

# New Solar System Force, Decay of Gravity, and Expansion of the Solar System

**Joseph J. Smulsky**

Institute of the Earth Cryosphere of  
the Russian Academy of Sciences  
Siberian Branch, Tyumen, RUSSIA  
e-mail: jsmulsky@mail.ru

**Charles William (Bill) Lucas, Jr.**

29045 Livingston Drive  
Mechanicsville, MD 20659-3271  
USA  
e-mail: Bill.Lucas001@gmail.com

**Correspondence on the New Solar System Force.** In this paper, Joseph Smulsky comments on the new solar system force as described by Charles Lucas in the previous issue of Foundations of Science, Volume 13, Number 4, November, 2010. Smulsky's letter appears first and is followed by a reply from Lucas.

## There is no Reason to Doubt Newton's Law of Gravitation

Joseph J. Smulsky

I always read with great interest the papers by Charles William Lucas, Jr. He does not agree with the contemporary scientific view of the world, sees many shortcomings in it, and is trying to eliminate them, offering his way to overcome them.

Outside the Mainstream there are many researchers who, like Lucas, do not recognize the fantastic modern constructions in physics. Along the way, I note that because of the lack of publication in the Mainstream, they are not exchanging the experiences and results among themselves. Therefore, each of them starts from zero, but do not rise, like Newton, on the shoulders of others. As a result, the discoveries by dissidents of scientific truth do not gain enough strength to overcome the fantasies of Mainstream.

Among all the dissidents Lucas is the one most focused on the non-relativistic description of interacting bodies. I followed with interest his work on the interaction of moving charges. I agree with many critical views of Lucas. However, I consider that moving relative to each other the charges  $q_1$  and  $q_2$  interact in another way, namely, the force which is derived in my papers, in particular in [1] - [2] is:

$$\vec{F}_{12} = k \frac{\vec{R}_{12}(1 - \beta^2)}{\left\{ R_{12}^2 - [\vec{\beta} \times \vec{R}_{12}]^2 \right\}^{3/2}}, \quad (1)$$

where  $k = k_e = q_1 q_2 / \varepsilon$  and  $\varepsilon$  is the dielectric permittivity of the medium;  $\vec{\beta} = \vec{v}_{12} / c_1$ ;  $c_1 = c / \sqrt{\mu \cdot \varepsilon}$ ;  $\mu$  is the magnetic permeability of the medium;  $c_1$  is the propagation speed of electromagnetic action in it, and  $\vec{v}_{12}$  is the velocity vector of the second particle relative to the first one.

In his paper: "Confirmation of New Solar System Force Supports Universal Electrodynamic Force" [Foundations of Science, Vol. 13, No. 4], Lucas proposes to add

his electromagnetic force to Newton's gravity force. To do this, he shows that Newton's law of gravity does not describe the interaction of the Solar System bodies. I disagree with his proposal.

The problem of interaction of Solar System bodies (the Sun, planets and the Moon) by Newton's law, we have solved for 100 million years (see, for example, [3]). We have compared the results of the solution at small time intervals with observations and have found that they coincide. Only one element of the orbit and only for one body, namely the position of the perihelion of Mercury, is slightly different from that calculated by Newton's law of gravitation. We have found an explanation for this. It turned out that due to rotation of the Sun about its axis the additional Newtonian effect arises, which shifts the perihelion of Mercury. We divided the part of the Sun's mass between bodies in the plane of its equator. Such a system, together with other bodies of the Solar system, has given the observed rotation of Mercury's perihelion [4] and not changed the dynamics of the other elements of the orbits.

When comparing the results of calculations with observations, we also made sure that the values of orbital elements in the first approximation coincide with the results of the problem of interaction between two bodies (the Sun and planet or the planet and satellite) at Newton's law of gravitation, in particular the two equations of this problem: the law of conservation of angular momentum (Kepler's second law)

$$r v = \text{const} = R_p \cdot v_p = R_a v_a \quad (2)$$

and the orbital period  $P$

$$P^2 = 4\pi^2 \cdot a^3 / G \cdot (M + m), \quad (3)$$

where the indices « $p$ » and « $a$ » are, accordingly, pericenter and apocenter;  $a$  is the semimajor axis of the orbit.

When the orbit is a circle with a radius  $R = R_p = R_a = a$ , then the body moves in an orbit with constant velocity  $v$  and the orbital period will be

$$P = 2\pi \cdot R / v. \quad (4)$$

After substituting  $P$  in (3) we receive

$$v^2 \cdot R = G \cdot (M + m). \quad (5)$$

We have derived the product  $v^2 \cdot R$ , since C.W. Lucas, Jr. uses it to prove the force proposed by Pari Spolter [5].

Now consider the results of Lucas, by which he proves the error of Newton's law of gravitation. Table 1 shows that the law (2) is not satisfied, because the ratio  $(v_p \cdot R_p + v_a \cdot R_a) / (2v \cdot R) \neq 1$ , where the velocity  $v$  is defined by (4) for a circular orbit of radius  $R = (R_p + R_a) / 2$ . Kepler's second law (2) refers to the distance and velocity for a single orbit

(i.e. the radii  $r$ ,  $R$ ,  $R_p$  and  $R_a$  in (2) and the velocities on this radiuses must be on the same orbit), but not for two different orbits. Therefore, the output of table 1 is incorrect because the ratio  $(v_p \cdot R_p + v_a \cdot R_a)/(v \cdot R)$  is not a consequence of Kepler's second law.

