Space-time Contraction Fields Offer an Alternative to Dark Matter

By John S. Huenefeld

ABSTRACT

An inward dynamic, within a gravitational field of General Relativity, provides the basis to propose a space-time contraction field around matter. This can only be achieved by making a fundamental shift in thinking from Einstein's conception of GR. This shift, if fully embraced, will change the paradigm of understanding for both space-time and matter, with implications ranging from quark behavior to the expanding cosmos.

Adding mass is not the only way to influence orbital velocities. A field of contracting space-time surrounding a massive object will also increase orbital velocities above that of Newtonian gravity alone. When applied to a model galaxy, a contraction field yields a flat rotation curve consistent with observations. The contraction field will also create gravitational lensing and hold galactic clusters together, explaining all observations attributed to dark matter.

Cosmologically, space-time contraction fields surrounding galaxies embedded within intergalactic regions of expanding space-time can lead to an observed acceleration of universal expansion. Over time, a greater proportion of the universe becomes occupied by expanding space-time. In the early universe, contraction fields acting within vast clouds of hydrogen gas , can explain the rapid formation of super-massive black holes, quasars, and large early stars.

The theoretical contraction field arises from consideration of a special class of inertial reference frames in freefall around a gravitating body. This class of inertial reference frame, falling from an infinite distance, reveals not only the metric of the GR field, but also a dynamic process where space-time is continuously contracted around matter in a very specific way.

SECTION 1. Space-Time In Motion With respect To Other Space-Time

In cosmology, the concept of universal expansion is widely accepted. In this theory, the fabric of space-time expands, carrying galaxies outward like stickers on an inflating balloon. At any given position inside this space-time, an invisible expansion field moves outward with a velocity increasing in proportion to the distance from any given point. This is a widely accepted form of space-time in motion with respect to other regions of space-time.

Einstein was slow to embrace universal expansion because he was reluctant to consider motions of anything other than material bodies. To this day, physicists remain reluctant to consider relative motions of space-time in other contexts. Some entertain the waterfall analogy, in which of space-time is falling into the event horizon of a black hole at the speed of light. But what then would be happening just above the event horizon? It must logically follow that if space-time is in freefall at the event horizon, it must also be in freefall at any other radius. This is a line of thinking that physicists shun. I ask the reader to indulge me and follow this line of reasoning, as I characterize these inward velocity fields, thereby adding a very specific vector field to GR.

Consider an inertial reference frame, one in which an object or observer will feel weightlessness, near a small, non rotating, black hole otherwise alone in a vast region of space-time. This reference frame is falling directly toward the center of the black hole from a vast distance, drawn by its gravity. This class of reference frame, follows the lowest energy null geodesic, and will be in motion on a radial vector leading directly toward the center of the black hole. If released at an infinite distance it will travel inward at escape velocity. As it increases in velocity, relative to the center of the black hole, the reference frame will become length contracted according to special relativity [2] as shown in figure 1.

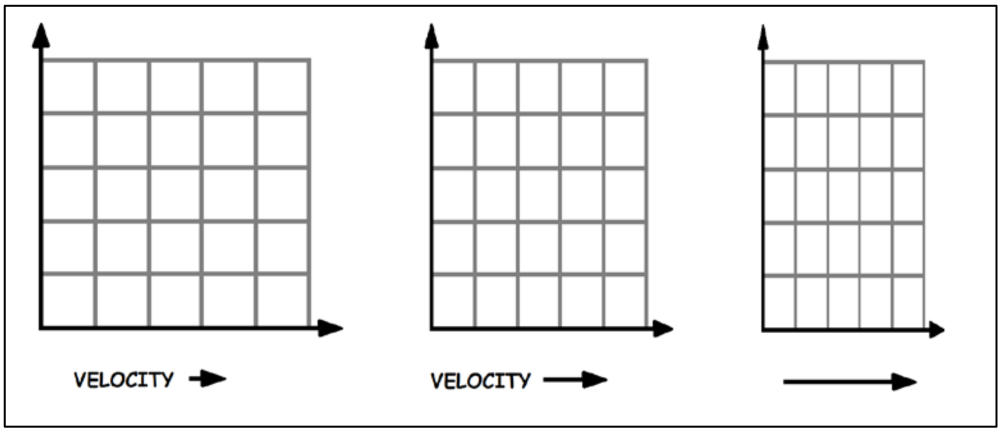


Figure 1.

Inertial reference frames in motion.

If we consider that this class of reference frame represents the state of local space-time and we imagine an infinite number of similar reference frames falling into the black hole from all possible angles and distances, a picture of an inward cascade of space-time emerges as shown in figure 2.

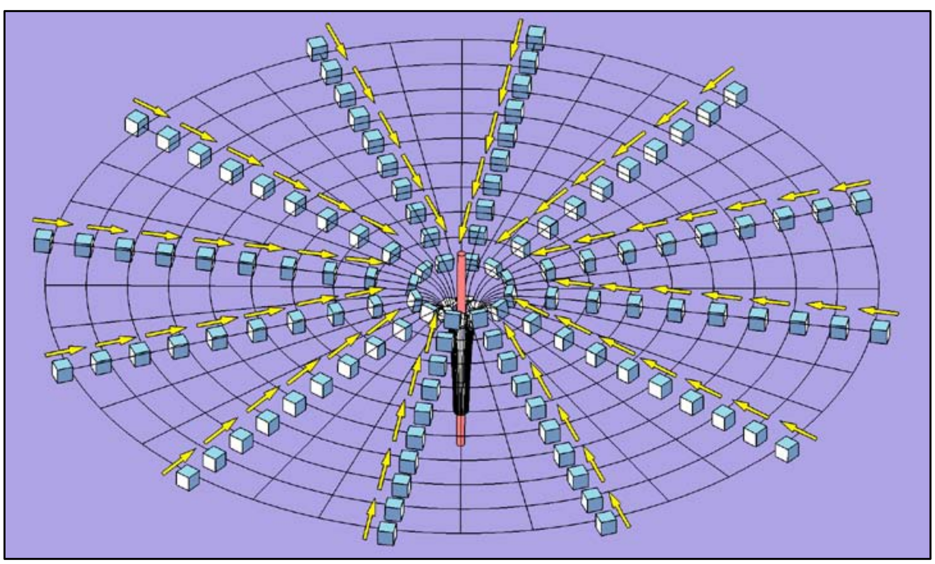


Figure 2.

One may now imagine a flux, of space-time through the surface of a sphere of any arbitrary radius. This flow rate may be characterized as being equal to the inward velocity at R times the area of the sphere at R as in equation 1.1.

$$\dot{\forall}(R) = v(R)A(R) \quad (0.1)$$

Just outside radius R, the velocity will be lower than at R and just inside, the velocity will be higher. Thus the flow through the surface of the sphere, while constant at a fixed radius, will be accelerating. The acceleration, or change in space-time flux with respect to time is expressed in equation 1.2.

$$\ddot{\forall} = A\frac{d}{dt}v \quad (0.2)$$

Understanding that acceleration is the time derivative of velocity this equation may be rewritten as equation 1.3.

$$\begin{gathered}\ddot{\forall} = aA \\ a = \ddot{\forall} / A\end{gathered} \quad (0.3)$$

If an object of mass m is placed into the reference frame at the chosen radius, it will accelerate along with the inward flow. Plugging this into Newtons force equation [1] yields equation 1.4.

$$\begin{gathered}F = ma \\ F = m\ddot{\forall} / A\end{gathered} \quad (0.4)$$

It is worth noting here that equation 1.4 is the gravitational equivalent of Faraday's law. It may be read, "Gravitational force is equal to the rate of change of space-time flux through a volume with normal cross sectional area A, containing a mass m." We may now replace the term for area A in equation 1.4 with the surface area of a sphere with radius r to arrive at equation 1.5.

$$F = m\ddot{\forall} / 4\pi r^2 \quad (0.5)$$

Looking at the term $\ddot{\forall}$, we see it has units of m^3s^{-2} This is very similar to the units of the gravitational constant G which has units $m^3kg^{-1}s^{-2}$. If $\ddot{\forall}$ is assumed to be proportional to the mass M of the black hole, we may replace it with a convenient constant, $4\pi G$, which is applied in proportion to the mass M and we get the very familiar equation 1.6.

$$\begin{gathered}F = \frac{mM\,4\pi G}{4\pi r^2} \quad \text{or} \\ F = \frac{mMG}{r^2}\end{gathered} \quad (0.6)$$

In this way, Newton's equation for gravity [1] may be derived on the basis of a space-time inflow velocity field. However, one must then ask where all this inflowing space-time is disappearing to. There *is* an answer. It is by accounting for this lost volume of space-time, that the cause of galaxy rotations faster than predicted by Newtonian gravity can be explained.

