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# The New Cosmology of The Urantia Book

Philip G Calabrese

**Introduction.** The cosmology of *The Urantia Book* (the UB) differs from the presently accepted cosmology of Earth's cosmologists in some very crucial ways. Perhaps the most striking difference is that in the UB cosmology has an absolutely fixed gravitational Center, which while not *in* space can nevertheless be *located* at the "focus of space". By contrast, Albert Einstein propounded Special Relativity Theory with no absolutely fixed reference frame. In Einstein's cosmology, any reference frame may be considered "fixed" and motions measured with respect to it.

Another big difference in the cosmology of the UB versus contemporary science is the geometric concepts associated with the particles described in the UB: Particles all have a relatively fixed central nucleus around which spin peripheral space energies at speeds beyond imagination. By contrast formal contemporary cosmology has abandoned geometric descriptions of ultimate particles (quanta) preferring to endow "point particles" with infinite space extension (to account for wave interference properties), plus velocity, momentum and spin (to account for quantum properties).

The UB affirms the existence of "open space" energies that produce energy waves that affect moving particles; contemporary science is just now beginning to imagine such pre-mass energies through which particles swim.

In Part I (Gravity and the Center of Inertia), I recount a little known solution of Einstein's field equations of relativity by the famous logician Kurt Gödel that includes a fixed Center rather than absolute relativity as arbitrarily postulated by Einstein.

In Part II (Quantum Entanglement – Spooky Action at a Distance, Bell's Theorem, and the Pre-Quantum Energies of Open Space), I explain, using the UB's cosmology, the mysterious "spooky action at a distance" phenomena called "quantum entanglement".

# Part I: Gravity and the Center of Inertia

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**Abstract.** Based on Einstein's insight that the inertial mass of a particle is a measure of its internal energy, this essay offers a geometric model to account for the great energy contained in even a small inertial mass. It asserts that the postulated "strong force" of individual particle internal cohesion is actually *primary* gravity, while the recognized particle-to-particle attractive force is a weak *secondary* affect. A quantum of energy is depicted as a particle comprising a fixed center strongly attracting some rapidly orbiting peripheral energy. Furthermore, these internal orbits give rise to faster-than-light pressure waves in the pre-mass energy content of open space that explain the inference patterns of so-call quantum wave-particle duality and even the "spooky action at a distance" of quantum entanglement.

**Two Kinds of Gravity.** Why is linear gravity so weak compared with other known forces like magnetism? Perhaps it is because the force of attraction "between masses" that we call gravity is a secondary affect of the "gravity of cohesiveness", the cohesive force that holds together each individual particle of energy.

**Mass-Energy Relationship.** According to Albert Einstein[1] "The mass of a body is a measure of its energy-content". He famously showed that the mass lost by an atom in an emission of a photon of light is the energy of the photon divided by $c^2$, the square of the speed of light. The atomic bomb demonstrated just how much energy is contained in even a small mass.

**Question:** How is so much energy packed into each particle of mass?

**Mass as Angular Kinetic Energy.** The inertial mass of a body is its rest mass, which is due to the potential energy of its internal configuration plus mass stored as angular kinetic energy.

**Axiom 1**: Inertial mass represents great internal force attraction (primary gravity) and associated spin within each material mass unit.

**An Orbital Model of Matter.** However, there is no adequate conventional concept of the interior structure of an electron. Typically, "point masses" and charges are assumed, or mass and charge densities, without further elaboration.

**Axiom 2**: Every particle or quantum of matter, much like the solar system, is comprised of a relatively heavy nucleus around which orbits lighter peripheral material at tremendous speeds and at distances that make the whole particle mostly composed of space! (But this space is not empty! More on that later.)

This orbital model of mass is consistent with the mass gained by a particle as it is accelerated to speeds close to c. The incremental kinetic energy added to the particle is increasingly stored as additional internal orbital spin (inertial mass) rather than linear motion.

While the "primary" gravity of individual particle cohesiveness is very strong, the secondary gravity of particle-to-particle attraction is much weaker. The gravity force attraction of the nucleus of one particle to the peripheral orbiting material of an adjacent particle is relatively weak, falling off by the square of the distance.