In Tables 2–9 for different pairs of bodies, Lucas shows that the product  $v^2 \cdot R$  is little changed for the same central body. Since the orbital velocity is  $v$ , he computes the formula (4), and the expression  $v^2 \cdot R$  in accordance with the Newton's law of gravitation is defined by (5). Since the mass  $M$  of the central body is much higher than mass  $m$  of its satellite, the product  $v^2 \cdot R$  is practically independent of the mass of the satellite. Therefore the formula (5) gives the result presented in Tables 2–9, that is, it defines all of the results of these tables.

Thus, Tables 2–9 convincingly demonstrate the validity of Newton's law of gravitation. And the conclusion of Lucas that the constancy of the product  $v^2 \cdot R \approx \text{const}$  indicates the presence of an additional force that is proportional to  $v^2 \cdot R$ , is erroneous.

For three centuries, many scholars have suggested amendments to Newton's law of gravitation. However, they were all rejected by the more accurate calculations of the interaction of bodies under Newton's law of gravitation. Given the above we can say: there is no reason to doubt Newton's law of gravitation.

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## Response by Charles W. Lucas, Jr. to paper

In the letter above the argument is made that there is a lack of publications critical of Newton's Law of Gravitation in mainstream physics journals, thus all such criticisms must be invalid. This assumes that consensus is the proper basis for science, which is not true. When Ptolemy introduced his earth-centric astronomical model to replace the ancient Sun centric model before him, he had the power to achieve consensus, but his theory was not correct. When Galileo corrected Ptolemy's earth-centric theory with a new heliocentric one, he did not have consensus, but his theory was correct. Science is supposed to be based on agreement with observation and the proper use of logic. Consensus is based on many other factors and is often wrong.

In the letter above the question is asked why the force formula

$$\vec{F}_{12} = k \frac{\vec{R}_{12}(1-\beta^2)}{\left\{ R_{12}^2 - [\vec{\beta} \times \vec{R}_{12}]^2 \right\}^{3/2}}$$

that was derived from the Biot-Savart-Laplace Law and the Faraday Induction Law is not correct for electrodynamics. The answer is that it is incomplete. It does not include non-conservative forces as represented by Lenz's Law. It does not include radiation reaction terms for Larmor radiation or terms such as would be expected from the Lienard-Wiechert potential. In order to obtain the correct vector symmetry in the numerator for radiation, it is necessary to interpret the derived

$$\left[ R^2 - \frac{V^2 R^2}{c^2 \sin^2 \theta} \right]^{\frac{3}{2}} \text{ term as } \left[ R^2 - \frac{\left\{ R \times \left( R \times \frac{V}{c} \right) \right\}^2}{R^2} \right]^{\frac{3}{2}} \text{ instead of the simpler } \left[ R^2 - \left( R \times \frac{V}{c^2} \right) \right]^{\frac{3}{2}}$$

In the letter above the claim is made that all the orbital motions of the solar system are completely explained by Newton's Law of Gravitation except for 43 seconds out of 5600 seconds/century of the rate of precession of the *perihelion of Mercury's* orbit (less than 1% of a very tiny effect) which has been attributed to General Relativity Theory. From Newton's Laws of Motion and Gravitation, Kepler's Second Law "A line joining a planet and the Sun sweeps out equal areas during equal intervals of time"

### (1) Kepler's Second Law $RV = \text{constant} = RpVp = RaVa$

where p = perihelion or point on orbit closest to the Sun and a = aphelion or point on orbit furthest from the Sun and his Third Law "The square of the orbital period of a planet is directly proportional to the cube of the semi-major axis of its orbit"

### (2) Kepler's Third Law $P^2 = 4\pi^2 a^3 / [G(M_{\text{Sun}} + m_{\text{planet}})]$

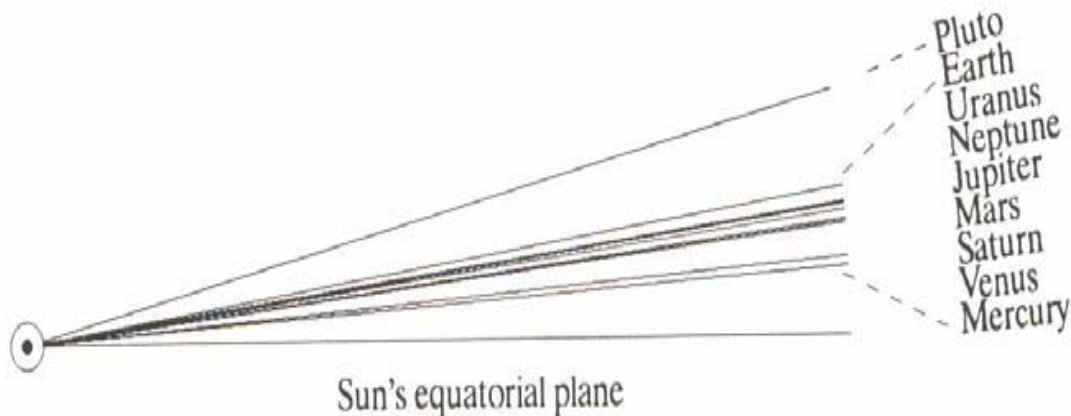
can be derived.