SECTION 2. The Application Of Relativity To Velocity Fields

Understanding how lost inflow volumes may be accounted for takes us back to figure 1. Applying the Lorentz transformations (equations 2.1 and 2.2) of special relativity [2] to spatial inflows provides the answer.

$$l' = l\sqrt{1 - v^2 / c^2} \qquad (1.1)$$

$$t' = t / \sqrt{1 - v^2 / c^2} \qquad (1.2)$$

In these equations, variables marked prime are those in the moving reference frame while the unmarked variables are in the rest reference frame of the black hole.

Starting from Newton's force equation (F = ma), we set acceleration equal to the time rate change of velocity and get equation 2.3.

$$a = F / m = MG / r^2 = dv / dt \qquad (1.3)$$

Next, by the chain rule, we look for the velocity change with respect to the radius, realizing that the time change in radius of a falling shell is equal to the velocity v. We may now solve for the change in velocity with respect to the radius dv/dr as show in equations 2.4 through 2.7.

$$\frac{GM}{r^2} = \frac{dv}{dr}\frac{dr}{dt} = \frac{dv}{dr}v \qquad (1.4)$$

$$\frac{GM}{r^2}dr = vdv \qquad (1.5)$$

Integrating both sides we get.

$$\frac{2GM}{r} = v^2 \qquad (1.6)$$

$$v = \sqrt{2GM / r} \qquad (1.7)$$

We recognize equation 2.7 as the Newtonian formula for escape velocity from a gravitating body. As assumed earlier, this is the unique inflow velocity vector profile for a gravitational field. In this case, we are not considering a body falling through space, but the fabric of space-time itself, falling inward toward a central point. As space-time falls inward, it will become length contracted in the direction of motion, relative to the central point, as shown in figure 3. Knowing the velocity as a function of radius, the non-Euclidian geometry (the metric) of the field may be characterized. We see that as a reference frame falls inward, volume is lost.

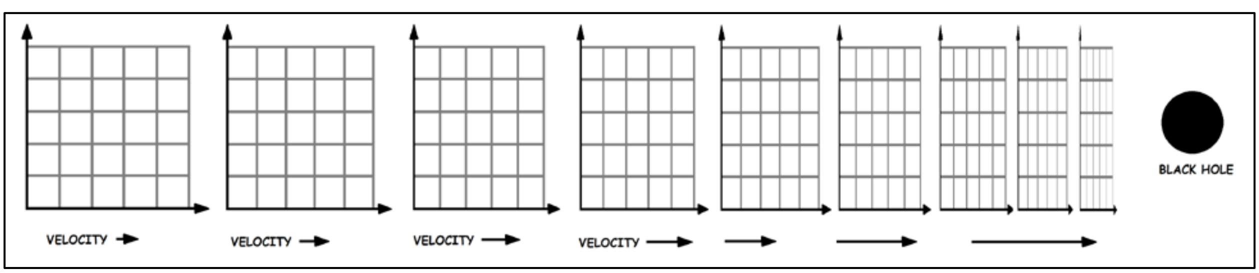


Figure 3.

Reference frames falling toward a black hole.

This is done mathematically by adjusting the radial and temporal dimensions of the vector field for the effects of relativity for both length contraction and time dilation as shown in equations 2.8 and 2.9.

$$v = l / t \tag{1.8}$$

$$v' = \frac{l'}{t'} = \frac{l\sqrt{1-\left(v^2/c^2\right)}}{t/\sqrt{1-\left(v^2/c^2\right)}} = v\left(1-\frac{v^2}{c^2}\right) \tag{1.9}$$

Substituting the value of v from equation 2.7 into equation 2.9 we get the relativity corrected equation for inflow velocity as a function of the radius as observed from a reference frame at rest with respect to the center of the gravity field.

$$v' = \sqrt{2GM/r}\left(1-2GM/rc^2\right) \tag{1.10}$$

Equation 2.10 represents the velocity that an object or reference frame, released from a vast distance, will appear to travel as observed from a reference frame at rest with respect to the gravitating object. In figure 4, v is the Newtonian form of the velocity.

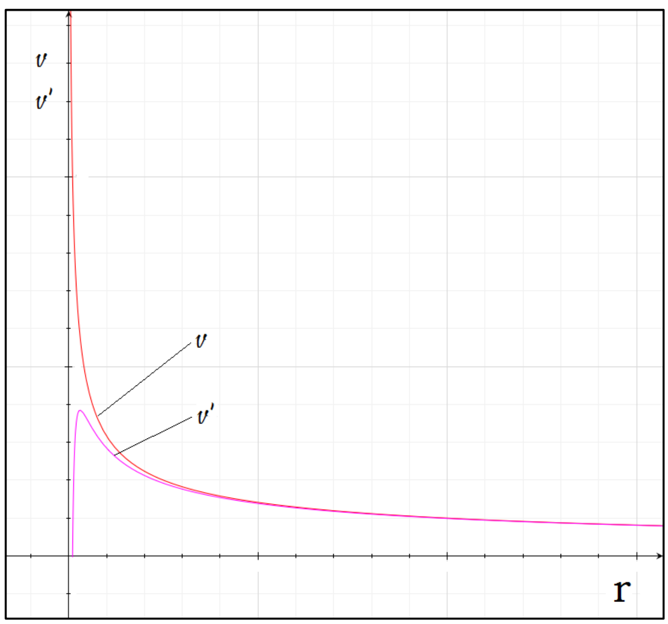


Figure 4.

Newtonian and relativistic velocity profiles.

Consistent with Einstein's theory, an object in this field will increase in velocity until it nears the center, where it will appear to slow down and eventually come to a stop at some minimum distance from the center. That minimum radius can be found by solving for r when v' equals zero as shown in equation 2.11. We recognize this as the Schwarzschild radius.

$$\text{if} \quad \begin{matrix} 2GM/r_{\min}c^2 = 1 \\ r_{\min} = 2GM/c^2 \end{matrix} \quad \text{then} \tag{1.11}$$

The same technique may be applied to equation 2.3, to obtain equation 2.12, the observed acceleration, a prime.

$$a' = \frac{GM}{r^2}\left(1-\frac{2GM}{rc^2}\right) \tag{1.12}$$

In figure 5, the Newtonian form of the acceleration field is plotted with a', the acceleration field as it would appear to an observer outside the field, at rest with respect to the gravitating body.

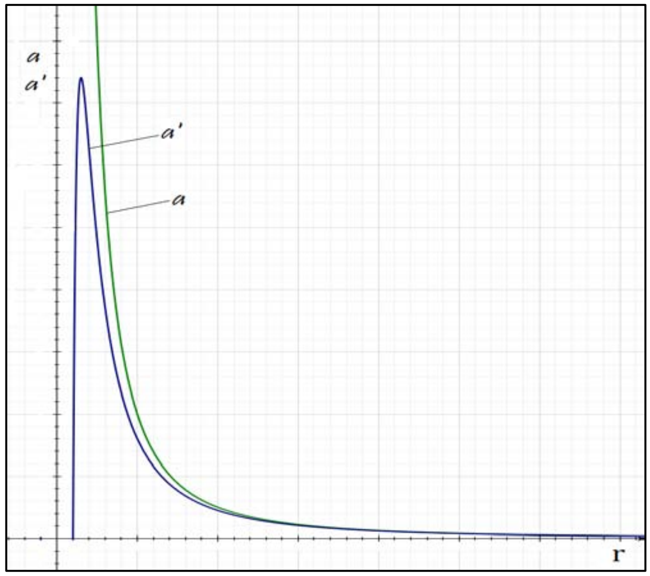


Figure 5.

