Magnetostatics relation to gravity with experiment that rejects Biot-Savart Law

J.C. Hodge[1*]
[1]Retired, 477 Mincey Rd., Franklin, NC, 28734

Abstract

Relating the concept of gravity to electromagnetics has been a goal of physics. The Scalar Theory of Everything (STOE) posits the components of the universe emerge to cause gravity and electromagnetic effects. The STOE is reviewed to show the gravity action and is extended to model magnetic effects. A fundamental change in the model of the action of magnetism is suggested. An experiment rejects the traditional magnetostatics Biot-Savart Law and does not reject the STOE.

keywords: STOE, Theory of Everything, magnetostatics, Biot-Savart Law

1 Introduction

The Scalar Theory of Everything (STOE) posits the components of the universe are introduced through Sources at the center of spiral galaxies (1). The components are removed from the universe through Sinks at the center of elliptical galaxies. That is, the spiral galaxies form around the Sources and elliptical galaxies form around the Sinks. This thermodynamic model calculates a theoretical average temperature of the universe of 2.718 K (2). Also, the ratio of the luminosity of Source galaxies to the luminosity of Sink galaxies approaches 2.7 $\pm$0.1 K (3). The present and past deviations are also explained as a Source and Sink hunting the average. The nearness of the ratio to the universe temperature suggest the B-band luminosity is an indicator of galaxy strength. This explains the differences between spiral and elliptical galaxies, cooling flows, and the intergalactic medium.

A fundamental characteristic of the STOE is that entities of our universe occur in pairs — discrete, continuous; algebra, geometry; positive, negative; gravitational mass, inertial mass; and electric (E), magnetic (M). The STOE suggests there are two and only two fundamental components of the universe. They are "hods" and "plenum" reflecting the fundamental pair. These terms and their fundamental status are unique to the STOE. All other structures of our universe emerge from the properties of these two components. So, the

*E-mail: jchodge@frontier.com

procedure to develop the STOE was to identify physics problem observations and conceive of the properties of the two agents that could emerge to yield the general observations of accepted models and that could explain the problem observations.

The hods are discrete and cause the plenum to warp plenum density ρ.

The force $\mathbf{F}_\mathrm{s}$ of the ρ field that acts on matter is

$$\mathbf{F}_\mathrm{s} = G_\mathrm{s} m_\mathrm{s} \nabla \rho \,, \tag{1}$$

where the G_s is a proportionality constant which is the surface area of the hods that the $\nabla\rho$ acts; m_s is the property of particles on which $\mathbf{F}_\mathrm{s}$ acts; $\rho = \rho_\mathrm{static} + \rho_\mathrm{dynamic}$, ρ_dynamic is caused by waves in the plenum, and ρ_{static} is the sum of the effects of all galaxies and masses:

$$\rho_\mathrm{static} = K_\epsilon \sum_{i=1}^{N_\mathrm{source}} \frac{\epsilon_i}{r_i} + K_\eta \sum_{l=1}^{N_\mathrm{sink}} \frac{\eta_l}{r_l} + K_M \sum_{j=1}^{N_M} \frac{M_j}{r_j} \,, \tag{2}$$

where the subscript, lower case, italic, roman letters are indices; ϵ_i and η_l are numbers representing the strength of the i^{th} Source and l^{th} Sink, respectively; M_j is the gravitational mass of the j^{th} object; K_ϵ, K_η, and K_M are proportionality constants; r_ϵ, r_η, and r_j are the distance from a Source, a Sink, and mass, respectively, to the point at which ρ_{static} is calculated; $\epsilon > 0$, $\eta < 0$, and $K_M < 0$; and N_source, N_sink, N_M are the number of Sources, Sinks, and matter, respectively, used in the calculation (4; 5).

Hodge (2016) (4) suggested the m_s property of matter is the cross section of the particle; the $\epsilon \propto M_{\mathrm{t}\epsilon}$, where $M_{\mathrm{t}\epsilon}$ is the effective mass of the Source galaxy; and the $\eta \propto M_{\mathrm{t}\eta}$, where $M_{\mathrm{t}\eta}$ is the effective mass of the Sink galaxy.