**Absolute Relativity.** Einstein, who questioned asymmetric interpretations of physical laws associated with different Cartesian reference frames, postulated that the laws of physics should be the same in all relatively moving reference frames. But he also stipulated, purely on aesthetic grounds, that there should be no preferred, absolutely fixed reference frame. He arbitrarily excluded all such solutions to his field equations.

Therefore, in Einstein's universe nothing is absolute fixed, or moving, except relative to some arbitrary frame. As a consequence, there is no universally recognized "now". Simultaneous events in one reference frame may not calculate as being simultaneous in another frame. This strange world conflicts with quantum mechanics, where "the state of the system at time t" assumes that "now" consistently applies to all space. Furthermore, certain observed "entanglement phenomena" of quantum mechanics contradict

Einstein's belief that all influences travel from place to place no faster than the speed of light.

Subsequent efforts to harmonize Einstein's gravitation theory (general relativity) with quantum mechanics have not revealed "the mind of God" with some simple, elegant and intuitive expression such as Newton propounded and for which Einstein searched.

**A Rotating Universe.** In the meantime, K. Gödel[2] showed that Einstein's field equations are satisfied by certain systems in which all matter rotates relative to its "compass of inertia", the location of its center of inertia or mass. Somehow in this strange universe, everything rotates around the same fixed center C like shadows cast in space from a central light source.

In Gödel's solution, everything rotates relative to its own "compass of inertia" with angular velocity $\omega = 2(\pi K\rho)^{1/2}$, where K is Newton's gravitation constant, and $\rho$ is the mean mass density. Therefore, in such a rotating solution the mass density is proportional to the square of the angular velocity of rotation or spin, that is, proportional to the angular kinetic energy.

**Wave Mechanics.** What evidence is there of rapid internal spinning in particles? Although it accurately predicts measurement probabilities, the standard "Copenhagen" interpretation of quantum mechanics uses the concept of wave-particle duality and instantaneous wave collapse upon observation to bridge the external affects of internal particle spin in the cosmos. Waves in the energy content of "empty space" generated by particle linear motion and internal spin are identified with the particles themselves.

An alternate (experimentally equivalent) interpretation of quantum mechanics holds that so-called empty space is really a pre-mass energy field whose pressure waves are capable of faster-than-light propagation. These waves can "guide" the mean path of particles into interference patterns (when passing one at a time through either of two slits). They can even affect measurement results made at widely separated places - the mysterious "entanglement phenomena" of quantum mechanics that Einstein called "spooky action at a distance".

These Schrodinger-DeBroglie "pilot waves" as developed by David Bohm[3] generate the standard quantum probabilities without identifying a particle's internal motion with the faster-than-light waves that it generates in the underlying pre-mass force-energy content of open space.

The wavelengths of these generated waves appear to be 860 times the diameters of the associated particles, a property probably determined by the pressure tension in the energy field through which the particles move.

Unseen Energies of Space. It is clear from celestial observations of galactic spin rates that galaxies harbor what is called "dark matter" that prevents their luminous bodies from flying apart. And the surprising *acceleration* of total space expansion has prompted the acceptance of some kind of "dark energy" pervading all supposedly empty space.

All in all, the cohesiveness and energy interactions of quantum particles suggest a strong central attractive force balanced by rapid orbital motion and augmented by open space force-energy pressure waves. Concentric donut-shaped rings of mass-energy with various spin orientations (angular momentum vectors) centered at various space positions naturally require 6 coordinates to completely specify.

A Cosmic Center of Inertia. There is a ubiquitous use in the foundations of physics of "force fields" defined "now" at all positions in space. The concept of a "space field of forces" simultaneously connects the separated positions of space. But how does such a force field like gravity arise in all space positions due to a mass at one position in space? What connects the mass at one position with the associated attraction at distant positions? Could it be something like Gödel's stationary Center C?