Newtonian and relativistic acceleration profiles.

It is important to note at this point that the superimposed velocity and acceleration fields described by equations 2.10 and 2.12 constitute a gravitational field completely consistent with General Relativity. The fields have all the features of those specified by Einstein's field equation. These inflow fields produce gravity, curved space-time, and gravitational time dilation. However, the differences between these fields and GR fields are subtle and profound.

Finally, we apply relativity to $\ddot{\forall}$, (which is proportional to the gravitational constant). $\ddot{\forall}'$, may be characterized and is plotted in figure 6.

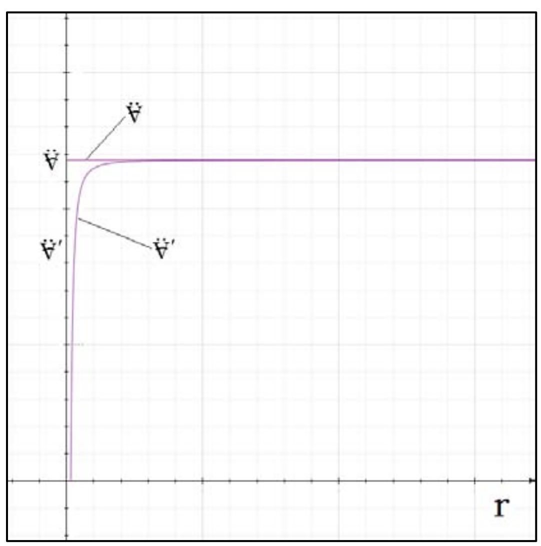


Figure 6.

$$\ddot{\forall}(r) = Aa = 4\pi r^2 \left(GM / r^2\right) = 4\pi GM$$
$$\ddot{\forall}'(r) = 4\pi GM \left(1 - 2GM / rc^2\right) \quad (1.13)$$

This is where the profound difference between General Relativity [2] and the inflow field concept can be seen. In this Fluid Space-Time (FST) conception, *gravity vanishes at the event horizon.* The gravitational constant is no longer a constant, but a function of the radius. This leaves an infinitely long corridor of space time at r_{min} moving off at the speed of light perpendicular to our familiar three spatial dimensions and avoids creating a troublesome singularity, as shown in figure 7.

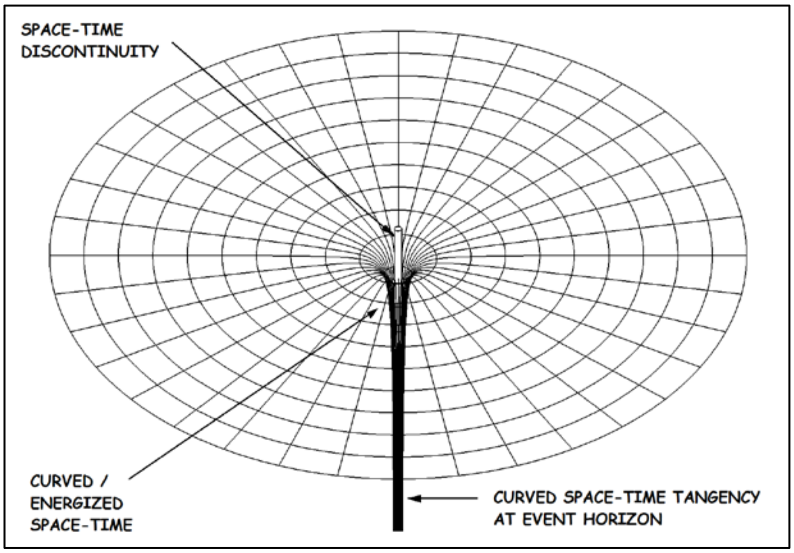


Figure 7.

In figure 8, a funnel shaped wedge has been extracted from an inflow field. The straight taper is what the outside observer will see (assuming Euclidian space) while the curved, hyperbolic funnel represents the space within the field if expanded back to its rest length (the non Euclidian space). At an infinite radius the curved funnel will be tangent to the straight funnel and the contraction will be zero. At the event horizon, the curved funnel will be tangent to a line just off the radial axis and the contraction of space-time will be infinite.

This is another profound difference between FST and GR. In FST, at the event horizon, an object may proceed inward at the speed of light, forever, and never get any closer to the center. The event horizon, in this case, represents an infinite contraction of space-time surrounding a discontinuity in space-time. Space-time has become so non-Euclidian that bubble has appeared in our universe. The shaded area near the central axis is a spherical domain lying below the event horizon that is not space-time and is not part of our universe.

In figure 8, by the time an element in the flow field reaches an arbitrary radius r, due to spatial contraction, it will actually have traveled an additional distance l down the curved funnel, from the point of view inside the flow, than what is observed from outside. The shaded region lA represents the volume of space-time that has been contracted at any radius r.

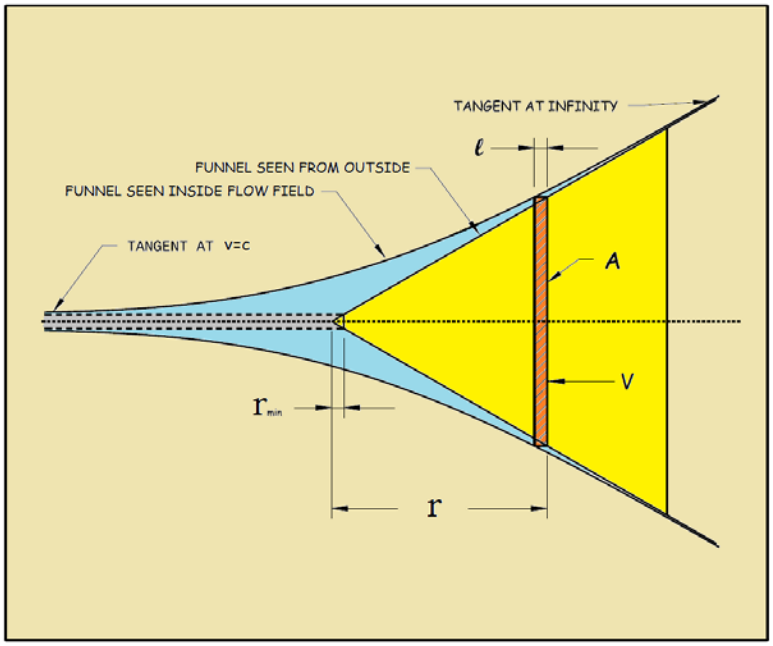


Figure 8.

The flow or flux of space-time passing through a sphere of radius r has been established in equation 1.1, and is repeated here for convenience.

$$\dot{\forall} = vA \tag{1.14}$$

Substituting the value of velocity from equation 2.7 and the area for a sphere we get equation 2.15.

$$\dot{\forall} = 4\pi r^2 \sqrt{2GM / r} \tag{1.15}$$

This is the "true" volume of spatial flow as seen by elements embedded within the flow field. The flux of space-time as observed from outside the flow field, accounting for spatial contraction is shown in equation 2.16.

$$\dot{\forall}' = 4\pi r^2 \sqrt{2GM / r}\left(\sqrt{1 - 2GM / rc^2}\right) \tag{1.16}$$

The amount of spatial contraction taking place at any radius r will be the difference between the inside view and the outside view.

$$\dot{\forall}_{contracted} = \dot{\forall} - \dot{\forall}' = 4\pi r^2 \sqrt{2GM / r}\left(1 - \sqrt{1 - 2GM / rc^2}\right) \tag{1.17}$$

We may now apply time dilation to arrive at a complete expression for "lost flux" as a function of radius in equation 2.18. This is the undiscovered contraction field surrounding all matter. Note that space-time is not just contracted, it is continually being contracted.

$$\dot{\forall}'_c = 4\pi r^2 \sqrt{2GM / r}\left(1 - \sqrt{1 - 2GM / rc^2}\right)\sqrt{1 - 2GM / rc^2} \tag{1.18}$$

Figure 9 is a plot of this function and what this graph shows is a bit surprising. The contraction rate $\dot{\forall}'$ starts at zero at the event horizon and increases parabolically with radius. The meaning of this is that while the effects of relativity diminish as the radius increases, because of the rate volumes increase with radius, there is a significant and ever increasing spatial effect. Any dark matter physicist should recognize the shape of this curve. It is the shape of the additional orbital velocity required to flatten a galaxy rotation curve.