Figure 1 of the original paper [1] shows that there are deviations from Kepler's Second Law and consequently Newton's Laws due to the eccentricity of orbits. Figure 3 of this

response shows that there is a quantization of the orbits that is totally missed by Newton's Laws and that the period of the orbits of the planets can be predicted from the period of the Sun.

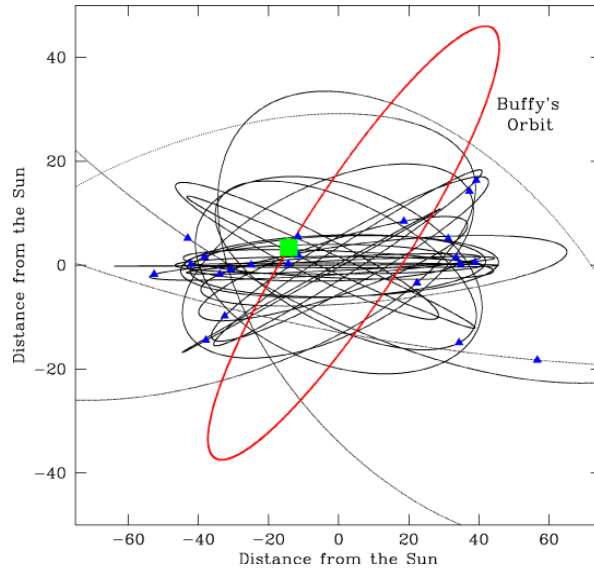
In this response evidence will be presented that Newton's Law of Gravitation does not explain even the gross overall motion of the bodies of the solar system as seen by an observer outside the solar system, gives no explanation for the observed quantum properties of the solar system as embodied in the modern version of Bode's Law, gives no explanation for why the bodies of the solar system, the galaxies and the universe itself are expanding, gives no explanation of the source of the gravitational force, gives no explanation of Hubble's Law for red shifts, gives no explanation for the Cosmic Microwave Background Radiation, gives no explanation for the quantization of redshifts about the center of the universe as observed by Tifft, and gives no explanation of how gravity's action-at-a-distance is possible. Finally evidence will be presented that Newton's Law of Gravitation is not a proper axiomatic theory based on logic as defined by Euclid, Plato and the ancient Greeks as the basis for all Natural Philosophy including the development of scientific theories.

To an observer outside the solar system, the solar system consists of a central star rotating on its axis with a number of solar bodies orbiting the Sun nearly in its equatorial plane. If the orbits of the planets are considered elliptical planes, all are observed to be tilted at various angles with respect to the equatorial plane of the Sun as shown in Figure 1.



**Figure 1 Angle of Tilt of Elliptical orbits of Planets with Respect to the Sun's Equatorial Plane[2]**

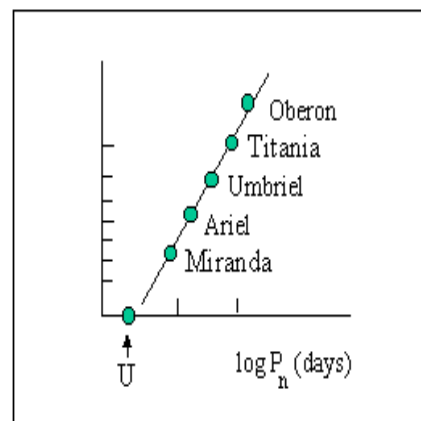
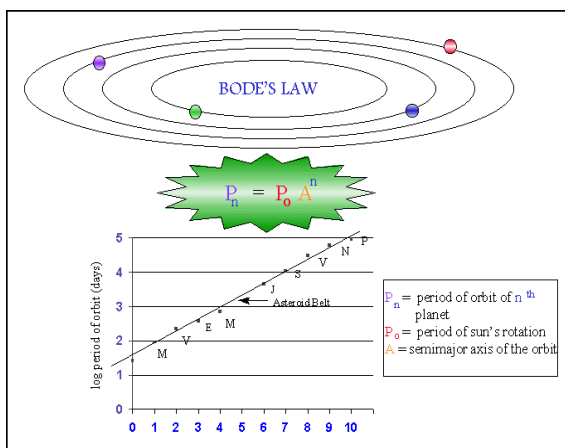
Note that the angles of tilt for Mercury, Earth, and Pluto appear to be quantized with the basic quantization angle being multiples of about 5 degrees with some fine structure due to moons for the other planets. Different orbits have their semi-major axes pointing in different directions in three-dimensional space. Presumably the material for all the solar bodies came from the Sun in the past and according to Newton's Laws all bodies should lie in the equatorial plane of the Sun like the rings of Saturn. Newton's Law of Gravitation cannot predict or describe the pattern of tilts of the orbits with quantization type features as seen in Figure 2 for planets and comets.



**Figure 2: Orbits of the Planets and Comets about the Sun**

One of the oldest empirical laws of astronomy is known as Bode's Law. It has been modernized over time to show the quantized orbital periods and radii in terms of the orbital period and radius of the Sun. Figure 3 shows the quantization of the orbits of the planets about the Sun and the moons about the planets.