# Part II: Quantum Entanglement – Spooky Action at a Distance, Bell's Theorem, and the Pre-Quantum Energies of Open Space

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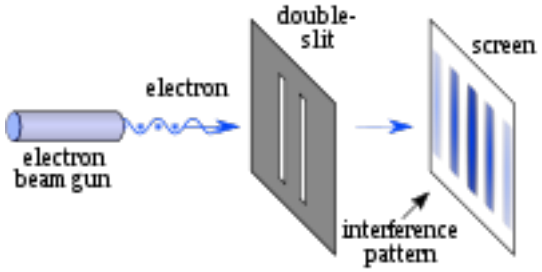
1. **Introduction.** It was Albert Einstein[4] who called quantum entanglement "Spooky action at a distance". He tried hard to prove it didn't exist. This phenomenon was already evident in the Double-Slit light experiments (See Fig. 1) performed by Thomas Young in 1801 and extended to particles in 1927 by C. Davisson and L. Germer

Fig. 1



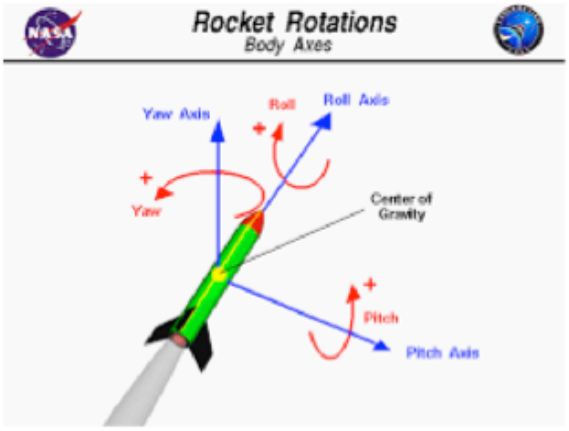

As well expressed by Wikipedia[5], "In the basic version of this experiment, a coherent light source, such as a laser beam, illuminates a plate pierced by two parallel slits, and the light passing through the slits is observed on a screen behind the plate.[4][5] The wave nature of light causes the light waves passing through the two slits to interfere, producing bright and dark bands on the screen — a result that would not be expected if light consisted of classical particles.[4][6] However, the light is always found to be absorbed at the screen at discrete points, as individual particles (not waves), the interference pattern appearing via the varying density of these particle hits on the screen.[7] Furthermore, versions of the experiment that include detectors at the slits find that each detected photon passes through one slit (as would a classical particle), and not through both slits (as would a wave)."[8][9][10][11][12]

When light was later shown to be a particle (a quantum, not a wave) by Einstein[6] the mystery deepened. He had explained the mysteries of radiation from a heated black body, but he made the double slit experiments even more mysterious: How could particles of light, each going through one or the other slit, know where to hit the photographic plate behind the slits to make an interference pattern in their aggregate?

Let's move on to the most important entanglement experiments. Recall that a particle can independently & simultaneously spin on 3 perpendicular axes.

Role, Pitch and Yaw of a rocket are rotations on 3 perpendicular axes. Opposite rotations on the same axis have opposite signs, – or +. (See Fig. 2)

**Fig. 2**



2. **The Stern–Gerlach[7] Experiments exhibiting "entanglement".** Particles with initial zero spin are spit into two sub particles, one moving left and the other moving right. Two sensors, S1 and S2, are set up to simultaneously measure the spin of the spit particles on any one of 3 possible axes:

Table 1. Stern-Gerlach Experimental Setup

|<---------- Large enough distance to preclude any influence ---------->|
(at twice the speed of light) of one sensor measurement by the other

| Sensor 1 (S1) | | Sensor 2 (S2) |
|---|---|---|
| **Alice** | | **Bob** |
| Randomly (& independently) measures **left** particle spin (+ or –) on axes A, B or C | Particle Splitting Area <------ **oo** ------> | Randomly (& independently) measures **right** particle spin (+ or –) on axes A, B or C |

Experimental Results

| Data from S1 | Joined Data | Data from S2 |
|---|---|---|
| A+ | A+ A- | A- |
| B- | B- C+ | C+ |
| C+ | C+ B- | B- |
| C- | C- C+ | C+ |
| B- | B- C+ | C+ |
| C+ | C+ A- | A- |
| A+ | A+ B+ | B+ |
| . | . . | . |
| . | . . | . |
| . | . . | . |

The dots represent hundreds of simultaneous, paired measurements enough to make two experimental observations:

1) Whenever S1 & S2 measure spin on the same axis (A, B or C), their measured values (+ or –) always *disagree*. (Apparently this is because the original composite particle started with zero spin. So if Alice's particle spins one way with respect to an axis, Bob's particle spins the other way with respect to that axis.) That is, for the subset of data pairs with both sensors measuring the same axis, the probability that they disagree in sign = 1.

