Abstract

The deceleration (acceleration) parameter q, which has been estimated as ~ 0.5 has been attributed to the gravitational attraction of ponderable bodies e.g., galactic clusters within the universe. Here it is postulated, following Einstein's equivalence principle between gravitation and acceleration that it is the acceleration parameter now observed which creates the gravity field of the ponderable bodies within the universe. It is postulated that the more distant aspects of the Hubble flows acceleration are those created by the initial outward motion from the point singularity at the universe's origin. Some additional theoretical discussion of supernova generation is also included.

A Causal Relationship between

Time, Gravity and the Hubble

Expansion of the Universe

Paul W. Dixon

University of Hawaii

The postulation that a relationship can be found between the expansional motion of the universe and the passage of time can be derived from the basic equations given by Einstein. (Dixon,2002) Should the Hubble parameter, h = 1, this would also make possible a physical explanation of gravity due to the deccelerative effects of frictional embeddedness of the Universe within de Sitter space.(Ellis,1987) Some recent observations favor higher values for h, i.e., closer to 1 for the Hubble value which observations would indicate a younger and smaller universe than has hithertofore been envisioned.

$$q = -H^{-2}\left(\frac{dH}{dt} + H^2\right)$$

"In a universe with a negative deceleration parameter q equal to ~.5, it follows that H = 1/t, where t is the time since the Big Bang. A non-zero, time-dependent value of q simply requires integration of the Friedmann equations backwards from the present time to the time when the comoving horizon size was zero." (Deceleration

parameter, Wikepedia)

The cosmological deceleration parameter may be estimated from the angular-size/redshift relation for compact radio sources. (Kellermann, 1993) “In cosmological models based on the standard Friedmann–Robertson–Walker geometry, the apparent flux density or angular size of standard candles or standard rods varies with redshift in a way that depends on the deceleration parameter q_0. (Open universes have $q_0 < 0.5$; closed universes have $q_0 > 0.5$.) At low redshift, however, observational errors are much greater than the differences in q_0 expected for different cosmological models, while at high redshift observational uncertainties, particularly at optical wavelengths, and apparent systematic evolutionary changes in sources obscure the expected geometrical effects. Here I show that measurements by very-long-baseline interferometry (VLBI) of compact radio sources associated with active galaxies and quasars may be largely free of evolutionary effects even at substantial redshifts. The relation between angular size and redshift for a sample of these sources indicates a value of q_0 close to 0.5, corresponding to cosmological density near the critical value.”

The deccelerative effects may therefore be inferred to be proportionately larger and the consequent relationship between acceleration and gravity proportionately larger.

The tensor value for gravitation (Einstein, 1923, 105a):

$K = 8\Pi\kappa/c^2 = 1.86 \times 10^{-27}$

(Einstein, 1923)

With the formula given by Margaret J. Geller and John P. Huchra (Geller & Huchra, 1989):

$H_0 = 100\ h\ km\ s^{-1}\ Mpc^{-1}$

It may, therefore, be postulated that the accelerative effects are transmitted through a four-dimensional manifold, which in this hypothesis, multiplies the effect and makes it omni-dimensional in the unit sphere. Relativistic effects would also be expected due to the fluxional characteristics of de Sitter space in conjunction with the continuum. In this postulation, q the deceleration parameter, rather than being the result of the gravitational attraction of the ponderable masses of the universe is itself the source of gravitation as where there is found an equivalence seen between between gravity and acceleration in the Generalized theory of relativity.

The lack of precise translation from the Hubble flow accelerative effects to the gravitational constant may indicate a turbulent passage through a highly variable

flux in de Sitter space. This motion of the continuum may be thought of as a relativistic motion through a turbulent sea which impinges on the continuum at every point. The gravitational constant is, thus, an average of this frictional and energetic interchange between these two domains, the continuum on the one hand, and de Sitter space on the other, in this postulation.

It is the interaction of a densely energetic field with the ponderable bodies of the continuum which are conceived of by Einstein as singularities in the field. It is thus postulated that each individual particle is a singularity. "The fact that the masses appear as singularities indicates that these masses themselves cannot be explained by symmetrical $g_{\mu\nu}$ fields , or "gravitational fields." Not even the fact that only positive gravitating masses exist can be deduced from this theory. Evidently a complete relativistic field theory must be based on a field of a more complex nature, that is, a generalization of the symmetrical tensor field" (Einstein, 1950). To employ the principle of equivalence as a means of understanding gravitational effects follows naturally from this explanation. As Einstein concludes, ..." I do not believe it is justifiable to ask: what would physics look like without gravitation?"