### Bode's Law works for moons around planets



**Figure 3a and 3b Modern Version of Bode's Law for Planets and Moons**

The modern version of Bode's Law can predict the period of the orbits of all the planets to within  $\pm 5\%$  from the properties of the Sun for planetary orbits and the properties of

the planets for moon orbits. Neither Newton's Law of Gravitation nor Einstein's General Relativity Theory can predict any quantization of orbits in the solar system.

### Titius- Bodes' Law - Planets and Moons

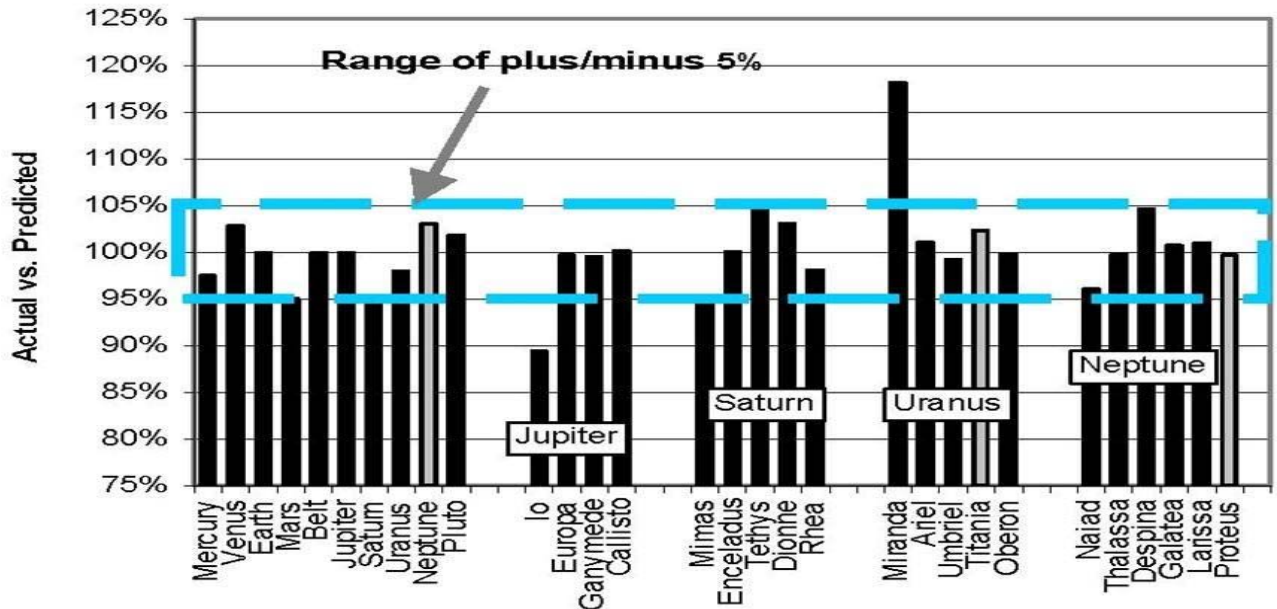


Figure 3c

### Modern Bode's Law for Planets and Moons

If one plots the increasing radii of the orbits of the planets about the Sun as shown in Figures 4A, 4B, and 4C, one sees an expanding wave pattern similar to that of an expanding disturbance in water.

