# A Universe a Single Field Can Play In

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## Abstract

A single-field approach to a unified field theory for physics defines space-time as MC. The Lorentz transform factor results as the distortion effect of enfielded mass. Euler's identity is the missing field factor or action principle to indicate the enfielding of energy into matter. The relative exponential differences between the four fundamental forces are then explained by the Euler factor's spin. This makes the factor into a hidden-variable patch for any field theory.

## 1. Development

### A single UFT force

Let us start with that basic truth written as E=MC^2 or E equals MC squared. This is called the principle of mass-energy equivalence. Let's go beyond that and make it into a principle of equality. So how can energy and matter be two forms of the same thing? Since this article is merely speculation, a mathematical recreation, we won't always be bound by the rigorous constraints of known physics. We can form a new interpretation of space-time (st) intended for compatibility with as many basic principles that fit. For classic unified field theory (UFT), we are concerned with the four basic forces of gravity, electromagnetism, nuclear binding, and radioactivity, to spin it into theory,

## 2. A Universe Needed

### Covering the 4 forces

Each of these forces is illustrated by one idea. Gravity is represented by a planet in space. Nuclear binding and radioactivity are illustrated by in the nucleus of the atom, protons are bound together in spite of their repelling electric charges. The nucleus can also discharge particles or radiation, radioactivity, which would be going away from the nucleus.

An actual illustration of electromagnetism would have dotted lines to show the magnetic field. Electric current flow lines up electrons, or if a bar magnet has the electrons lined up in the same orientation, the effect is the same as current flow, to create a field. We could take the direction of current flow as fitting the "right hand rule" of a field curving around like fingers curled up behind the right hand's pointing thumb.

# 3. Action Principles

## Speed-field relation

Electromagnetism is also modeled as the electromagnetic wave spectrum, which also is modeled with particle properties. A particle of light is called the photon, typically considered as energy without mass. The constant speed of light, C, in all frames of reference led to the theory of special relativity. General relativity models the curvature of space and time by gravity from mass. One way it was confirmed is by observing the bending of light rays near the sun. Massless photons with no field of their own are still affected by a gravity field just because space itself is curved. If something is mass, it can never reach the speed of light, according to relativity.

For our UFT substance, we will not make a sharp distinction between mass and energy. Instead, in Table 1 we will compare fields and particle speeds:

| | Speed | Field range |
|---|---|---|
| Photon | C | 0 |
| Weak nuclear | ? | 10^-17m |
| Strong nuclear | ? | 10^-15m |
| Electromagnetic charge on a mass | Current flow | observable |
| Gravity mass | Inertial or g acceleration | interstellar |

Table 1: Speed and Field Range

It seems there is an inverse relation between speed and field. A slower speed has a bigger field.

## What is a field? Definition

A field is an area where force or some other quality manifests. We will address the aspects of speed, range, intensity, force, and momentum. Begin with E=MC^2 or E equals MC squared, or energy equals mass times the speed of light times the speed of light. This is a kind of statement of the ultimate potential energy in mass. Dividing both sides of the equation by the speed of light, we now have E/C=MC. This is a momentum field of mass times the speed of light. Here we depart from relativity theory because in real-world physics this is supposed to be impossible. So, our UFT's mass M is not yet matter in the conventional sense. If it is really moving at the speed of light C then it is a photon. It can be modeled as an electromagnetic force, but it does not have the force fields of matter like gravity, binding, or radiation. It moves in a straight path as energy, whereas all the fields of matter would confine it to a local area. To become fielded as matter, its straight-line path must change.

# Enfielding by Euler's

There is a mathematical symbol which is interpreted in physics to mean rotate 90°. It is the letter i which also stands for the square root of negative one, √-1. This is part of Euler's equation e to the pi i plus1 equals zero: $e^{(\pi i)} + 1 = 0$ or $e^{(\pi i)} = -1$. The symbol pi or π is defined as the ratio of the circumference to the diameter of a circle, and Euler's equation can be interpreted as a way to describe cyclical patterns. If a straight path photon of energy begins a 90° or 90-degree rotation from the diameter of the circle to move along the circumference we can say that it has become enfielded into matter (fig 1).