The interaction of the accelerative force is thus an n-dimensional interaction between the accelerative effect owing to the embeddedness in de Sitter space and a singularity generates the gravitational distortion in the field proportional to the mass

of the singularities - i.e., gravitational mass.

It follows from this discussion, that the principle of equivalence permits the translation from acceleration to gravitational effects. Accelerative effects are then partitioned differentially according to inertial mass in a Gallilean frame, which, however, induces a Riemannian alteration in the field according to the Generalized Theory of Relativity. The rigidity of this field is estimated as being very great according to Virginia Trimble. Accelerative effects due to gravitation may therefore be found to radiate through this densely energetic field. This gravitational radiation may not take the form of a particle for this reason and this may account for our current inability to detect the "graviton."

An alternative hypothesis which may be of additional interest to those described in the recent article (Peebles & Silk, 1990) is one derived from General Relativity. These mathematical findings show the universe as having a densely energetic field intrinsic to its structure. The empirical findings regarding the Casmir effect add further support to these conclusions.

Should one add to this the mathematical finding of Yaakov Zel'dovich as to the generation of matter in empty space, it may be possible to formulate a model of

universe formation which will save the phenomena of star and galaxy formation.

The difficulty in accounting for the missing matter which is central to a galactic disk and which allows for increments in rotational velocity by a factor of ten beyond that accounted for by the observed luminous matter in the galactic disk, may also be central to this disk. If the matter is not central to this disk, is in the form of a halo surrounding the galaxy, then there should be no increment in rotational velocity.

Current research indicates that the cold dark matter hypothesis is not able to independently account for the missing mass, galactic streaming, the balance between the Universe's density and the Hubble expansion of the Universe and most importantly the observed structure of galaxy distribution within the greater dispersion of galaxies at 14 h^{-1} Mpc. It is, thus, at this larger scale where "walls" and voids extend for many parsecs where this postulation no longer suffices. (Saunders, W., Frank, C., Rowan-Robinson, M., Efstathiou, G., Lawrence, A., Kaiser, N., Ellis, R., Crawford, J., Xia, X., & Parry, I. , 1991)

It is possible to save the cold dark matter hypothesis with the reinvocation of the cosmological constant of Albert Einstein. This postulation involves new physics since it envisions an attractive force which then accounts for the Hubble expansion of the Universe. This cosmological constant would then account for as much as 80% of the critical density. This is seen as being dynamically equivalent to

endowing the vacuum with a non-zero energy density. (Efstathiou, Sutherland, & Maddox, 1991)

With the postulation of a densely energetic field intrinsic to universe formation as seen in the derivations of the Standard Model, we may safely avoid the new physics which is necessary for the cosmological constant, and thus avoid a fresh blunder in this direction.

A value for q measured from standard candle observations of Type Ia supernovae, which was determined in 1998 to be negative, surprised many astronomers are with the implication that the expansion of the universe is currently "accelerating" (although the Hubble factor is still decreasing with time; see the articles on dark energy and the Lambda-CDM model). (Kutner, 2003)

Should this postulation be found correct, then the oscillating (bouncing) universe formulation, where the canonical h = 1 model requires a certain density, would be met with yet some additional density to account for the apparent oscillatory nature of our Universe which may be some 100 cycles away from the first cycle. (Sikkema & Israel, 1991).

In this way, the phenomena of observational cosmology may be saved without recourse to amathematical rules and new physics. How these gaussian waves which are manifested in this theoretical formulation in the early universe are then

transformed to non-gaussian waveforms, seen in observational cosmology, needs further development and astrophysical observation.

Should we consider the alternative hypothesis of the cosmos having a densely energetic field, we may note universe formation as a condensation in a false de Sitter Vacuum then the combined interaction between the electrical charge in de Sitter space creates singularities whose outer expansion is seen as the positively accelerated expansional movement of our universe. Thus, a potentially infinite number of universes may form in de Sitter space.

