the above quantities of gravito-inertia.

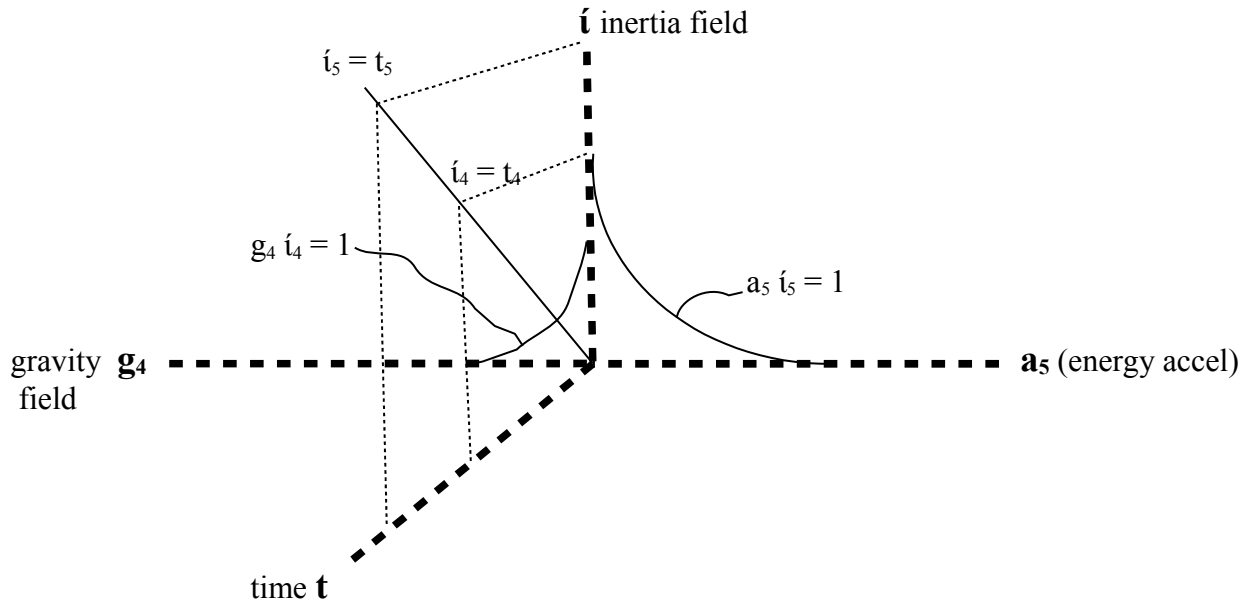


Diagram 2

Time and inertia can be numerically the same but are orthogonal. $t_4 \perp i_4$, $t_5 \perp i_5$
 The product of acceleration and inertia equal 1. $a_5 i_5 = 1$ (equivalence principle)
 The product of gravity field and inertia equal 1 $g_4 i_4 = 1$ (equivalence principle)

The 4D gravitational field is in the opposite direction to 5D acceleration which is energy through mass, toward the centre of mass. The gravity field is from the centre of mass outward and weakens as $1/r^2$.

Electro-Magnetic Comparison

There is an equivalent relationship in electro-magnetism, with magnetic field, electric field, current and force as shown in *Diagram 3*.