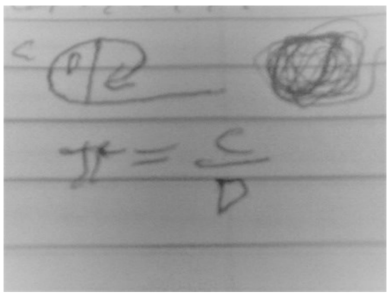


*Figure 1*

This is one way to interpret the meaning of i. Another interpretation of Euler's equation is that $e^{(xi)} = \cos(x) + i\sin(x)$. Which again would be the cosine wave in the real-number plane and a sine wave in the 90-degree imaginary i-plane. However, when x is pi this cyclical wave motion is also just equal to -1 which could mean the opposite direction that a photon was moving in before it became enfielded and took an orbit at a right angle (fig 2). So then Euler's equation would be a multiplying factor in a UFT formula.

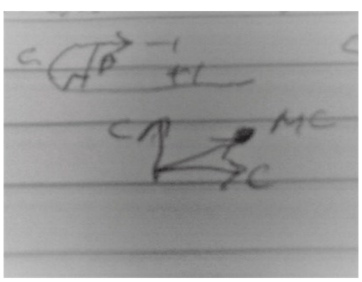


*Figure 2*

This explains the how but not the why of enfielding. It would also explain the how of the reverse process of unfielding where a matter particle or wave stops harmonizing in its self-contained area and resumes a straight path as a photon vibrating with its wave-like properties. Something of the why may be due to the +/ - nature of the direction of the equation which was defined as one. When two UFT particles collide, we will take that to be the final multiplication of their masses, and we will only consider the directional value of +/-1. Positive one has been defined as the path of a photon while -1 has been defined as the path of enfielded mass. A few basic possibilities exist:

-1 X -1 = +1 two masses collide and convert to photons,

-1 X 1 = -1 mass absorbs a photon,

1 X 1 = 1 photons collide and merge or remain photons.

Those would be the rules according to basic arithmetic. The other possibilities which would not conform to standard arithmetic are:

1 X 1 = -1 photons collide and emit a mass,

-1 X 1 = +1 mass absorbs a photon and converts to photon,

-1 X -1 = -1 two masses collide and remain mass.

For now, the basic rules can suffice. The other rules may apply if something else like the Euler field factor makes a better fit to reality.

## Space-time (st) defined as MC

So, our particle of UFT material has now become fielded mass and is no longer moving at the speed of light C. Then what was the meaning of a potential momentum field MC? This is the ultimate momentum from the ultimate energy that any mass can have. For conservation of energy, this is the structure of space-time. In any inertial frame of reference, a particle's total momentum is MC merely due to its existence in space-time. A Cartesian-like grid would have the X and Y axes represented each by a C vector, meaning the speed of light (fig 3).

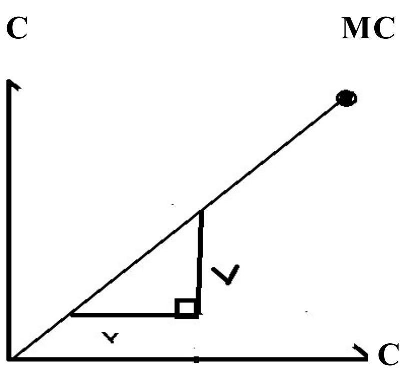


*Figure 3*

Note that area is two dimensions or C squared, as in E=MC^2. This can be interpreted as the three-dimensional aspects of the grid, and the two-dimensional plane of C squared would be analogous to the curl of the field while one-dimensional vector momentum is analogous to the divergence of the field. MC is the space-time tension that any particle has. Left on its own, that particle can move along the grid as a photon or other energy particle.

What of the inverse relation between speed and field? A particle at slower speed has a bigger field. A ratio $V/C$ that appears in relativity theory also makes sense to modify the momentum field $E/C=MC$ since the momentum of physical objects is $MV$ not $MC$. To maintain the original balance of the relation, we have $E/(V/C) = MV/C$. The left side of this equation will become bigger as the velocity becomes smaller. So, we can call the ratio $V/C$ a measure of the field intensity. Since our basic structure of space-time is $MC$, a measure of the range ratio factor $R$ of any field could be defined so that $RV= C$. Then range factor times intensity is $R \times V/C = CV/VC = 1$. A photon with velocity $C$ has field intensity one to begin with, and a range of one, which would mean the diameter of the photon itself with an exterior field of zero. Since $R = C/V$ there is now some justification for the traditional infinity postulates of fields: as $V$ approaches 0 the range factor approaches infinity for that special frame of reference.