A philosophical position may be cited from, G. W. F. Hegel (1956), ..." there is no essential existence which does not manifest itself." The very large energies derived by Willem de Sitter for the equations describing the false vacuum of de Sitter space yield an energy density of 1.69×10^{126} for eV (electron volts) per cm^3.), the energy density of de Sitter space is given as: 5×10^{31} kelvin and 3×10^{93} grams per cm^3 , converted to eV via $e=m^2$ which is Albert Einstein's famous equation. This energy would then find expression in the observable universe. In the sense of this analysis, it would be quite unlikely that energies of this order of magnitude would remain hidden should a transition be formed in the potential barrier towards de Sitter space. This transition would thus form a Type Ia Supernova where the energies cited in this exegesis are clearly sufficient for Supernova generation.

Within the universe, it may be posited that there is an interaction

between the field and extant matter which causes a clumping of the field in the central region of the galaxy in a lens shaped figure, to some degree also corotating with the galaxy. In a geometrical sense, there would be the superposition of a somewhat larger concentration of the field in the aforementioned lens shaped figure, in the same space as the galaxy. This would be a self-interacting mass since gravitational effects also serve as source of gravitational energy according to Herman Weyl. Thus, while invisible and of the same ambient temperature as that of the galactic milieu, there would be no difficulty in accounting for the additional gravitational mass by the postulation of this densely energetic field.

Galactic streaming would be an expected conclusion from this theoretical formulation since there would be currents and countercurrents in the spherical chamber of the universe. This streaming action would not require a great attractor but would follow naturally from the equations for turbulent action in an expanding spherical chamber. Electrical effects of motional action in the false de Sitter vacuum upon the continuum would serve to initiate these motional actions in a wave-like Gaussian activity.

It is, therefore, postulated that the generally spiralform galaxies of the continuum are storm-like formations upon planar waveforms of varying dimensions. Thus matter formation and further gravitationally based condensation in star formation from the hydrogen dominant original composition to its present atomic

composition is subsequent evolutionary development which includes supernovae formation of the elements of greater atomic weight.

The wall-like aspect of galaxy formation which has been difficult to account for in the now extant formulations would also follow naturally from this postulation as wave-like actions of any dimension result from the summation of waveforms due to random coincidence in a virtually infinite field of interacting wave action.

Since this action may be conceived of as a pressure wave, it should demonstrate the periodicity of those observational findings mentioned in the following citation. (Geller, 1990)

With increased technological precision, there should be further confirmation of the Standard Model were we to include the special and generalized theories of relativity and their theoretical extension with particle physics in a somewhat larger, coherently articulated, framework.

The current observation that none of the extant theories: hot, cold -dark matter, etc., are likely candidates to explain the distribution of matter in the cosmos as shown in the preceding paragraphs, is given a similar disconfirmation with the observation of the early appearance of quasars some 1 billion years subsequent to the origin of the universe. (Reese, 1990). The isotropic flat background radiation gives little hope to the reigning cold-dark matter hypothesis as to a coincident evolution of galaxies with quasars. Coinicident evolution of galaxies and—quasars

is essential to account for their vast radiational flux with black hole formation amidst a resevoir of matter in an accretion disk surrounding a black hole or other highly condensate object during the initial birth of galaxies.

Where the various hypotheses cited by Silk and Peebles have a lesser probability of successful prediction to the observable universe than was previously thought, the penetrance of the potential barrier towards de Sitter space should have a greater likelihood during early times in a more densely energetic era than is currently observed. The formation of cosmological wormholes as a novel hypothesis of an intrusional event from de Sitter space is an alternative hypothesis to the "central machine" accretion disk orbiting a supermassive (10^8-10^9 solar masses) black hole model of Martin Rees- is therefore proposed.

The observational indices of blazars, optically violent variables seen at normal quasar redshifts, which term is taken here as including B L Lacertae objects, and those quasars which exhibit highly polarized strong emission line spectra are seen to have no characteristic form of blazar variability. Also the spectral index parameters (ai) appear to be consistent with relativistic shocks and synchrotron losses. Thus the model is that of a quiescent jet and the cut-off effects being due to shock acceleration in the flow. (Ballard, 1990) An observation of blazar intensity having been found to be in one instance to be an increment of some ten million solar luminosities in one second's duration.

"This suggests an inhomogeneous model for the emission region is required. An example is provided by a polarized component with a high-frequency cut-off and second component with a steeper spectral index and no significant polarization, tentatively identified with shock accelerated electrons and a quiescent jet, respectively."