2) Nevertheless, over the whole of hundreds of paired measurements, Sensors S1 & S2 still agree on half of the joined data pairs. That is, P(S1 and S2 measured spin values agree) = 1/2.

By Observation 1) it is deduced that the two splitting particles have the opposite values (+ or –) for each of the three spin axes A, B, and C, when they leave each other. For example, If the left particle has spin values (+–+) for axes ABC respectively then the right particle has spin values (–+–) for ABC.

**Bell's Theorem[8]:** Assuming the particles have enduring (local) spin values (+ or –) for each of the 3 axes A, B, C, the above statements are statistically impossible unless the spin values of each particle are somehow influenced by the distant spin measurement of the other particle at faster than light speed. (!) That is, given the above observations, the sensor measurements can't be independent of each other. Proof: Consider Table 2, which describes the mathematics of the Stern–Gerlach experiments.

Table 2

Sensor Agreement Table[9] (Joint Distribution Table)
a = agreement; **d** = disagreement

| Particle Spin Types | | Nine Possible (Equally likely) Spin Axis Measurement Pairs for S1 and S2 | | | | | | | | | Prob. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | (ABC) | A A | A B | A C | B A | B B | B C | C A | C B | C C | |
| Eight | (+++) | d | d | d | d | d | d | d | d | d | $x_1$ |
| possible | (++–) | d | d | **a** | d | d | **a** | **a** | **a** | d | $x_2$ |
| left particle | (+–+) | d | **a** | d | **a** | d | **a** | d | **a** | d | $x_3$ |
| spin value | (+––) | d | **a** | **a** | **a** | d | d | **a** | d | d | $x_4$ |
| triples for | (–++) | d | **a** | **a** | **a** | d | d | **a** | d | d | $x_5$ |
| axes (ABC), | (–+–) | d | **a** | d | **a** | d | **a** | d | **a** | d | $x_6$ |
| of probability | (––+) | d | d | **a** | d | d | **a** | **a** | **a** | d | $x_7$ |
| x1, x2, ... x8. | (–––) | d | d | d | d | d | d | d | d | d | $x_8$ |
| Column Probabilities | | 1/9 | 1/9 | 1/9 | 1/9 | 1/9 | 1/9 | 1/9 | 1/9 | 1/9 | 1 |

Notice that based on the Particle Spin Implication, for example, if the left particle has spin triple (+ + –) as in the 2nd row, then the right particle has spin triple (– – +). It follows that the sensors will always disagree (d) in rows 1 and 8. The sensors will also always disagree if they measure spin on the same axis –- AA, BB or CC. So those columns are all d's.

In the 2nd row the sensors will also disagree if one sensor measures spin on axis A and the other sensor measures spin on axis B. So there is a d in that row under columns AB and BA. In the 2nd row, the sensors will agree (a) only if one measures axis A and the other measures axis C, or one measures axis B and the other measures axis C. That finishes the 2nd row. The other rows have similarly been filled in with d's and a's.

Concerning probabilities, each of the nine columns has equal probability 1/9 of occurring because the two sensors *randomly and independently* choose one of the three axes A, B or C on which to measure spin direction. The 8 rows correspond to the 8 possible left particle spin-value triples. The ith row has unknown probability xi but the sum of the 8 xi's must be 1 because the particle spin triple must be one of the 8 possibilities.

The probability of a particular measurement axis pair (column j) and a particular particle spin value triple (row i) is $(1/9)x_i$ because the row in which the particle belongs depends on the spitting process and is supposed to be *independent* of the axes to measure randomly chosen by the sensors. (The probability that both of two independent events occur is the product of their individual probabilities.)

Using the table, we can now express the probability P(a) that the sensors agree. The probability that the sensors measure the same sign, that is, agree (**a**), is

$$P(\mathbf{a}) = (0/9)\,x_1 + (4/9)x_2 + (4/9)x_3 + (4/9)x_4 + (4/9)x_5 + (4/9)x_6 + (4/9)x_7 + (0/9)x_8$$

$$= \quad (4/9)\,(x_2 + x_3 + x_4 + x_5 + x_6 + x_7) \quad \leq (4/9)\,(1) \;=\; 4/9 \;<\; 1/2.$$

But this contradicts experimental observation 2). (!) The particles are somehow “entangled”.