Look at the above diagram of the path of $MC$ in a CxC grid (fig 3). Using the Pythagorean theorem, break Its $C$ vector into its right-angle velocity components $v$ and $V$:

$$v^2 + V^2 = C^2 \qquad v^2 = C^2 - V^2 \qquad v^2/C^2 = C^2/C^2 - V^2/C^2$$

$$v^2/C^2 = 1 - V^2/C^2 \quad \text{so} \quad v/C = \sqrt{1 - V^2/C^2} \quad \text{and if } Rv = C \text{ then } R = C/v$$

But $C/v = 1/(v/C)$ which $= 1/\sqrt{1 - V^2/C^2}$ which is the Lorentz transform factor (Ltf) so

the range factor $R$ of $v$ = the Ltf of its co-component $V$. The velocity components $v$ and $V$ come from the enfielding of mass $M$ (fig 4). Special relativity's Ltf is generated here by the mass distortion of (st) into the sublight velocity of matter.

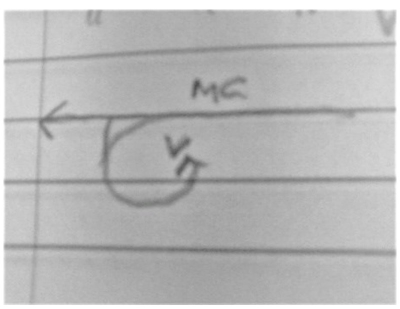


*Figure 4*

# 4. A Universe Compared

## Scale of forces

The following table is from a standard textbook cited in the sources:

| Force | relative strength | Range |
|---|---|---|
| Strong nuclear | 1 | 10^-15m |
| Electromagnetic | 10^-12 | oo |
| Weak nuclear | 10^-14 | 10^-17m |
| Gravitation | 10^-40 | oo |

Table 2: from Hartmann and Impey, 2002

## Gravity thus 1/100

The table uses the Strong nuclear force as a unit of one since it is the strongest. The relative strengths of the other forces in the table are compared to that. One implication from the table is that gravity is also not really an infinite range. We see that gravity is less than the strong force by a factor of 10 to the -40 power. If there is an inverse relation between speed and field, then it may also show up between strength and range. We may thus conclude that the range of a gravity field is greater than a strong field by the factor of 10 to the 40th power. Multiplying these two factors means that we combine the exponents to get the range of a gravity field as: 10^-15m x 10^40 = 10^25 meters.

We can compare this result to the known size of the universe, 8.8x10^26 meters. Rounding this up to 10^27m we see that the universe is about 10^2 or 100 times bigger than the extent of a single gravity field. Our galaxy is said to be only 5x10^20m across, which is well contained within any single gravity field. A galaxy may only affect 1/100 of the rest of the universe, with its gravity. This may explain so many astronomical observations which at present do not fit any theories.

So in the table, both gravity and electromagnetism carry a definition that their ranges are infinite. I would call this an infinity postulate. Instead, here is a new infinity postulate that the space-time tension of a particle everywhere is MC. The old infinity postulate is not used. Unfortunately, our formula for the range of field based on velocity does not give an easy answer for gravity's field as 10^25 meters. For example, a single g of earth acceleration due to gravity for one second gives about 10 m/s. The speed of light C is $3\times10^8$ m/s. From that, the gravity range of an earth particle would be only 10^7 m. If we multiplied masses in Newton's formula, perhaps we could add exponents to get 10^14. Now the gravitational constant G has a power of 10^-11. If this were inverted and the exponent was added, then we would get 10^25 meters.

This implies an alternative range formula when considering paired velocities:

$R_1 R_2 / G$ = range

Later results for weak and strong particle speeds support the use of this formula.

What does not support this formula are the unit labels on the gravitational constant G and also the range ratio factors R. We can only take the number values from G instead of its labels. If we treat the range factors like a 1-second snapshot then there is some support for using them as actual distance values and not just dimensionless ratios, since time times velocity equals distance.

## Spin cycles for field strength

If we subtract exponents in the above table we see that electromagnetism is 10 to the 28th power stronger than gravity, or 10^28. The two forces have different inverse square laws, one based on charge Q and the other based on mass M. Our UFT field should only have a single inverse square law. Besides that law, it also has the new Euler factor e^(nπi) where the exponent n pi i allows for many cyclical waves or spins represented by the letter n. If each enfielded mass has its own Euler factor and two masses multiply in such an inverse square, then at the very least it would be e^(2πi) which would revert to a direction of +1 if it were still photons, but it is not. Instead, for two enfielded masses the system has them spinning or cycling at some value of e^(nπi).

The value of n may be the only difference in field strengths. For comparison, let us say that n equals 1 for the gravity field G and we don't know the value of n for the electromagnetic field Q. We do know that the ratio or fraction Q/G equals 10^28. All other field formulas in the fraction have canceled out leaving only:

e^(nπi) / e^(πi) = 10^28. This simplifies to e^((n-1)πi) = 10^28. Solving for n we get:

n = (28 ln10) / (πi) + 1 as how many more cycles or spins the enfielded particle had to make to go from gravity to electromagnetic strength. In this context if we treat the i as just one then the value of n is 21.522 or 21 and a half spins. Similar calculation results for strong and weak forces will appear in a table below.