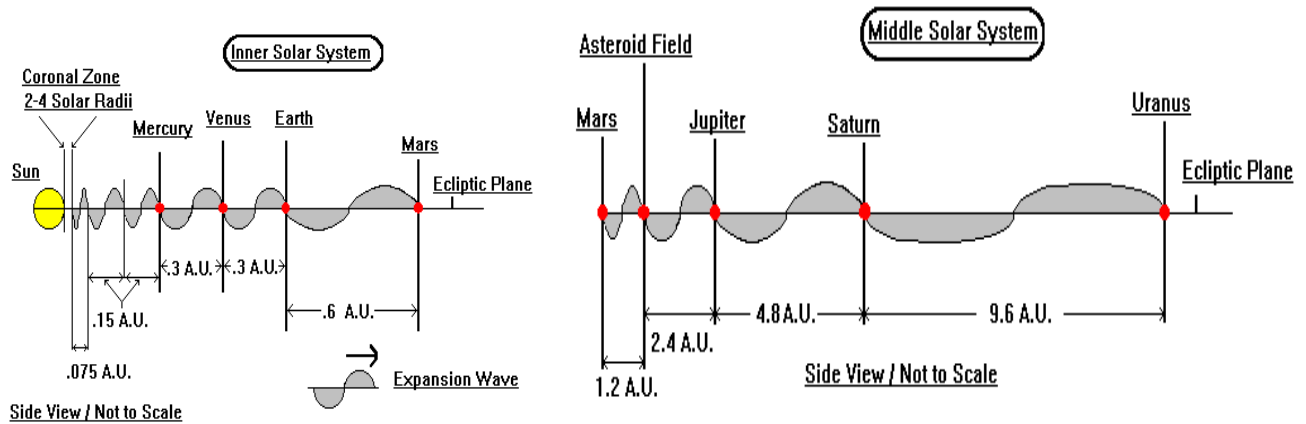
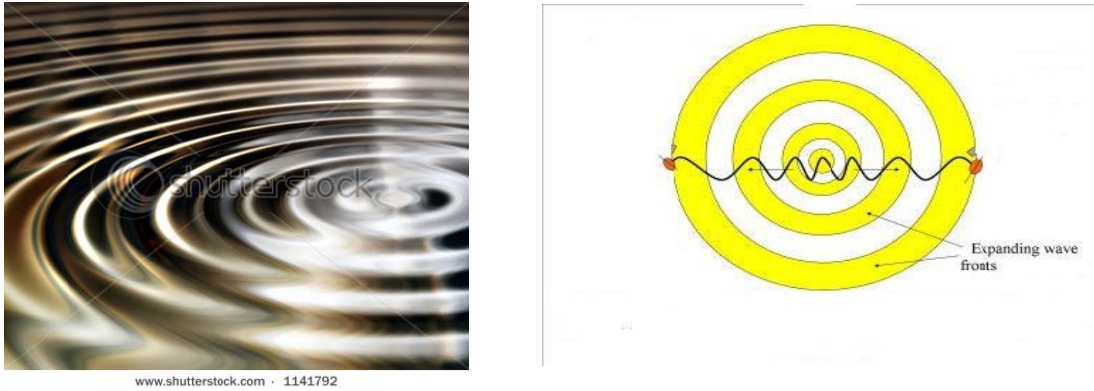
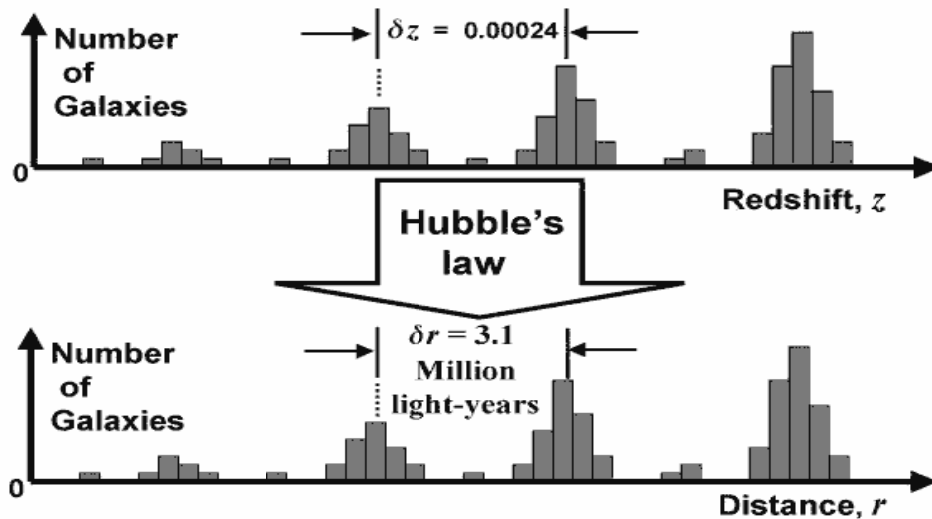


Figure 4a and 4b Increasing Wavelength Distances Between the Inner and Outer Planet Orbits



**Figure 4c Water Surface Waves Showing Expansion of Disturbance with Increasing Wavelength**

The pattern of expanding waves depends on rate of decay of gravity. If this effect is valid, it should appear on other size scales in the universe. In Figure 5 the quantization of Hubble’s redshifts supports Bode’s Law on a universal scale.



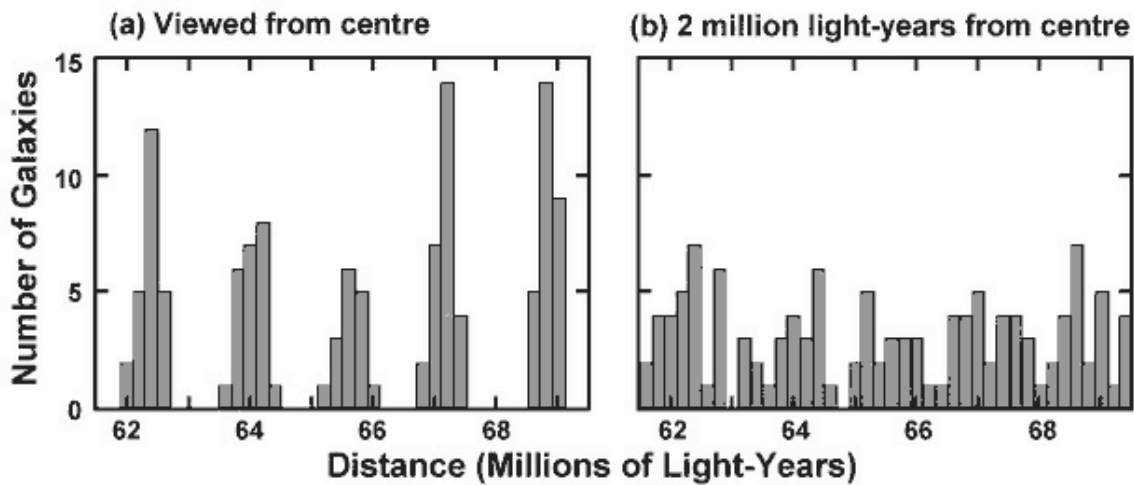
**Figure 5 Tift’s Quantized Red Shifts Support Bode’s Law on Universal Scale [3] (idealized format without background)**

In the early 1970s William Tift [4] at the Steward Observatory in Tucson, Arizona, was analyzing the red shift data and began transforming the data into “power spectra” that show how the various spacings in the red shift data occur. This statistical technique shows difficult-to-see regularities as peaks rising above the random noise in a plot. The noise could be due to such things as the “local” or “peculiar” motions of the galaxies. Tift [4] noticed a surprisingly strong peak corresponding to an interval between red shift  $z$ ’s of about 0.00024 and a weak peak at  $\frac{1}{2}$  of 0.00024.