If the $\nabla\rho$ effect of the galaxies Sources and Sinks is small, the $\mathbf{F}_\mathrm{s}$ is the Newtonian gravitational force.

Hods travel through the plenum at the fastest speed of matter. The plenum is continuous and causes the hods to move by a $\nabla\rho$. The plenum waves travel at many times the speed of light and have the property of inertia (6). Matter consists of hods and plenum and, therefore, has both gravitational attraction mass of the hods and inertial mass of the captive plenum. The Equivalence principle derives from the constant amount of plenum held by each hod. This model corresponds to both General Relativity and quantum mechanics (5). Further, the STOE explains many problematical cosmological observations:

1. Galaxy redshift was explained using 32 spiral galaxies of the Key Project (correlation coefficient 0.80)with a higher correlation coefficient of 0.88 (3). This model of photons loosing energy recovered the Hubble Law as a linear equation where the constant accounts for the blueshift of nearby galaxies. The decline of energy is by the release of hods and a reduction of plenum (inertia) held by the photon.

2. The redshift model also explains the observed discrete redshift.

3. The Pioneer Anomaly (PA) was explained using the same equation [Eq. 1] and concept as the galaxy redshift with solar system masses warping ρ along the signal path (7). The PA is an unexplained signal frequency shift from the spacecraft [P(10) and P(11)] expressed as an unexplained acceleration $\mathbf{a}_{\mathrm{P}}$. The STOE is consistent with the general value of $\mathbf{a}_{\mathrm{P}}$; with the annual and diurnal periodicity; with the differing a_{P} between the spacecraft; with the discrepancy between *Sigma* and CHASMP programs at P10 (I) and their closer agreement at P10 (III); with the slowly declining a_{P}; with the low value of $\mathbf{a}_{\mathrm{P}}$ immediately before the P11's Saturn encounter; with the high uncertainty in the value of $\mathbf{a}_{\mathrm{P}}$ obtained during and after the P11's Saturn encounter; with the $\mathbf{a}_{\mathrm{P}}$ being Earth directed rather than Sun directed; and with the cosmological connection suggested by $a_{\mathrm{P}} \approx cH_{\mathrm{o}}$ (c is the speed of light and H_{o} is the Hubble constant). No other model explains all the observed anomalies.

4. The 2006 STOE PA predictions that no other model predicted were found in 2009 and 2011 (8).

5. The rotation curves (RC) of the 105 galaxy sample included a wide range of characteristics including rising, falling and flat RCs (4). The equations used in the analysis considered the $\nabla\rho$ from mass (gravity) and from the Source. Astronomers have tracked the behavior of the plenum from Sources as "dark matter".

6. Asymmetric RCs effect was calculated, with a term $|\mathbf{K} \bullet \mathbf{a}_{\mathrm{o}}|\mathbf{R}_{\mathrm{major}}$, where $\mathbf{K}$ is a constant, $\mathbf{a}_{\mathrm{o}}$ is the acceleration (force) exerted by the neighbor galaxies, and $\mathbf{R}_{\mathrm{major}}$ is the radial distance to the maximum asymmetry along the major axis of the target galaxy (4). The uncertainty change from $\pm 21\%$ for RC only to $\pm 10\%$ when asymmetry was included.

7. Several outer galaxy parameters have been found to correlate with galaxy central mass M_c and central velocity dispersion σ_c (9, and references therein). This is difficult to model in spiral galaxies using infall models. The STOE model suggests an outflow from the center followed by a return flow in spiral galaxies. The σ_c was found to correlate to host galaxy's B band luminosity for a sample of 82 galaxies. The M_c was found to correlate to host galaxy's B band luminosity for a sample of 29 galaxies. The sample included seven galaxies other studies excluded.

The STOE was extended into the world of the small by using the characteristics of the two components of the universe to model light.

1. The redshift model suggested photons were columns of hods. Each hod column causes waves in the plenum. These waves cause other photons to change relative position as they travel. This causes the coherence of photons over long distances (10).

2. Extending the photon model to single photon diffraction and interference (11) suggested an experiment that rejected wave models of light (12). A

further extension of the experiment suggested another experiment (13). Both these experiments predicted their result that rejected wave models of light and suggested a different approach to Quantum Mechanics (14).