## Inertia, where is +/- always

The value of n may also determine where is a +/- polarity in the UFT field, which is always seen in Q but never recognized in gravity's G. Consider two curves extended into complete circles side by side: a OO pattern (fig 5). This could represent the spinning (st) cycles of two enfielded masses. General relativity would make this out to be the (st) funnels of mass without any spin. By spin I refer to the n value of the Euler field factor. If the spins are in the same direction they have the same sign whether +/+ or -/-.

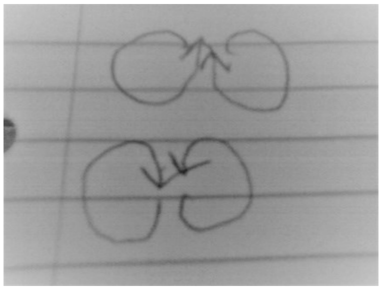

*Figure 5*

If the spins are in the opposite direction they have different signs whether +/- or -/+, and the circular paths will come around to go through the middle of the OO shape in the same direction. This is opposite signs attracting in (st). If the spins are in the same direction and get out of sync the paths will collide in the middle of the OO, opposing each other in reverse direction (fig 6). This is repulsion of the same signs whether +/+ or -/-.

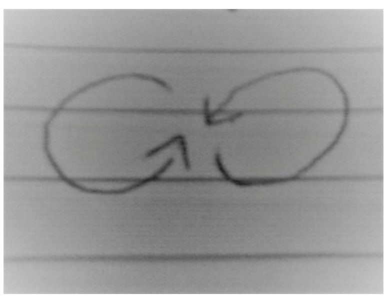

*Figure 6*

What of the neutral charge, which can show up on a neutron that may split into a +/- proton and electron? Where does the spin go for a fielded yet neutral mass? On a two-dimensional figure, the spin may shift off of the diagram into the third dimension, losing its mutual or opposite flow to a 2-d spin path. This then raises the prospect of neutrons and antineutrons in their own +/-/0 plane of action.

The question remains, where is repulsion with the force of gravity? All around us we see everything attracted with gravity as if everything has opposite +/- polarities. Part of the answer may be in an anthropic principle: If the anti-gravity were not already gone we would not be here to notice. There are suggestions that galaxies are separating at an accelerating rate, and this would clearly be due to repulsion of their net gravitational fields. The cosmological constant of general relativity may then be an index of anti-gravity repulsion.

On an everyday level, where else could anti-gravity repulsion show up? Modeling gravitational motion occurs in two dimensions, one in the direction of attraction and the other at an inertial right angle. Inertia is plain velocity not acceleration so it is a momentum not a force. The momentum that keeps two masses moving away from each other or towards each other as the case may be. Maybe sometimes inertia is from the impetus of repulsion. In a broader inertial frame of reference where special relativity would apply, but too local for general relativity, anti-gravity only happens on a gravity scale. In a single field there is only one kind of repulsion: when n values get out of sync.

## Quantum unit basis

One way to get a real value of n is to use quantum theory and Planck's constant h. Combining E=hF and E=MC^2 makes MC^2=hF which gives the frequency F= MC^2/h for a matter wave. If we put in the numbers for the reduced constant h and the Planck mass then we get:

2.18x10^-8 (3x10^8)^2 / 1.05x10^-34 = 18.6857x10^42 = 1.8x10^43

This is the Planck frequency in Hz for the upper bound of electromagnetic or cosmic rays. Since this is the highest possible frequency, it can represent the strongest force of nuclear binding.

To be consistent with the Heisenberg uncertainty principle, the smallest possible spin radius should be the 1.6×10^-35 m Planck length when we interpret the uncertainty principle as angular momentum.

## Radioactivity-binding +/-

The next table will show the relative spin-cycle n values for each force and also their characteristic frequencies. The relative force magnitude alters the frequency exponents:

| Force | Magnitude | Frequency Hz | Relative n |
|---|---|---|---|
| strong | 1 | 10^43 | 30.317 |
| electromagnetic | 10^-12 | 10^31 | 21.522 |
| weak | 10^-14 | 10^29 | 20.056 |
| gravity | 10^-40 | 10^3 | 1 |

Table 3: Relative Comparisons

The characteristic frequencies for electromagnetic and weak force are beyond the high gamma range. Since gamma rays are part of radioactivity emissions this is not too surprising for the weak force. It is more surprising that it would be the basis of charge Q. Gravity does give a good fit merely by subtracting exponents, though gravity waves are not electromagnetic waves. This 10^3 frequency could be the actual angular speed of a single-n spin speed.