In 1984 Tift and Cocke [5] examined the 1981 Fisher-Tully survey of red shifts in the radiowave (21 cm wavelength line from hydrogen) part of the spectrum. They found sharp periodicities at exact submultiples  $\frac{1}{3}$  and  $\frac{1}{2}$  of 0.00024.

However, despite Tift's steady stream of publications, astronomers remained skeptical about the notion of quantized red shifts. Then in 1997, an independent study of 250 galaxy red shifts by Napier and Guthrie [6] confirmed Tift's basic observations. They found the red shift distribution to be strongly quantized in the galactocentric frame of reference with a very high confidence level. The galactocentric frame of reference is the frame at rest with respect to the center of our own galaxy, the Milky Way. When they compensated for the earth's motion around the Sun and the Sun's motion around the galaxy center, the quantizations appeared more clearly.

In 1996 and 1997 Tift [7, 8] showed that it is important to compensate the galactocentric red shifts further by accounting for our galaxy's motion with respect to the cosmic microwave background radiation. Doppler shifts of the microwaves show that our galaxy is moving about 560 km/s in a direction south of the constellation Hydra.[9] Accounting for this motion converts the galactocentric red shifts to a frame of reference which is at rest with respect to the cosmic background radiation and presumably at rest with respect to the universe as a whole. In this frame the red shift groups are much more distinct from one another suggesting that the universe has a defined center. Additional periodicities of 1/4 and 1/8 of 0.00024 were observed. See Figure 6 for the skewing effect of observing the red shifts away from the center of the universe.



**Figure 6 Effect of Observing Red Shifts Away from the Center of the Universe**

In 1992 Tift [10] in an anonymous paper claimed that galactic red shifts have actually decayed slightly in just a few years. This is consistent with red shifts being primarily gravitational red shifts and the force of gravity declining rapidly far away near the edge of the universe. The electrostatics theory of gravity is the only theory of gravity that predicts the general decay of all red shifts in the universe.

Maps of the bottom of the oceans on earth as well as maps of the moon and other planets show that they have expanded significantly over time. The large ridges left by the expansion show how the continents used to be connected. See Figure 7 below.

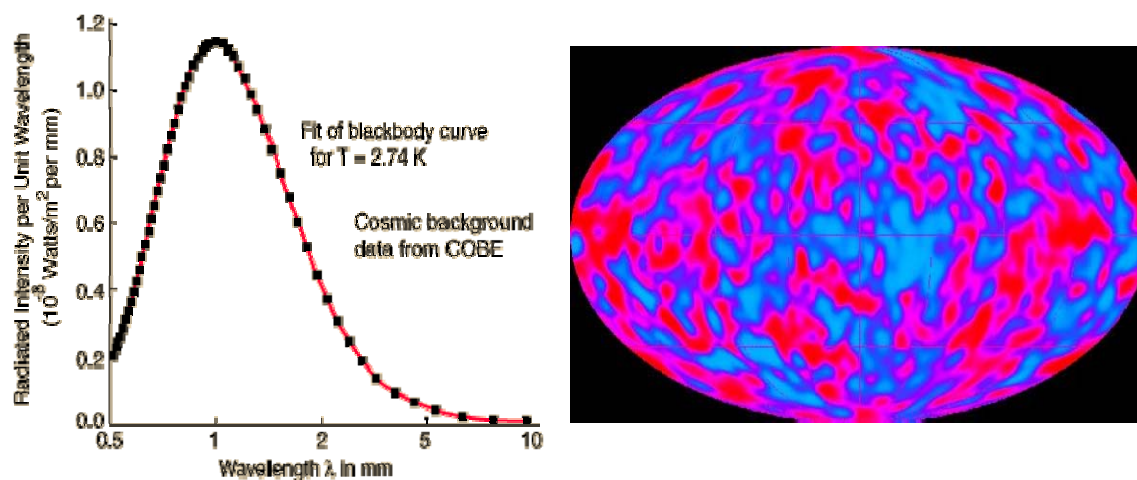


**Figure 7 Stretch Marks of Earth Expansion [11]**

A theory of gravity in which gravity decays can easily explain the expansion of the earth, moons, planets, Sun galaxies, and the universe as a whole. However, neither Newton's Law of Gravity nor Einstein's General Relativity Theory can explain any decay in gravity, because they do not describe the origin of gravity or the mechanism that causes gravity.

Newton used the phenomenon of motion to explain the origin of various forces acting on bodies, but in the case of gravity, he was unable to experimentally identify the motion that produces the force of gravity. Moreover, he refused to even offer a hypothesis as to the cause of this force on grounds that to do so was contrary to sound science. He lamented that "philosophers have hitherto attempted the search of nature in vain" for the source of the gravitational force, as he was convinced "by many reasons" that there were "causes hitherto unknown" that were fundamental to all the "phenomena of nature". These fundamental phenomena are still under investigation and, though hypotheses abound, the definitive answer has yet to be found. And in Newton's 1713 *General Scholium* in the second edition of *Principia*: "I have not yet been able to discover the cause of these properties of gravity from phenomena and I feign no hypotheses... It is enough that gravity does really exist and acts according to the laws I have explained, and that it abundantly serves to account for all the motions of celestial bodies." [12]. Three hundred years later, electrodynamics was found to be what Newton was looking for.