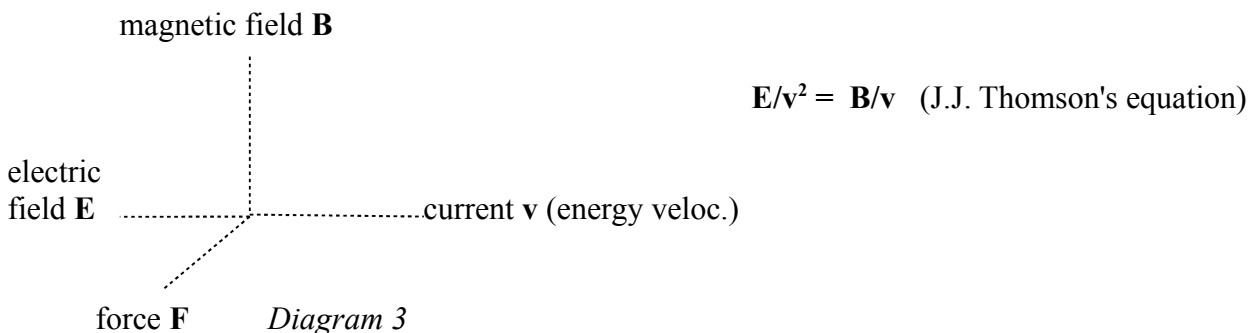


Diagram 3

The electric field, E is in the opposite direction to the energy velocity, v (current) and weakens as $1/r^2$. The comparison above may suggest that Time is an acceleration of a Force when seen from the lower dimension, i.e. $t = \int ma$. More research and deduction is needed.

The Mathematics of Inter-Dimensional Times and Light Speeds

The purpose of these calculations is to find an order of magnitude for the differences in c_4 , c_5 , t_4 and t_5 . From the foregoing it is evident that $\frac{c_4}{t_4} \times 10^{44} = \frac{c_5}{t_5}$ as calculated in the dimensional energy section.

Therefore $c_5 t_4 = c_4 t_5 \times 10^{44}$,

and $c_5 = \frac{c_4 t_5 \times 10^{44}}{t_4} = \frac{3 \times 10^8 \times 10^{-44} \times 10^{44}}{10^{-44}}$ (using t_p values from p.7, Time(t): (1))

then $c_5 = 3 \times 10^{52}$ m/s .

If $\frac{c_5}{t_5} = 10^{44}$, then $t_5 = \frac{c_5}{10^{44}} = \frac{3 \times 10^{52}}{10^{44}} = 3 \times 10^8$ sec

So, in orders of magnitude

$$\begin{aligned} c_4 &= 10^8 \text{ m/s} \\ t_4 &= 10^{-44} \text{ sec.} \\ c_5 &= 10^{52} \text{ m/s} \\ t_5 &= 10^8 \text{ sec.} \end{aligned}$$

The general inter-dimensional equations are

$\begin{aligned} c_{n+1} &= c_n \times 10^{44} \\ t_{n+1} &= c_{n+1} / 10^{44} \end{aligned}$	or, $c_n = t_{n+1}$
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The 5th dimension apparently has a much slower time and a much higher light speed as seen from the 4th dimension, as discussed in the previous section. Light speed differs by a factor of 10^{44} m/s, and Planck time is numerically equal to light speed of the previous dimension. That is a ratio of one 5th dimension second to 10 years in 4th dimension time.

The implications of this have yet to be fully assessed, but it does suggest explanations for virtual photons, the source of gravity, the relevance of inertia, some of the strange phenomena of quantum physics as later discussed, and takes a step further beyond Einstein's Relativity without contradicting any part of his theories except removing the confining limits to cosmology set by an absolute speed of light. It also suggests that higher dimensions when viewed from the 4th dimension move toward timelessness in comparison ($t_6 = 3 \times 10^{52}$, or 4th dimension ten thousand billion billion years to one 6th dimension second, but only 10 years seen from the 5th dimension), and they are an engulfing omnipresent part of the 4th dimension, manifestations of which are seen in the form of gravity and other phenomena.