We can now fill in the missing velocities in our first table above for the strong and weak nuclear forces. Use the field definition of range times velocity equals C, or RxV = C. For the strong nuclear force, its range is 10^-15m while the speed of light C is 3x10^8 m/sec. V would have to be 10^23 for the exponents to work, which is impossible for a single particle, but we have two particles multiplying in the inverse-square relation. As was done with the gravity example above, we will also consider the gravitational constant with its exponential power of 10^11. So, from an exponent of 23 we subtract 11 and then divide by 2 leaving 23-11 = 12 / 2 = 6 for the exponent. So the revealed mass particle velocity in a field of nuclear binding strength is 10^6 m/sec.

Similarly for the weak nuclear force, its range is 10^-17m. To get a light speed C value of 10^8 m/sec, V would have to be 10^25 for the exponents to work. Again, we subtract the gravitational constant's power and divide the result by 2 since two particles are multiplying their fields together. 25-11 = 14 / 2 = 7 so the revealed particle velocity involved in the weak force is 10^7 m/sec. Weak forces emit particles and gamma rays, so regardless of electromagnetic charge there is still a repulsion occurring due to out-of-sync spin-cycle values of n.

The usual way binding force is thought of, is so the binding force is assumed to overcome the like-charge repulsion of protons. If there is only a single binding inverse-square force then this may not be necessary. Experiment does show that such amounts of energy are involved in the nucleus, so it makes sense to keep these relative magnitudes of forces to make the tables used here.

## Relative forces spectrum

A final question for this system is whether or not there are only four n-spin values as shown in the table. Perhaps there is a range of values making a spectrum of field strengths. In nature we observe four discrete effects which have led to field models limited to those effects. Maybe we will start noticing more effects, or forces. Until then, what does the table tell us about a spectrum?

Two masses multiplying in an inverse-square relation would have their exponents adding together, which would include the n-spins factors. Just using the four table values gives us a spectrum of 10 possibilities listed as follows:

for the strong force: 30+30 = 60, 30+21.5 = 51.5, 30+20 = 50, 30+1 = 31
for electromagnetism: 21.5+21.5 = 43, 21.5+20 = 41.5, 21.5+1 = 22.5
for the weak force: 20+20 = 40, 20+1 = 21
and for only gravity: 1+1 = 2

If we cluster these values, the possible spectrum for pairs of interacting masses may sort out as follows:

Gravitic: 2 to 20
Electroweak: 20's to 40's, observed as weak if it repels from the nucleus.
Strong: 50 to 60, which may also be involved for repulsion into radioactivity.

Here n is part of the exponent of the Euler factor e^(nπi) where, once fielded by e^(πi), any further rotation by n spins makes the vortex effect in (st) to give field strength and matching to any of the drawings presented in this paper. A better analogy than a vortex would be like a fishing line reel that increases tension as it is wound up.

# 5. Conclusions

This mathematical recreation is based upon a strong equality principle. The simplicity of it does have some notable differences from standard interpretations which can be summarized here:

1. Mass is totally conserved in this system, transforming unfielded energy into matter. Of course, in relativity theory mass increases with velocity. Such complications would have prevented working out the basic geometry.
2. Unfielded mass moving at light speed is the basis of space-time. This does not have to conflict with a wave-particle duality.
3. Fields are not infinite by assumption, having a range based on velocity and fitting the Lorentz transform factor. At small velocities fields would appear infinite.
4. Euler's identity is the invisible missing field factor which would be placed next to a mass in the inverse-square part of a field equation. If the spin value is zero, mass is not fielded. The spin value n may be deemed a hidden variable.
5. Since this is a single field, different forces are not overcome by the interaction of fields. The relative spin between any two fielded masses decides the force. Forces are replaced in transition, not overcome.

These are the main differences from usual approaches to making a UFT. Here our speculation is at an end.

## Final Note

While not directly connected to my previous ideas about organizing mathematics into mythic algebra, there is a similarity in the UFT approach here which can be pointed out. The earlier notion of binary set states such as Mythic/Real is reflected here in the notion of a particle or wavicle as fielded/unfielded. The unfielded basis of space-time can be considered as the overall Association connection whereas fielding reduces that connection to the familiar subset of arithmetic operations. The echo of mythic algebra is not necessary to follow the course of this. It may show the style and pattern of my intuition, though.

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