In the electrodynamics theory of gravity [13], gravity is due to the electric force between vibrating neutral electric dipoles consisting basically of atomic electrons and nuclear protons forming dipoles in atoms. In electrodynamics anything vibrating must accelerate to do so and must radiate away energy according to the laws of electrodynamics and thereby decay. The energy radiated away can be calculated and has been found to be equivalent to the Cosmic Microwave Background Radiation as shown in the fit to the data in Figure 8 [13]. Newton's Law of Gravity is unable to predict the Cosmic Microwave Background Radiation due to vibrating neutral electric dipoles, because it lacks the mechanism responsible for gravity.



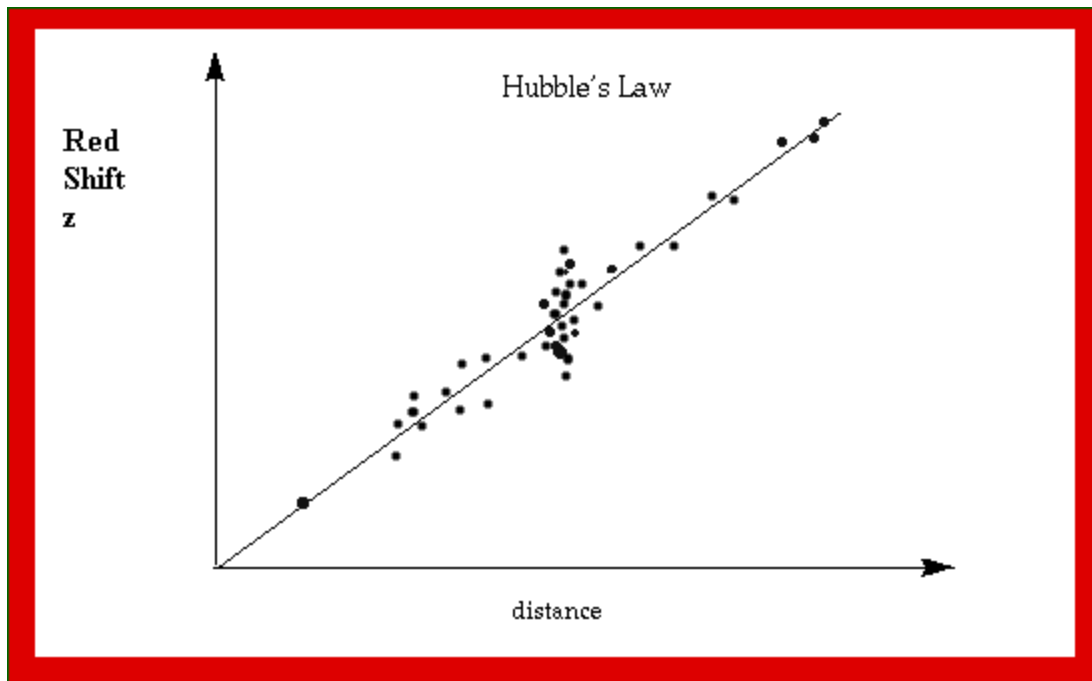
**Figure 8 Fit of Gravity Decay Radiation to Cosmic Microwave Background Radiation Data from COBE**

The decay of gravity has many implications. First and foremost is that the strength of gravity was much greater in the past. The decrease in the force of gravity over time has a significant effect on the light that we see from distant stars. From conservation of energy light emitted from a stellar surface on a star of mass  $M$  and radius  $R$  is expected to have a red shift equal to the difference in gravitational potential. Using  $G$  for Newton's universal gravitation constant this potential at the stellar surface is  $-GM/R$  and zero at infinity, so the red shift  $z$  may be defined as

$$z = \frac{\Delta\lambda}{\lambda} = \frac{GM}{c^2 R}$$

The Pound–Rebka experiment of 1959 measured the gravitational redshift in spectral lines using a terrestrial  $^{57}\text{Fe}$  gamma source [14] and confirmed the relationship above for the redshift  $z$ .

If the force of gravity is decreasing, then  $GM/R$  would have been orders of magnitude greater in the past when gravity was stronger, i.e.  $M$  would have been much larger and  $R$  much smaller. Thus, in general, the gravitational red shift of light from stars should be larger, the farther away the star is, independent of the star's velocity or type as shown in Figure 9. The star's velocity can produce an additional Doppler red shift and the star's size can alter the rate of decay. An examination of the data that Hubble used to formulate his famous law that red shifts are roughly proportional to distance is shown in Figure 9. Note that the Doppler red shift due to velocity and different decay rates for different star sizes causes deviations (from a perfect straight line) which are usually small in comparison with the main effect of the gravitational red shift from earlier times. The gravitational red shift should have been much larger in the past than it is today on the earth or our Sun. Redshifts of magnitude 6 have been observed which, in terms of the conventional interpretation as being due primarily to relativistic Doppler shifts, implies velocities greater than  $c$  the velocity of light. The gravitational interpretation of redshifts does not have this problem.