It is clear that where the fluxional energetics of the quasar may equal the continuous output of 100 million galaxies with the shock parameter providing additional variation to this output with energetics having variability in the million solar luminosity range, mass conversion equations do not suffice. In other words, more energy is needed.

This alternative model must also provide for the finding of increments in luminosity of a quasar sample of .25 magnitude over a seven year observational period. (Cristiani, Vio, & Andreani, 1990). As stated herein, the model put forward by Martin Rees, "...though suggestive, is obscure in its fundamental structure and lacks a direct observational confirmation."

The general model of universe formation conceived of as a condensation in a false de Sitter vacuum shows that our universe is conceived of as a black hole which has formed in de Sitter space. Topologically, each point in our universe neigbours de Sitter space, though direct penetrance into the continuum is prevented by a large potential barrier. Please note:

"Quantum tunnelling towards an exploding Universe," (Perry, 1986) It is, therefore, following this well known postulation of Willen de Sitter, that it is hypothesized that the greater, unipolar phenomena such as Type I and II supernovae, BL Lacertae objects and Quasars and also transitionally highly energetic phenomena at the center of this galaxy and other similar galaxies, are instances of a breaching of the potential barrier towards de Sitter space.

This position is also brought forward by Martin Elvis (1987) who states, "One of the assumptions must be wrong . Either the gas densities are higher and the C III emission comes from somewhere else; the ionization parameter is large, which would make extra difficulties with the line ratios; or there is a special geometry in the nucleus so that, for example, the gas does not see the same continuum as we do." In conclusion he states, "On the other hand, as the emission line problem has turned out to be so intractable, researchers are now looking for extra sources of energy in quasars."

The model used in my analysis is that of Erez Braun and Mordehai Milgrom, (1990). This position is called the Variable Ejection Wind Model (VEW) which has the point of origination in a varying continuum. In this conception, "the variability occurs at ejection (i.e., with variable mass and energy output) the flow being terminal from there on..." In my postulation the gas intrudes as an energy flux in a monopolar jet from the false de Sitter vacuum. Conformal changes via the geometry of the continuum transform this flux into elements of this continuum in a kind of

crystallization effect. Braun and Milgrom conclude that, "disk or jet-like geometries are not excluded by the observational data"..."Actually, some authors prefer nonspherical geometries as a conclusion resulting from models of resonance-line scattering (Turnshek, 1988) and the fact that multiple troughs are sometimes observed (Turnshek 1986)."

One finds for de Sitter space:

$$\tfrac{1}{2}\left[\frac{1}{\beta_s}+\frac{1}{\beta_D}\right]\sigma\acute{r} = -\frac{\beta_D+\beta_s\varepsilon}{r} - \frac{GM\sigma}{2\beta r^2} + \frac{\sigma\chi r}{2\beta_D} - \rho_D$$

In the nonrelativistic limit, the terms on the right hand of the equation (4.29) are the surface tension, the gravitational attraction, the de Sitter repulsion, and the pressure difference, respectively.

Several paradoxes must be considered in this connection. The first paradox concerning the volume of the de Sitter vacuum is resolved when we consider its unusual geometric structure. The false-vacuum of de Sitter space inflates as expected, yet does not move out into the true vacuum region. In fact the domain wall is constantly accelerating towards the false-vacuum region, but the false-vacuum region is inflating so rapidly that the motion of the wall does not prevent it from expanding exponentially. (Blau, Guendelman, & Guth, 1987).

Penetrance through the domain wall permits the rapid emergence of an

exploding universe into the true vacuum region, with its time vector, X. also expanding exponentially until the momentum is adsorbed within the true vacuum region. In Quasar energetics, with the continuous extrusion of the energies of 100 million galaxies for some billions of years, this may indicate that it is possible to produce a more permanent rent in the domain wall than is seen in the more transitory perforations found in Supernovae Type la & lb. In this way, those difficulties found in accounting for these vast energies would have a ready explanation in the unique properties of the false-vacuum conditions of de Sitter space.

The observational evidence reveals the uniform presence of monopolar jets from quasars. These objects are four to five times larger than the bipolar objects. Where the fluxional energetics of these variables is measured in millions of galaxies of luminosity, it would appear plausible to assume that there is a unique and different source of energetics for these larger variables (i.e., de Sitter space) since there is a dichotomous distinction between Class I and Class II objects. (Burns, 1990). Further observations of eight core-dominated quasars all showing one-sided jets is cited in Kollgard (1990).