Effects from Higher Dimensions

Dimension Relativity Theory predicts that each dimension is contained within the next higher dimension. As our primary interest is in our own 4th dimension, it seems appropriate to view what might be true here. The acceleration energy of the 6th dimension would also engulf the 4th dimension, just as does the acceleration energy of the 5th. The 6th dimension acceleration would be $c/t = 10^{88}$ as seen from the 4th, the 7th $c/t = 10^{132}$ and the 8th $c/t = 10^{176}$. Each dimension has its own particular light speed and time. The light speed exceeds c_4 and photons from higher dimensions are not detectable in the 4th dimension, as previously discussed under Time and Inertia on page 12. The interaction of the super fast photons of the 6th and higher dimensions with mass in the 4th dimension may account for the other forces known to us. They are, in addition to electro-magnetism and gravito-inertia, the electric charge, the weak nuclear force and the strong nuclear force. The strong nuclear force field decreases as a function of $1/r^5$, which suggests that its source may be photons from the 8th dimension. The logic comes from the Assumption 4, which proposes the mathematical integral between dimensions, or four integrals above the 4th dimension, moving from $1/r$ for the 4th $1/r^2$, $1/r^3$, $1/r^4$ to $1/r^5$ in the 8th, as outlined on page 9 under The Relationship between Electro-Magnetism and Gravito-Inertia. If this is so, it implies that the weak nuclear force originates from perhaps the 7th, and that there is another interaction, perhaps the energy which gives mass its electric charge, from the 6th, or vice versa. The rate of decay of the field may be the clue as to the source dimension of the photons whose interaction with 4th dimension mass creates the field. Further deduction and research is needed on field decay rates and whether there is a relationship to source dimension.

Bull's Equations

Summarized below are five new equations relating to the Theory of Dimensional Relativity and seven Newtonian equations in different form.

The above quantification of inertia (page 10) which identifies an alternative unit of measure for acceleration also offers another set of equations. They represent an alternative approach to calculating quantities seen in Newtonian physics.

For example, given the alternative measures for acceleration $\mathbf{N\ kg^{-1} = ms^{-2}}$, then $s^2 = \mathbf{N\ kg^{-1}\ m^{-1}}$, therefore $s^2 = \mathbf{kg\ m\ N^{-1}}$ and $s = \sqrt{(\mathbf{kg\ m / N})}$ which in English says that time equals the square root of (mass times length divided by force).

Symbols used are F = force, m = mass, a = acceleration, *i* (iota) = inertia, t = time, v = velocity, r = length, M = momentum, n = dimension number, c = the speed of light, g = gravity field, E = mass-energy and k denotes a constant.

<u>Quantity</u>	<u>Equation</u>	<u>Unit of Measurement</u>
1. Dimensional Energy	$E_n = (m\ c^{(n-1)}\ i_k\ n_k) / t^{(n-3)}$	(varies with dimension)see p.3, 7
2. Equivalence Principle constant	$a\ i = k\ (k = 1)$	(dimensionless)
3. Light – Time constant	$c_n / t_n = k\ (k = 10^{44} = 1/t_p)$	(m / s ²) where n > 4
4. Inter-Dimensional light/time equivalence	$c_{n+1} = c_n \times 10^{44}$ $t_{n+1} = c_{n+1} / 10^{44}$	(m/s) (s)
5. Inertia	$i = m / F$	(kg / N)

Newtonian

1. Time	$t = \sqrt{(m\ r / F)}$	(kg m / N) ^{1/2}
2. Acceleration	$a = F / m$	(N / kg)
3. Velocity	$v = Ft / m$	(N s / kg)
4. Length	$r = Ft^2 / m$	(N s ² / kg)
5. Mass	$m = Ft^2 / r$	(N s ² / m)
6. Force	$F = m r / t^2$	(kg m / s ²)
7. Momentum	$M = F^2 t^3 / m r$	(N ² s ³ / kg m)

This form of the Newtonian physics equations is useful where inertia is relevant to considerations as the units are intuitive and accord with the reciprocal, which can be helpful when analyzing complex situations involving the Equivalence Principle such as that on page 11.

The relationship between acceleration, velocity and length in these equations has been inverted when compared with Newtonian equations, in that time, t becomes a multiple. This suggests a mathematical approach from a different direction, as in the case of time dilation on page 11, and provides different insights. Equations can be returned to Newtonian form substituting mr/t^2 for F.