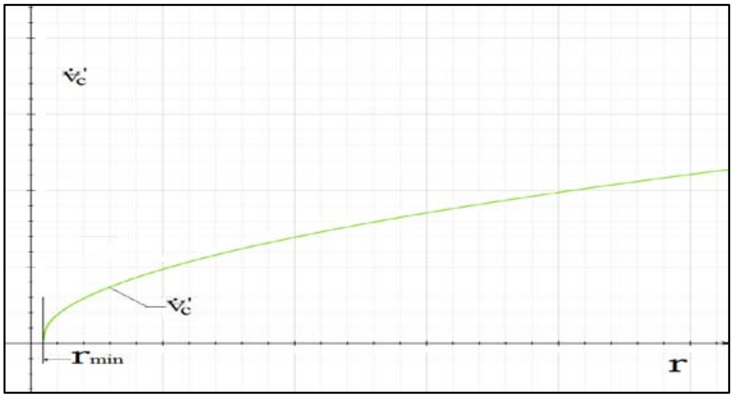


Figure 9.

SECTION 3. The Missing Component Of Gravity

A consequence of the inflow gravitational field model is the "lost flux" field, which represents an ongoing contraction of space-time surrounding all objects that have the property of mass. The lost flux field must be considered a separate field, orthogonal and acting independent from the primary gravitational field. Gravity remains active in the remaining space-time, but objects also move toward the center because a portion of the space-time between is continuously vanishing.

The lost flux field manifests as a space-time contraction around matter in a spherical shell and varies as a function of the radius according to equation 2.18. Dividing equation 2.18 by the area of a sphere of radius r, yields what may be called the drift velocity. It represents the velocity the surface of a bounding a sphere will be shrinking due to the contraction of space-time inside. This function is plotted in Figure 10.

$$V_{drift} = \sqrt{2GM/r}\left(1-\sqrt{1-2GM/rc^2}\right)\sqrt{1-2GM/rc^2} \tag{2.1}$$

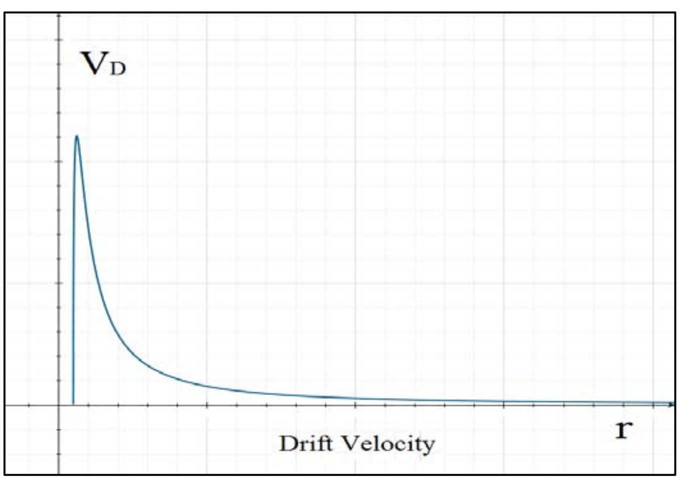


Figure 10.

This function has a similar form to the acceleration curve in figure 5, but it is a velocity curve, first order with time, while the acceleration curve is second order with time. In order to account for the complete motion of a particle in a gravitational field both equations 2.12 and 3.1 must be applied. Both functions approach zero at very large distances, however, equation 2.12 falls off much more rapidly. For massive bodies, gravity will dominate for some distance but eventually the displacement due to drift velocity becomes equal to the displacement due to gravitational acceleration over a period of time. Beyond that, the drift velocity displacement may become many times greater than the gravitational acceleration displacement.

Isaac Newton [1] used the method of equivalent triangles to develop his gravitation equation. His method may be adapted to predict the change in orbital velocities in expanding or contracting space-time. As shown in figure 11, a distance S_{exp} is added to, or subtracted from, the distance S_{grav} to find the resulting orbital velocity. Expansion of space-time will tend to slow orbital velocities while contraction will tend to increase them. **Adding extra mass is not the only way to change an orbital velocity.**

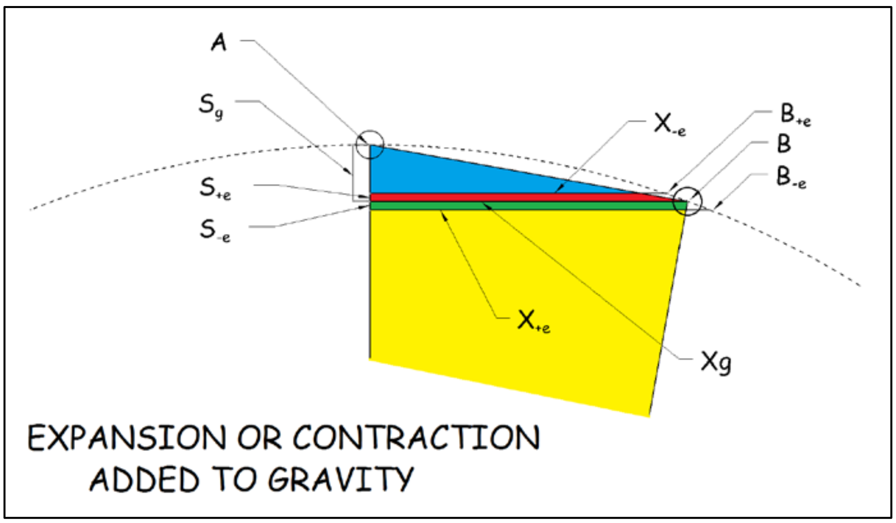


Figure 11.

$$V_{orbit} = \sqrt{2R(S_g \pm S_e) / \Delta t^2} \quad where \tag{2.2}$$
$$S_g = a\Delta t^2 / 2 \;\; and \;\; S_e = V_{Drift}\Delta t$$

The expansion or contraction displacement term may be combined with the gravitational acceleration displacement term to create a dimensionless scale factor as shown in equation 3.3.

$$S = \left(\frac{S_g \pm S_e}{S_g}\right) = \left(1 \pm \frac{S_e}{S_g}\right) = \left(1 \pm \frac{2V_{Drift}}{a\Delta t}\right) \tag{2.3}$$

The total orbital velocity is then computed using the scaled displacement.

$$V_{orbit} = \sqrt{aR(1 \pm S_e / S_g)} = \sqrt{aR(1 \pm (2V_{drift} / a\Delta t))} \tag{2.4}$$

As the equation for orbital velocity stands above, there is a dependency on the value of delta t chosen. There ought to be a single answer for orbital velocity independent of the time period used. On one hand, if a very long time period is used, the effect of expansion will vanish. On the other hand, if setting up a computer simulation, it would be tempting to use a very short time step to improve accuracy, but in that case it would be gravity that vanishes. Using Newton's method requires a time period somewhere in between, where the time period is a small fraction of the orbital period. What we need is a time period that balances the second order term with the first order term.

Two possible approaches could be taken to resolve the issue. First, another mathematical relationship could be sought to identify the proper value of delta t, and second, a value of delta t could be chosen to match observations. In a Fluid Space Theory model of the galaxy and the solar system, the value for delta t which best matches observations for contraction fields is e seconds or 2.71828. This is also reasonable from a mathematical standpoint as e is the natural balancing point for terms of different orders.