The energetics of supernovae Type la & lb, which are of approximately one solar mass, and yet 2.5 times greater in magnitiude than Type II supernovae of some 10 solar masses or greater, should then result from a small though highly energetic flux's reading of a more highly energetic region in the continuum of the false de Sitter vacuum. The postulation of intrusional events from other, more highly energetic continua, is not excluded from this analysis.

Should we consider the observations of Quasars and related objects as offering a window into the primordial region of de Sitter space, it would appear, perhaps as expected, that this is a region of intense turbulence, of storm-like aspect, which may upon occasion form a condensation that is universe formation. The decay of universe rotation through shear effects due to the topological embeddedness of the continuum in de Sitter space is seen in Oyvind & Harald (1987). It may then be in error to presume that de Sitter space is a static creation of invariant action but may instead be, according to these observations, a region of dynamic action and hence interaction with the continuum.

The possibility of creating a topological configuration such that there would be a nonsingular throat between our Euclidean geometry and that of de Sitter space may be considered in this connection. (Yoshida, Hirenzakei, & Shiraishi, 1990). On page 1978 of this article the interval between these universes is estimated.

A non-singular wormhole would permit the entrance of these vast energies resident in de Sitter space via a monpolar jet. The larger objects which are four or five times larger than the smaller bipolar jets also have a kind of pooling of this flux on the obverse side of the monopolar jet. This and the serried patterns of the jets, would appear to be due to columnar action of these jets impinging on a field or other material barrier resident in the space neigboring the quasar.

As the penetrance toward de Sitter space is classically prevented by a potential barrier, the right initial conditions for penetrance must exist where those

instances where sufficient energy is concentrated to penetrate the potential barrier towards de Sitter space. Even though we must consider the paradoxical nature of de Sitter space, with its simultaneous expansion and retreat of the domain wall, and the violent flux of de Sitter space inferred from blazars and other optically variable sources, penetrance through the potential barrier towards de Sitter space, within the limits of these many parameters, is still only a function of energy.

The equations which describe cosmological wormholes all lead to crunch in the long run (John Archibald Wheeler, personal communication). Even though a non-singular throat may permit the entrance of the vast energies of de Sitter space into the continuum, eventually this flux will cease. Within the vast flux contingent on the point origin of the Universe, it is postulated, rents appear in this densely energetic field which is the Universe. These rents may appear due to:

1. Wave like interactions which by probabalistic interactions produce energy density regions of sufficient energy density to generate an hiatus in the time field which is then generative of quasars under this postulation. This supposition requires nothing more than pressure wave interactions in highly turbulent flux.

2. Implosive contraction of stars with masses greater than ten solar masses upon exhaustion of core thermonuclear fuel are productive of SN Type Ⅱ.

3. Smaller solar mass objects (~l solar masses) with no trace of hydrogen near maximum light produce SN Type la & b. These objects show carbon, oxygen,

silicon, and other elements in their spectra. SN Type I have homogeneous light curves and are approximately 2.5 times more luminous than SN Type II. It may be possible to breach the potential barrier towards de Sitter space via high energy physics experimentation. (Dixon, 2003)

What is here proposed is to investigate set isometries between de Sitter space and Euclidean geometrey. Thus for example for any four-point set E = (p1,p2,p3,p4) which is not of the class S, there is a p-isometrey on E which is not Euclidean.

In this connection investigation of the invariant subspaces of these matrices would lead to an estimate of their rate of convergence with minimal steps of perturbation. Computer programs evaluating the energetics of these perturbative manipulations would be of interest in this matter. (Cohen, 1990). For these initital conditions, the density of the degenerate electron gas at the time of supernova generation for SN 1987A is estimated to be greater than 2×10^{14} g/cm^3. (Atwood, 1989)

The significance of this research to high energy physics would be to establish the threshold for penetrance towards de Sitter space thus elucidating the optimum intitial conditions for formation of wormholes, particularly in the case of a wormhole from an Euclidean geometry towards de Sitter space. The characteristics of the domain wall, a primary aspect of field theoretic notions, would also be clarified and be better understood as result of these investigations.

The profound importance of this research in prevention of supernova generation via

experimental mischance by increasing our understanding of high energy physics and field theory concomitantly should also be considered.

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