Einstein's proposition that the speed of light is constant is only true within one dimension, in our case the 4th. The constant *c* becomes a variable in a different dimension when seen from the former, and the constant factor becomes *c/t*, which holds constant for all time dependent dimensions above the 4th. Einstein's search for the origin of gravity was programmed to fail because of his own proposal that the speed of light was absolute and invariant, which is only true within any one dimension.

Emerging Conundrums, Micro and Macro

Modern science has ascertained that some subatomic particle spin has a rotational velocity up to 1.37 times the speed of light, which does not concur with the scientifically accepted limitation of light speed. Similarly, the fact that our galaxy, which is about 100,000 light years across, has a rotational unity, suggesting that the connection between one side and the other is made by some governing agent which exceeds the speed of light. The solution to those conundrums may be related to dimension and its possible effect on relativistic light speed as observed from the 4th dimension. More deduction and / or research in this area may be productive.

Dimensional Independence - Quantum Entanglement

We have a mindset wedded to cause and effect, and therefore have trouble comprehending the concept of quantum entanglement where there is no cause-effect progression. That with two widely separated particles one can have an effect on the other before it has been caused, such as a transmission being received before it was sent. Experimental evidence indicates that this is indeed the case. The intention to transmit is apparently enough to have an effect on the entangled particle if we must look at it in this cause-effect manner. This might suggest that quantum entanglement is independent of dimension, time and therefore of the speed of light, or, obeys the light/time ratio of a higher dimension. The strangeness of quantum mechanics to our normal perception of reality is underlined by our difficulty in perceiving outside the parameters of time. The Uncertainty Principle, the observation affecting the outcome, reversed cause and effect are all more easily understood if time is not considered as part of the issue. One might conclude that these quantum sized particles are not necessarily part of the same dimension in which we exist and therefore not subject to the same rules of time or light speed. This is even more likely in the case of sub-quarks which disappear and re-appear and are fundamentally the energy to mass connection moving between this dimension and another.

Conclusions

1. The quantification and concise expression of the Equivalence Principle has enabled another approach to the conclusion of the Theory of Special Relativity regarding the dilation of time. The Equivalence Principle conclusions are the same as those of Special Relativity but provide another insight into the relative speed of light between dimensions and the relationship between time dilation and acceleration. This has important implications for the study of cosmology and the structure of the universe.
2. The Equivalence Principle has always underpinned the Theory of General Relativity and with a clearer understanding, it has enabled the quantification of time dilation through the mathematics of inter-dimension. The magnitude of the slowing of time in the 5th dimension as seen from the 4th is that we see one second in the 5th dimension as equivalent to approximately 10 years in the 4th dimension.
3. Dimensional Relativity Theory and the Equivalence Principle deduce and support the Relativistic Speed of Light Theory. Special Relativity Theory establishes the *time to acceleration* connection, the Equivalence Principle establishes the *acceleration to inertia* connection and Dimensional Relativity Theory establishes the *inertia to time* connection. *Together they are a progression of Einstein's Relativity Theories.* Light speed in the 5th dimension as seen from the 4th is approximately 10^{44} m/s faster than the 4th, which accords with the c/t acceleration ratio between the dimensions. In the 4th dimension light travels 9×10^{15} metres in a year. In the 5th dimension light travels 9×10^{61} metres in a 4th dimension year. The galactic rotational unity conundrum may well be control from the 5th dimension.