3. The model simulation of diffraction suggested characteristics of hods and photons. One is that the hod is a magnet. The photon is a bar magnet. This allows assembles of disc magnets to construct models of particles (15). This explained the observation of the Stern-Gerlach Experiment in terms of alignment of magnetic poles. This is usually called "spin", but it is not physical spin of particles (16). These structures are magnetic with North and South poles as shown in the diagrams in (15).

4. The other is the cause of the waves in the plenum which direct the photons.

5. A model of how the Stern-Gerlach Experiment produces the "spin 1/2" observation of electrons was based upon the structure (16).

The observations of E and M fields that combine to form Maxwell's Equations are macroscopic concepts. The (simplified) magnetostatics Biot-Savart Law to compute a magnetic field $\mathbf{B}$ caused by a steady current I in a element of a wire $\mathrm{d}\mathbf{l}$ at a point $\mathbf{r}$ relative $\mathrm{d}\mathbf{l}$ is (SI units):

$$\mathbf{B}(\mathbf{r}) = \frac{\mu}{4\pi} \int \frac{I\,\mathrm{d}\mathbf{l} \times \mathbf{r}}{|\,\mathbf{r}\,|^3}\,, \tag{3}$$

for an infinitely long wire. Therefore, the $\mathrm{d}\mathbf{l}$ with an angle θ to $\mathbf{r}$ has some contribution to $\mathbf{B}(\mathbf{r})$.

The STOE's goal is to describe the magnetostatics experiments in terms of emergent hod and plenum effects. Thus, the magnetostatics effects can be related to the cosmological observation enumerated above. The coulomb field has been explained as vortices of the plenum caused by movement of hods because of the speed of waves in the coulomb field (17; 18).

This paper suggest the M is the emergent effect of clouds of unbound hods.

2 Model

The E has been attributed to the plenum vortices. The pair fundamental observation of the universe suggests the M is a hod emergent effect. The hod is a magnet analogous to a disc magnet (15). The electron structure (15, figure 9) of photons accumulates hods as it moves unbound through the plenum which has clouds of unbound hods as suggested in the galaxy redshift model (3). The analogy with disc magnets is seen in Fig. 1.

Although bound, the extra hods are loosely bound. These may fracture off the electron as separate hods as the electron moves as the redshift model suggests (3).

The electron moves by the force of the plenum acting on the hods' surface. This establishes a unique orientation relative to the direction of motion. The

Figure 1: Electron moving through the plenum has accumulated hods.

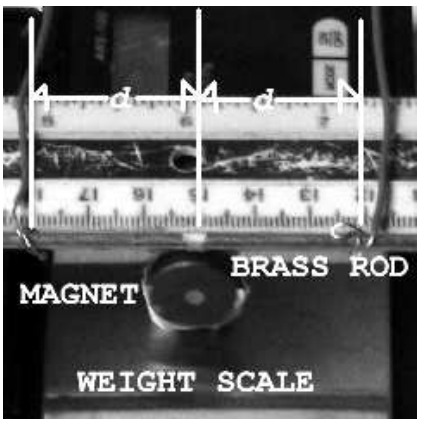

Figure 2: Photo of the experimental setup.

Stern-Gerlach Experiment shows the magnetic axes of the electron establish a further definition to the orientation of the electron. This in turn establishes that the hods fractured from the surface leave in a particular orientation. The static magnetic field has been experimentally determined to be concentric to current flowing in wires (see Eq. 3). Therefore, the hods' surface normal and the hods' velocity are perpendicular to the electron flow. This is inconsistent with the θ having a value of other than $\pi/2$.

3 Experiment

(All measurement are $\pm 10\%$ unless otherwise stated).

Wires attached to a brass bar (1/8 inch thick) (hereinafter "bar") induce a current through the bar, between the wire attachment points at a distance of 2 d apart. A disc magnet (1.82 cm diameter X 0.2 cm thick) is placed approximately 0.05 cm under the bar and on a gram-weight (gw) scale (AWS-100, Digital scale) with a tolerance of ± 0.02 gw. (see Fig. 2)

The weight measured W is the difference of the meter reading without current and the meter reading with current. The readings with current in both directions are averaged.