Possible Explanations: a) There is mutual sensor influence at faster than light speeds - measurement of one particle affects the property values of the other particle; the measurements are not really independent, or b) The particles are also waves that can interfere with each other but instantly become localized when measured. This is called instantaneous wave-particle “collapse”; particles don't really carry “local reality” spin.

3. **The de Broglie-Bohm Interpretation of entanglement phenomena**. When E. V. Schrödinger[10] in 1926 proposed his wave theory of quantum mechanics, he believed he had found a new phenomenon --- quantum waves. L. V. de Broglie[11] had suggested this 3 years earlier. But a competing (Copenhagen) interpretation identified the particles and waves and informally called them wavicles. Supposedly, material particles were also waves.

Soon, scientists altogether discarded visualization efforts and merely assigned properties of position, velocity, mass, spin and so forth to “point particles” without any concept of their internal geometric properties. Quantum mathematics predicts the observed probabilities. And that is pretty much where things now stand.

But in the 1950’s David Bohm[12] showed that quantum entanglement could be explained with particles having local properties such as spin as long as faster than light interference was caused by what he called “guiding waves”. Although this interpretation is not presently the standard, it produces the same experimental data. And it is consistent with what *The Urantia Book* says:

42:5.4 2. Ultimatonic rays. The assembly of energy into the minute spheres of the ultimatons occasions vibrations in the content of space which are discernible and measurable.

42:5.14 The so-called ether is merely a collective name to designate a group of force and energy activities occurring in space. Ultimatons, electrons, and other mass aggregations of energy are uniform particles of matter, and in their transit through space they really proceed in direct lines. Light and all other forms of recognizable energy manifestations consist of a succession of definite energy particles which proceed in direct lines except as modified by gravity and other intervening forces. That these processions of energy particles appear as wave phenomena when subjected to certain observations is due to the resistance of the undifferentiated force blanket of all space, the hypothetical ether, and to the intergravity tension of the associated aggregations of matter. The spacing of the particle-intervals of matter, together with the initial velocity of the energy beams, establishes the undulatory appearance of many forms of energy-matter.

42:5.15 The excitation of the content of space produces a wavelike reaction to the passage of rapidly moving particles of matter, just as the passage of a ship through water initiates waves of varying amplitude and interval.

42:5.16 Primordial-force behavior does give rise to phenomena which are in many ways analogous to your postulated ether. Space is not empty; the spheres of all space whirl and plunge on through a vast ocean of outspread force-energy; neither is the space content of an atom empty. Nevertheless there is

no ether, and the very absence of this hypothetical ether enables the inhabited planet to escape falling into the sun and the encircling electron to resist falling into the nucleus.

Thus, *The Urantia Book* affirms that the waves are separate from the particles and that they consist of compression waves within the energy content of space. Since these waves are in the pre-mass energy medium, they are not subject to Einstein's constraints of light speed as the maximum speed of all moving particles.

42:4.14 The quantity of energy taken in or given out when electronic or other positions are shifted is always a "quantum" or some multiple thereof, but the vibratory or wavelike behavior of such units of energy is wholly determined by the dimensions of the material structures concerned. Such wavelike energy ripples are 860 times the diameters of the ultimatons, electrons, atoms, or other units thus performing.

That is, the ratio of the wavelengths associated with these particles to their diameters is 860, which must be a property of the force-energy content of space.

Since the energy of a wave is inversely proportional to its wavelength, the particles of smallest diameter are associated with the waves of highest energy.

42:5.1 In the superuniverse of Orvonton there are one hundred octaves of wave energy.

Each octave represents a doubling (or halving) of the wavelengths of the preceding octave. Therefore there are likely particles ranging in diameter d (from that of the ultimaton) through particles of diameter 2d, 4d, 8d, 16d, ..., $2^{100}$d to give rise to 100 octaves of wave energy.

$2^{100}$ is a whole number with 31 digits. So the largest particles are 10 million trillion, trillion times the size of the ultimaton. And the ultimaton has a diameter 1/860 that of the waves of shortest wavelength.

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