4. An understanding of dimensions has enabled a plausible and analogous Theory of the origin of the Gravitational Field, a phenomenon which is inadequately explained in the Einsteinian Relativity Theories. The analogous relationship between electro-magnetic and gravito-inertia fields in this theory supports Assumption 4.
5. An understanding of dimensions may provide a theory as to a reason for a black hole and a result for matter consumed by a black hole, not previously noted in physics, through the calculated energy threshold of each dimension, and the consequence of it being exceeded in the lower dimension.
6. The Relativistic Speed of Light Theory explains some of the puzzling phenomena of quantum physics and virtual photons, but maintains a constancy with time.
7. Einstein's proposition that the speed of light is constant may only be true within one dimension, in our case the 4th. The constant c becomes a variable in a different dimension when seen from the former, and the constant factor becomes c/t , which holds constant for all time dependent dimensions above the 4th.
8. *The universe will continue to expand at an accelerating rate* because the gravity field is sourced from the acceleration of the energy of the next higher dimension through the mass of the lower dimension. Gravitational force can therefore not overtake the acceleration.
9. The results indicate that the initial four hypotheses on page 2. are (1) correct, (2) incorrect, (3) correct, (4) probably correct, supporting evidence and no evidence to the contrary. Further research on Assumption 4 is warranted.
10. Time (on page 12) can, through the inertia field and the Equivalence Principle, be deduced as a function of the reciprocal of acceleration from the next higher dimension and also as an acceleration of a force, which in turn relates time to mass. Acceleration itself is a time dependent quantity, so that there is an unresolved circularity within the mathematics, which may have been recognised by the reader earlier in this Paper. On consideration of the mathematical circularity, Assumption 3 is probably still valid (*time is reciprocal to energy*), the mathematical circularity being caused by the nature of time itself, also noted by Einstein in his view of 'space-time' as a single connected entity.

Summary of New Theories

1. Theory of Dimensional Relativity

The ratio of energy between consecutive time dependent dimensions (n), 4th dimension and higher, is an acceleration of magnitude c_n / t_n , which is a constant and equals $1 / t_p$, the reciprocal of Planck time in the 4th dimension. The mathematical relationship between the mass-energies of these dimensions in ascending order is an integral of the previous dimension. Time is a function of a reciprocal to acceleration in each dimension and numerically equal to the speed of light in the previous dimension. Each higher dimension contains all of the lower dimensions. The ratio of light speed to time is a constant in each time dependent dimension and is an acceleration maximum of the order of 10^{44} m/s^2 beyond the previous dimension.

The equation for dimensional mass-energy is $E_n = m c^{(n-1)} i_k n_k / t^{(n-3)} \text{ J/kg}$.

The equation for the light-time constant is $c/t = k 10^{44} \text{ m/s}^2$.

2. The Quantification of the Equivalence Principle

The mathematical relationship between acceleration and inertia is reciprocal. The product of acceleration and inertia is always constant. The equation is $a i = 1$.

3. Theory of the Origin of the Gravitational and Inertia Fields

The Gravitational field arises as a result of an acceleration of energy through mass. The Inertia field arises as a result of the acceleration of mass through energy. These two fields become force fields when they interact with mass and have a reciprocal value, the product of which is a constant. Gravity arises from the acceleration through mass of energy from the next higher dimension, (energy which is not detectable from the lower dimension,) and inertia arises from the acceleration of mass through energy from the next higher dimension, (energy which is not detectable from the lower dimension). The equation is $g i = 1$.

4.Theory of the Relativistic Speed of Light

The acceleration c/t between dimensions is a constant (from the Theory of Dimensional Relativity above) and time (t) is not a constant, (as established by the Special Theory of Relativity), therefore the speed of light (c) is not constant and varies with time (t) between dimensions. The equations for the Inter-dimensional light speeds and times are $c_{n+1} = c_n \times 10^{44}$ and $t_{n+1} = c_{n+1} / 10^{44}$.

5.Theory of the Relationship of Gravito-Inertia to Electro-Magnetism

Gravito-Inertia is a result of acceleration of energy through a three dimensional conductor (mass), and its converse. Electro-Magnetism is a result of a velocity of energy through a two dimensional conductor (wire), and its converse. The mathematical relationship is that Gravito-Inertia is a function of an integral of Electro-Magnetism. The former originates in a higher dimension than the latter. The effects of the Gravito-Inertia fields are seen in the lower dimension as are the effects of the Electro-Magnetic fields. The effects similarly from higher dimensions may account for the electric charge, the weak and strong nuclear forces, which together give mass its atomic structure.

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