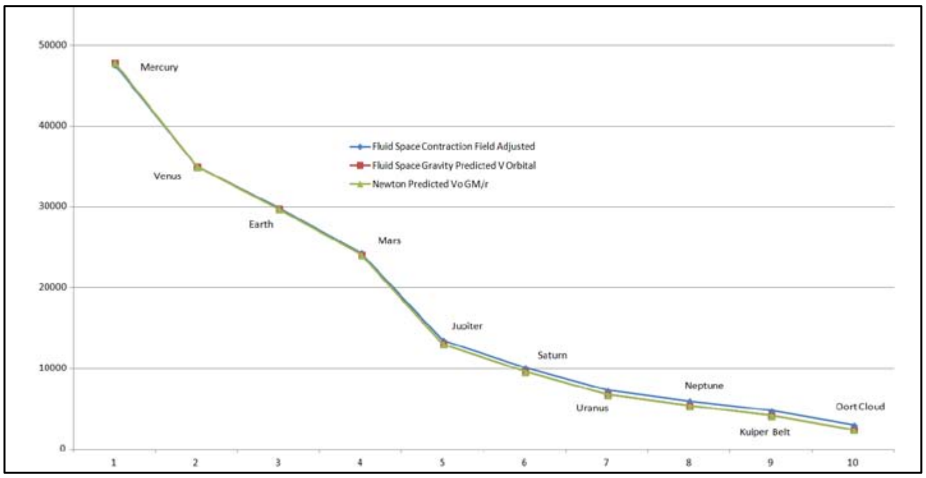


Figure 12.

Using a delta t of ***e*** seconds, at the surface of the Earth, the contribution of the contraction field is 0.000058% of normal gravity, it is no wonder it has never been observed. At the surface of the sun, the contribution is 0.35%, still hardly noticeable at all. The drift velocity falls off more slowly than gravity, so its influence increases with distance. In figure 12, applied to the solar system, it provides a small but nearly constant increase to gravity with distance progressing outward. Distant Oort cloud objects should be observed to orbit 10% to 20% faster than predicted by gravity alone.

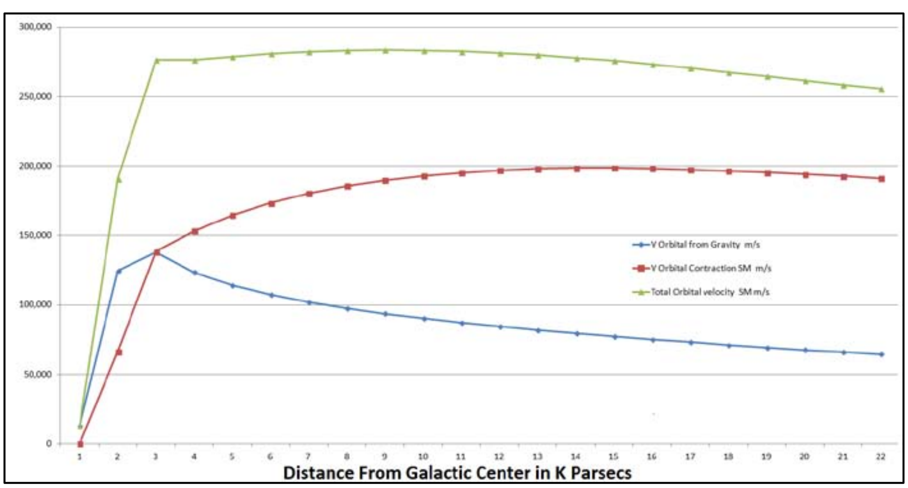


Figure 13.

For a galaxy similar in size to our Milky Way, the contributions of the contraction field can reach many times that of normal gravity, resulting in a flat rotation curve as in figure 13. This completely replicates the results of a dark matter halo, without the need to have any dark matter at all.

SECTION 4. Extraordinary Claims Require Extraordinary Proof.

Einstein's famous equation [3] reveals the connection between energy and matter. One possible interpretation is that all matter in the universe is actually some stable form of condensed energy.

Treating space-time as a perfectly elastic super fluid provides additional understanding. Let's take a look at a cube of space-time set into motion. We will use the engineering term of strain to measure the amount of contraction. Strains, by definition, have a value between zero and one.

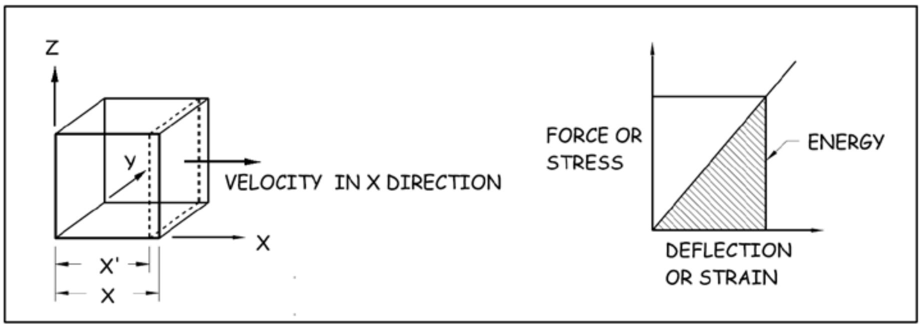


Figure 14.

Figure 14 shows a unit cube of space-time which undergoes a velocity change in the x direction. The unit cube becomes contracted spatially or strained, defined as follows.

$$\varepsilon_{space} = \frac{x - x'}{x} = \frac{x - x\sqrt{1 - v^2/c^2}}{x} = 1 - \sqrt{1 - v^2/c^2} \quad (3.1)$$

At rest, the strain is zero and the cube will appear full size. At the speed of light, it will have a strain of 1.0 and will have become fully contracted in the direction of motion. Now, in contradiction of Einstein, let us allow space-time to acquire energy as it becomes contracted.

Figure 14 shows a standard force deflection plot with a linear elastic constant. The slope of the line represents the elastic modulus, and the area under the line is the energy required to cause the deflection, at a particular level of strain. Now if we knew the elastic modulus of space-time we could compute the energy of a fluid space sink flow field. A likely candidate is c^4/G. This term appears in Einstein's field equation and has the units of force ($kg\text{-}m\text{-}s^{-2}$). A constant K is included in case the modulus is actually some multiple of this guess.

$$\frac{force}{area} = \frac{Kc^4}{GA} = E \qquad \textit{Young's modulus of space-time} \quad (3.2)$$

Strain energy U is defined as follows.

$$U = \frac{1}{2}\forall\sigma\varepsilon = \frac{1}{2}\forall E\varepsilon^2 \quad (3.3)$$

U as defined above represents the energy accumulated between a strain of zero and the strain in question. As applied to a space-time inflow field it represents the energy accumulated as space-time falls from infinity down to a given radius r. We know the strain as a function of velocity and we know velocity as a function of radius, so first we define U as a function of velocity as in equation 4.4.

$$U(v) = \frac{1}{2}\forall\left(\frac{Kc^4}{GA}\right)\left(1-\sqrt{1-\frac{v^2}{c^2}}\right)^2 = \frac{Kc^4\forall}{2GA}\left(1-\sqrt{1-\frac{v^2}{c^2}}\right)^2 \tag{3.4}$$

To express U as a function of radius we set v^2 equal to 2GM/r, and use the volume and surface area of a sphere of radius r.

$$U(r) = \left(\frac{4\pi r^3 Kc^4}{24\pi r^2 G}\right)\left(1-\sqrt{1-\frac{2GM}{rc^2}}\right)^2 = \left(\frac{rKc^4}{6G}\right)\left(1-\sqrt{1-\frac{2GM}{rc^2}}\right)^2 \tag{3.5}$$

The value of U(r) represents the amount of energy stored in the contraction of space time surrounding a gravitating body, from the given radius r out to infinity. At r equals infinity, the energy is zero. The value of U increases as r is reduced from infinity to r min ($2GM/c^2$).

$$U(r_{\min}) = \frac{K2GMc^4}{6Gc^2} = \frac{KMc^2}{3} \tag{3.6}$$

If a value of 3 is assigned to the constant K, we find the following.

$$U(r_{\min}) = Mc^2 \tag{3.7}$$

We have now arrived at Einstein's matter energy equivalence equation by an entirely different route. This tells us that the total energy of a space-time contraction field around a gravitating body is equal to its rest mass times the speed of light squared. There is no "matter" left to fall below the event horizon to form a singularity.