The resulting weight measurements are constant (within the tolerance) and independent of d. However, note the lowest measured $d = 0.9$ cm has the lowest reading and this $2d$ is less than the diameter of the magnet.

Figure 4 shows a modified experiment wherein both wire attachment points are on one side ($p_1 = 1$ cm) such that the current does not flow over the magnet. The $\mathbf{W = 0.00}$ gw in this case.

Figure 5 shows a modified experiment. The bar is approximately 2.7 cm long such that the current does flow approximately 2.0 cm along the bar. The

Table 1: Data for Distance d of current flow vs weight measured W.

d cm.	W_1 [a] gw (±0.02)	W_2 [b] gw (±0.5)
0.9[c]	0.07	0.36
1.0	0.08	0.40
2.0	0.09	0.41
3.0	0.09	0.41
4.0	0.08	0.40
5.0	0.08	0.39

[a] The W_1 series was with a regulated current of 1 amp.
[b] The W_2 series was from the output of a 6 v. battery. Therefore, the current output is highly variable. Taking a reading 10 seconds after reconnecting reduced the variability.
[c] This measurement is slightly inside the overlap (see Fig. 3).

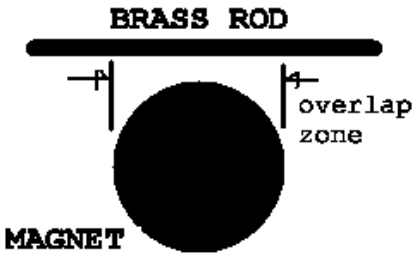

Figure 3: Diagram defining the "overlap".

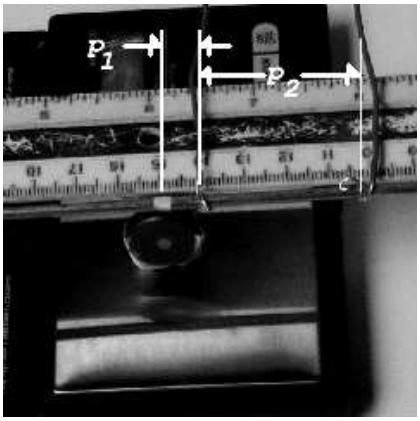

Figure 4: Current on only one side of the magnet.

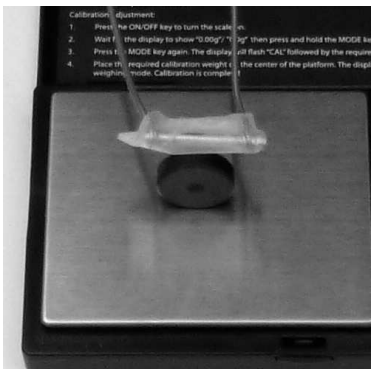

Figure 5: Short bar.

$\mathbf{W} = \mathbf{0.08}$ gw in this case.

4 Discussion and Conclusion

Gravity according to the STOE is a result of $\nabla\rho$ acting on the surface of hods. "Dark matter" is the same effect where the $\nabla\rho$ is directed outward from the Source at the center of spiral galaxies. The properties of plenum also describe the interaction of the E and B. Gravity, redshift, E, and B are emergent properties of the plenum and hods (19).

Curiously, the use of "overlap" is consistent with the actual use of calculations. For example, the calculation of Ampere's force law involves a total force per unit length on either wire. Then the length is immediately reduced to the length of the shorter wire. This is the overlap.

The magnetic "field" according to the STOE is the density distribution of hods with the same orientation. This is like the electric "field" being the density of plenum cones and rings. The hods generate vortices in the plenum as they move. The behavior of hods far from the emitting current in antennas is the study of the electromagnetic field (EM). The description of the EM field from a dipole antenna array is the basis for the STOE model of photon diffraction.

The $\mathbf{B}(\mathbf{r}) = 0$ in Eq. 3 for $\theta \neq \pi/2$. The traditional magnetostatics Biot-Savart Law is rejected. The STOE model of magnetostatics is not rejected .

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