**Figure 9 Hubble's Law for Redshifts  $z$  vs. Distance**

Newton's Law of Gravitation was derived from empirical observations by induction according to Newton's *Philosophiae Naturalis Principia Mathematica* 5 July 1687.

**“Every point mass attracts every single other point mass by a force pointing along the line intersecting both points. The force is directly proportional to the product of the two masses and inversely proportional to the square of the distance between the point masses.”[15]**

Newton's Laws of Motion and Gravity were based on the point particle idealization, the notion of action-at-a-distance through the ether, and the notion of mass. The descriptions of the universe in terms of fictitious quantities such as point-particles, mass, ether, and action-at-a-distance forces eventually led to the rise of existentialism to replace the approach of natural philosophy. The existentialist philosophers expressed the sense of the purposelessness and absurdity of a universe that Newton described with fictitious forces and masses that did not exist.

During the time that existentialism was a dominant force in philosophy, many major developments of modern science occurred. These included the invention of quantum mechanics, especially the Copenhagen interpretation of quantum mechanics, in which the particles in nature are all point-like. The universal wave function of quantum mechanics describes point particles as governed 100% by random statistical processes. In the quantum realm it is not possible to determine that action A caused result B. The natural philosophers had believed, from experience with the real world that the universe is not totally random in nature, but has a certain degree of order, and the law of cause and effect

is dominant. Also modern natural philosophers realized from scattering experiments that every particle in nature has a finite size and an internal structure contrary to the assumptions of quantum mechanics and Newton's Laws.

Einstein's theory of relativity was also introduced during this time. It too was based on the point-particle notion combined with the idea that the spatial universe was homogeneous and isotropic. The lumpiness of stars and galaxies in space seemed to deny the latter assumption. Also relativity theory introduced the notion of four-dimensional space, where time is the fourth dimension. No wonder the existentialist philosophers found the universe confusing without purpose and meaning. These scientific theories described the universe using nonsensical notions that defied the reality of the ancient natural philosophers.

In the 1930s a new philosophy called structuralism [16, 17] was developed by the Bourbaki (a secret society of French mathematicians) using some new ideas about structure from Russian linguists. According to this new philosophy there are underlying structures in science and mathematics and the relationship of these structures is the source of meaning and reality that was missing in mathematics and science. The items making up any particular system employing the structures are based on axioms which comprise the barest set of first principles. The theorems of mathematics or the theories of science are obtained by the rigorous application of logic to these axioms in a manner similar to the way proofs of theorems are done in Euclidean geometry.

The Bourbaki, in a series of 10 volumes, revolutionized most of mathematics by establishing an axiomatic basis for all of mathematics and showing its common structures. The Bourbaki believed that every fact in mathematics must have an explanation. Using set theory they attempted to show the unity and universality of mathematics in terms of axioms, logic, and structures. Structure was seen as the mathematically describable portion of reality that has meaning. This meaning can be expressed in terms of mathematical symbols and equations. Structuralism was perceived as the method of intellectual inquiry that provides a framework for organizing and understanding areas of human study that enables the discovery of meaning. Structuralism replaced existentialism which regarded human existence as unexplainable and without meaning, i.e. not in agreement with logic and common sense.

Members of the Bourbaki worked with researchers in many fields and applied structuralism to their studies. In the areas of linguistics [18], literature [19], psychology [20], anthropology [21,22], and economics[23] the Bourbaki were able to help researchers move their study from a descriptive phase to one based on mathematical symbols and mathematical equations with laws and theories derived by rigorous logic from a finite set of axioms. Many of these researchers won Nobel prizes for their work.

The work of Newton in developing his Laws of Motion and Gravity lacks the structure that gives the ultimate reality and meaning to motion and gravity. That structure for inertia and gravity appears to be based on the electrodynamics of interacting neutral vibrating electric dipoles in matter. There is no proper axiomatic basis for Newton's

Laws of Motion and Gravity. There are many notions involved in his work that are known to be false, i.e. action-at-a-distance forces, point-particles, ether, and mass. There is no understanding of the source of the gravitational force. The process of observation and use of logical induction was fine in Newton's day, but the French Bourbaki have raised the bar back to the ancient Greek axiomatic standards of Euclid and Plato; and shown the role of geometry in structures as the source of ultimate meaning and reality. Having a non-axiomatic theory with equations that describe some data is no longer acceptable as proper science.

Thus in conclusion, one can say that there are many good reasons to doubt the validity of Newton's Law of Gravitation. The work of Pari Spolter is just one of many showing the limitations of our current theories of gravity in not being able to predict the eccentricities of the orbits or the Coulomb electrical contribution to the forces involved. [2]

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km/s toward galactic coordinates ( $88^\circ$ ,  $2^\circ$ ) and the velocity of the center of our galaxy with respect to the cosmic background is 556 km/s toward galactic coordinates ( $266^\circ$ ,  $29^\circ$ ). The latter corresponds to right ascension and declination ( $10^{\text{h}} 30^{\text{m}}$ ,  $24^\circ\text{S}$ ) below the constellation Hydra. Note that the speeds above are much larger than the earth's average orbital velocity around the Sun of 29.79 km/s.

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