Matter doesn't tell space-time how to curve, ***matter is curved space-time***. What we call matter is actually the energy stored in the entire gravitational field, the bulk of which is concentrated very closely around the central space-time discontinuity. When sufficient energy is concentrated in a small enough volume, a discontinuity in space-time will pop into existence. For the tiniest masses, there is now a theoretical basis for the existence of "quantum foam".

This provides a means to calculate vacuum energy in space using the shell method. The energy value at a larger radius, subtracted from the value at a smaller radius, and divided by the volume between the two radii. This yields the energy density of the space between. As the shell thickness approaches zero, the value converges nicely, and has the expected magnitude.

Three dimensional volume of a region of space-time is not conserved under a velocity transformation. However if we define a four dimensional volume as below, we can see that length in the direction of motion is transferred over to the tc axis under a velocity transformation, leaving the four dimensional volume unchanged.

$$\begin{aligned} & z \times y \times x \times tc = z' \times y' \times x' \times t'c \\ \textit{where}\quad & x' = x\sqrt{1-v^2/c^2} \\ & t' = t/\sqrt{1-v^2/c^2} \end{aligned} \tag{3.8}$$

We have now arrived at a completely contrarian view of matter from that of main stream physics and classical mechanics, but one compatible with quantum theory and observations. Figure 15 shows the conventional concept of substantive particles moving about in a void of space-time. This notion must be discarded.

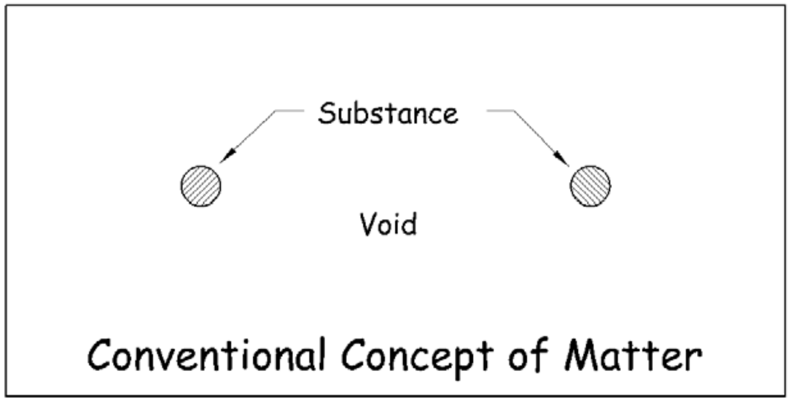


Figure 15.

As shown in Figure 16, the substance of our cosmos actually lies in the fields stretching between tiny discontinuities in space-time.

For centuries, our concept of matter has been exactly the opposite of the truth. What we have considered substance is actually void and what we have considered void is actually where the substance of the cosmos lies. The cosmos is not made of a multitude of individual particles, but is an **infinitely complex, single, interconnected whole**.

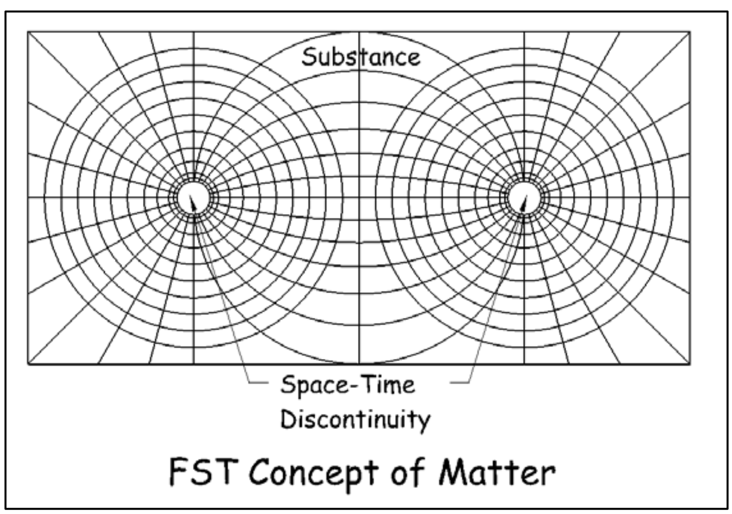


Figure 16.

SECTION 5. Cosmological Considerations.

There are several considerations which lend credibility to a contraction field as an alternative to dark matter. First of all, the mathematical development of the velocity field may progress equally well with an outward velocity rather than an inward. Either flow direction will produce an inward gravitation field in agreement with Newton, with a non Euclidian space-time metric compatible with GR. The symmetry breaking difference is that the inward flow field will have a contraction field while the outward flow field will have an expansion field. Based on the observed behavior of stars orbiting within galaxies, normal matter is assigned the inward direction flow field.

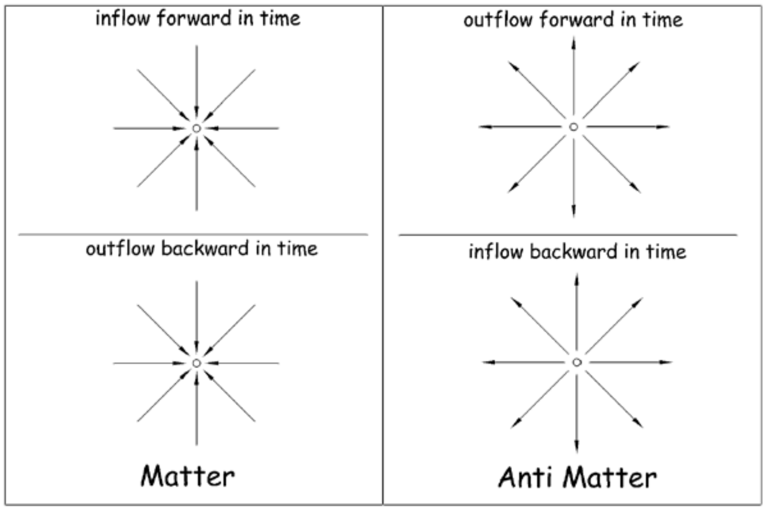


Figure 17.

Figure 17 breaks down the four cases of inflow and outflow moving either forward or backward in time. This new conception of matter works well with the accepted behavior of matter and antimatter with respect to the arrow of time. It is also easy to see how an inflow field meeting an outflow field will result in annihilation and release of the field energy.

If a contraction field gives normal matter galaxies a flat rotation curve, what would the expansion field do to an antimatter galaxy? It turns out that the influence of the contraction or expansion field varies with both the mass of the object and the distance from it. Figure 18 is a plot of the point at which the contraction field matches the effect of gravity over e time units. The acceleration scale factor equals 2 for normal matter or 0 for antimatter. Marking either the gravity pause, or double gravity for antimatter and matter. What is clear is that as mass increases, a smaller the radius is needed to reach the point where the contraction or expansion fields exceed the effect of Newtonian gravity.

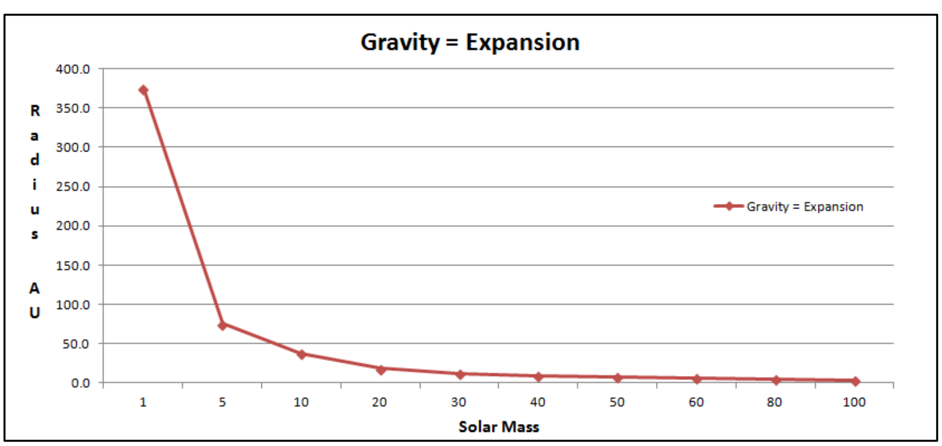


Figure 18.

The orbital environment within a galaxy is a realm of very tiny accelerations acting over very large distances. The following charts explore the effectives of the contraction field over short, medium and long distances for bodies of 10 to 100 solar masses.

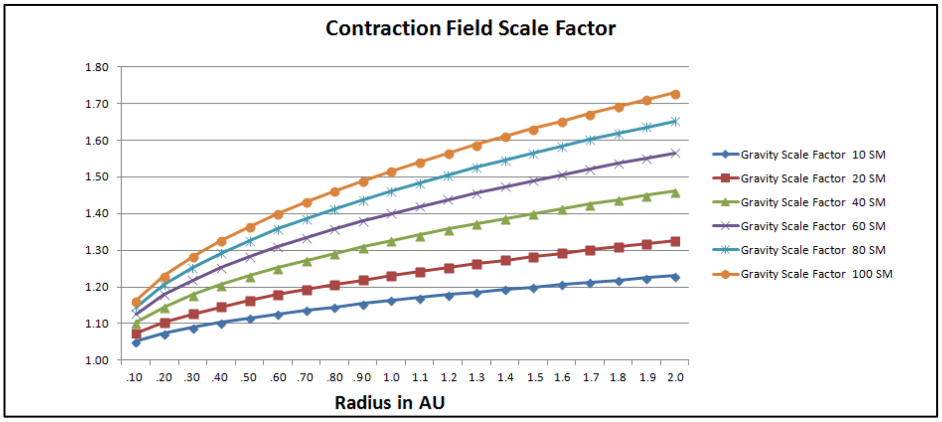


Figure 19.

Figure 19 shows the scale factors out to a distance of 2 AU. In this range the scale factor is less than 2 so Newtonian gravity dominates. In the following discussion, note that while the scale factors continue to increase with distance, they are applied to accelerations which decline with the inverse square of the distance. Thus, the "extra gravity halos" (EGH) produced will eventually diminish to nothingness at great enough distances.

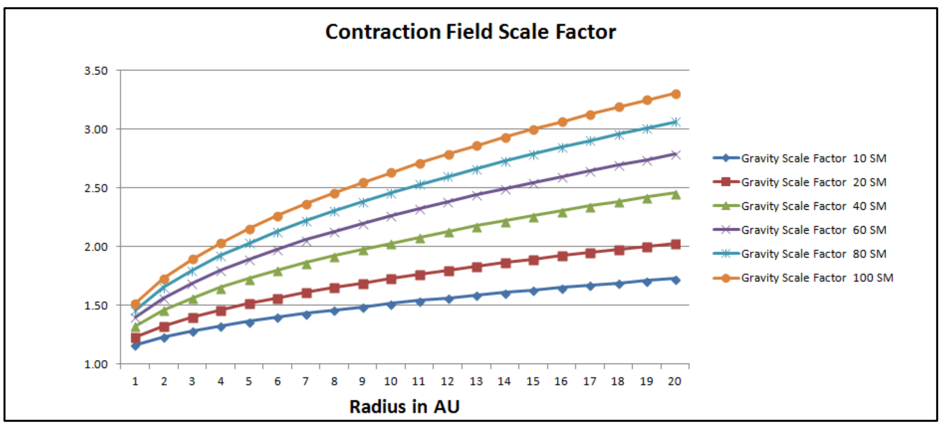


Figure 20.

Figure 20 shows the scale factor out to a distance of 20 AU. In this range the scale factor rises to more than 3 for larger bodies. This represents the transition zone where the contraction field begins to become dominant. Masses of large stars will likely be overestimated when orbits of bodies within 20 AU are computed using Newtonian gravity alone.

Figure 21 shows the scale factor at galactic ranges out to a distance of 20 Parsecs. In this range, the scale factor rises to over 1000 for bodies of 100 solar masses. This represents the zone where the contraction field becomes extremely dominant. In these three charts, the shape of the function looks the same no matter what distance scale is focused on. Another thing revealed is how much more effective the contraction field is for larger bodies. For stars like our sun and smaller bodies scale factors even at galactic distances remain small, making their contribution to the galactic contraction field flat. On the other hand, large stars in the galactic core and the super massive black hole will have a pronounced contraction field with scale factors of hundreds of thousands time greater than gravity alone. These types of bodies will be primarily responsible for the projection of EGH's, or dark matter halos.

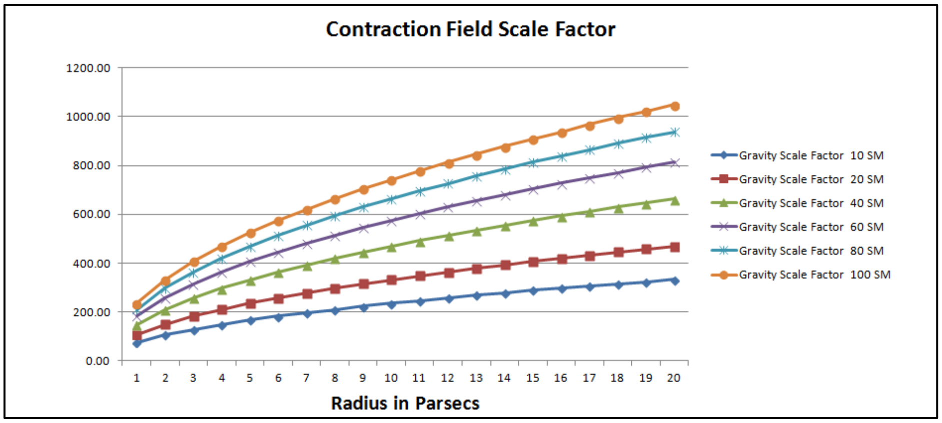
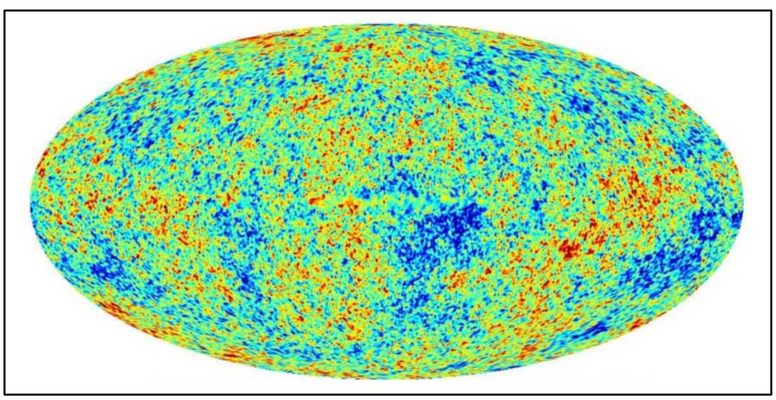


Figure 21.

In figures 19 through 21, the effect for antimatter bodies will be exactly the opposite. In the early universe, a cloud of antimatter hydrogen could likely never become dense enough to form a star and certainly not a galaxy. The expansion field would make it tend to disperse instead.

This may require a rethinking of the evolution if the early universe. Consider the cosmos shortly after the big bang. Due to small fluctuations, portions of the infant universe expand while others contract, as revealed in the cosmic microwave background. As matter and antimatter begin to condense out of the hot dense cosmos, the expanding portions might tend to collect antimatter, while the contracting portions collect matter. The period of annihilation, might actually have been a period of segregation, where antimatter and matter collected in the expanding and contracting regions. Once complete the matter clouds would contract and condense to form the visible universe while the antimatter clouds would expand and disperse to become invisible in intergalactic space. A great deal of antimatter may still be with us.



Cosmic Microwave Background: NASA

This will reshape cosmology by showing that the conglomeration of expanding and contracting space-time seen in the early universe remains with us to this day. Red shift of distant galaxies must now be considered as the result of both overall expansion, and the amount of time the light has spent passing through expanding intergalactic clouds of antimatter.

In current theory, dark matter as a particle, would not contribute to the creation of super massive black holes in the early universe due to the cooling rate of particulate dark matter. The Fluid Space Theory contraction field does not suffer from this limitation and could play a significant role in the formation of early stars and super massive black holes. Figure 22 shows gravity scale factors for bodies increasing by powers from 10 solar masses to 1 million solar masses.

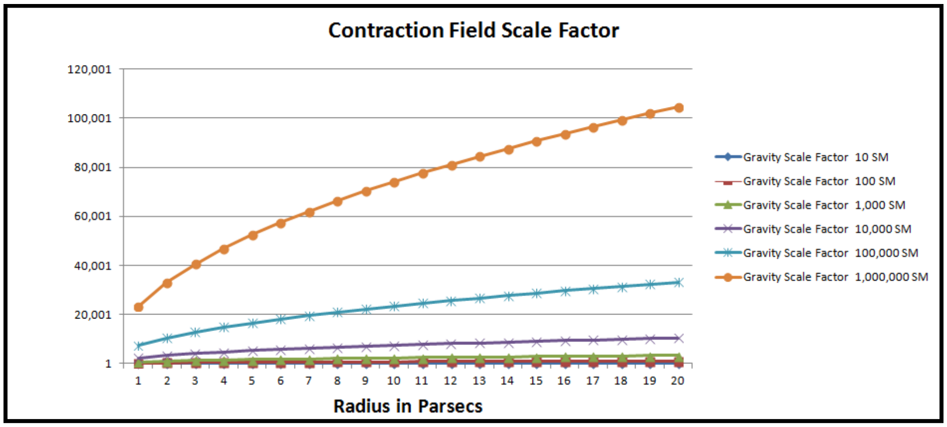
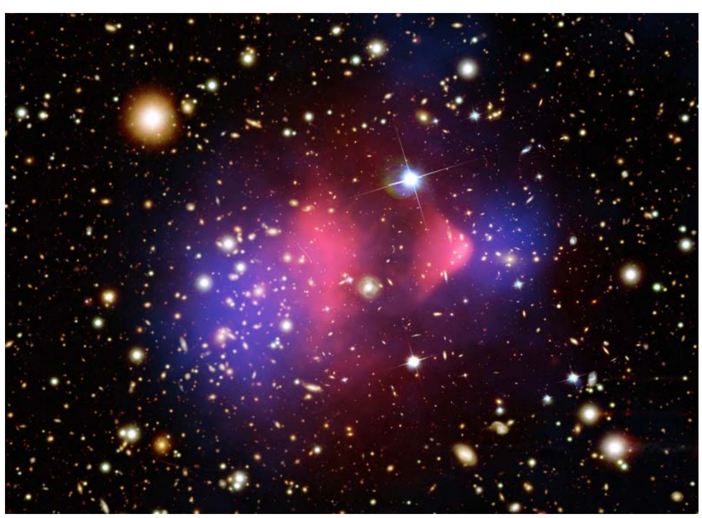


Figure 22.

For a 1 million solar mass black hole at a distance of 20 parsecs, the contraction field will project one hundred thousand times more strongly than normal gravity. Masses of black holes in galactic nuclei computed on the basis of Newtonian gravity could be grossly overestimated. A black hole of one hundred thousand solar masses would appear to have the influence of a 2 billion solar mass black hole at 20 parsecs if Newtonian gravity alone is assumed.

This explains why the EGH's in the bullet cluster remain in conjunction with the stars and super massive black holes within the galaxies, while the large diffuse gas clouds left behind do not project a coherent lensing contraction field. This also explains why ultra diffuse galaxies (dwarf galaxies puffed up by super nova activity) tend to be either dominated by 99.9% dark mater, or have none at all. If the original dwarf galaxy had a massive black hole it will project a strong EGH, if it did not, there will be none.



The Bullet Cluster: NASA

There is another compelling argument for the existence of these contraction and expansion fields. Consider the primordial atom poised on the tipping point just before the big bang. It may tip one way and expand forward in time, or tip the other way and expand backward in time. Once it tips, the direction of time is locked. But the direction of time selected doesn't really matter. If it tips backward in time, antimatter will take up the role of matter with a contraction field while matter assumes the role of antimatter with an expansion field. Either way an evolving universe made of normal matter stars and galaxies will be seen. Time could be flowing backward for us right now in an antimatter universe and we would never know it. The arrow of time question is thus resolved.

Concerning accelerated expansion. Once in motion, assuming equal volumes of the early universe are occupied by matter and antimatter on a backdrop of overall universal expansion, a plot of the total expansion rate may be created. In a model universe shown in Figure 23, the region occupied by matter is allowed to contract down to a stable size, while the region occupied by antimatter continues to expand at a constant rate. The combined volume is then scaled and plotted onto a background of space-time expanding at a constant rate.

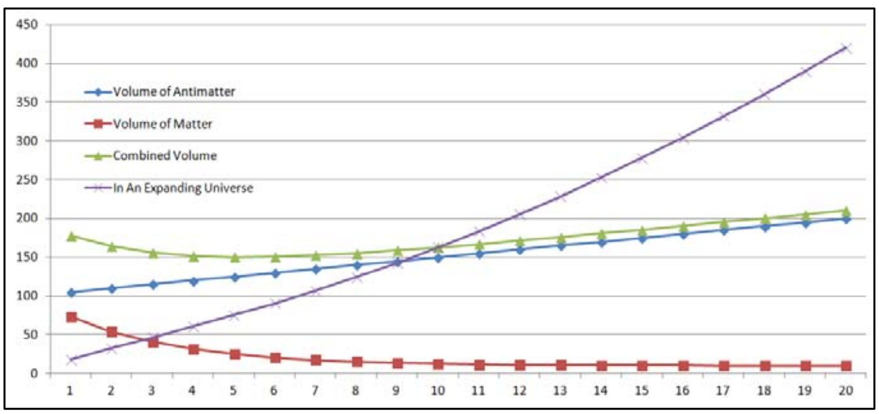


Figure 23.

This results in an expansion curve (violet) that begins flat or may even decline at bit, but then accelerates after a certain period. This happens without the need for any dark energy to drive it.

Conclusions

Einstein developed his famous field equation in the era of the model T Ford. At the time no one had the slightest idea about dark matter or dark energy. Today, everyone is looking for a simple, sexy new theory to explain dark matter and dark energy, more like a Tesla roadster than a model T Ford. The physics community today is highly invested in Einstein's field equation, but when Tesla Motors developed the roadster, did they start from a blueprint of a model T Ford? To develop a complete theory of gravity, which accounts for dark matter and dark energy, tweaking a model T equation, which was never designed to account for such things, will never work. Einstein's field equation must be abandoned. A complete theory of gravitation must be built up from scratch, starting from a blank sheet, but guided by current knowledge and technology.

In this paper I have outlined an approach, built around a vector field and developed without the use of tensor calculus, which describes a complete theory of gravitation. Today, no serious paper is published in anything other than tensor notation, but I submit that this the very thing that is holding physics back. Such notation leaves the theorist wandering in a mathematical fog, groping for answers, and restricts readership to a select group of insider academic physicists. The theory expressed in this paper is accessible to a much wider audience, including technical professionals from many fields, undergraduates, and even high school students.

In review, the "dark matter halo" or EGH is revealed as a contraction field which arises as a result of relativity and as a consequence of gravitation. Space-time has been shown to acquire energy, revealing that the mass of an object is equal to the energy stored in its gravitational field. This allows a correct calculation of vacuum energy using the shell method. The antimatter imbalance of the universe is resolved by allowing for vast clouds of invisible anti hydrogen to remain expanding in intergalactic space. The arrow of time question is answered by understanding that no matter which direction time flows, forward or backward, the universe will look the same either way. An finally, accelerated expansion of the universe is explained as an unmasking of the true expansion rate as the space occupied by normal matter takes up less and less of the cosmos over time. Six paradigm changing ideas that can revolutionize physics and explain our cosmos.

I don't expect these ideas to catch on quickly with mainstream physicists. After all, these ideas break Einstein's rules, and contradict conventional thinking. On top of that, they are being proposed by an outsider, with a background in aerospace engineering, not physics. But I have no doubt that these ideas are correct, and will form the basis of a revolution in physics in some distant future.

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