SECTION 4

The Outward Flow from All Particles

The gravitational and electrical interactions of particles requires communication between them. That comes about as follows.

The gravitational effect between two gravitating objects is the net combined vector effect of myriad individual gravitating particles of one of the two objects interacting gravitationally in Particle-on-Particle pairs with myriad individual gravitating particles of the other of the two objects.

Particle's Propagated Outward Flow

Each and every gravitationally attract**ing** *Spherical-Center-of-Oscillation* must communicate to each gravitationally attract**ed** particle its "message": the direction from the attract**ed** particle to the attract**ing** one and the magnitude of the attract**ing** particle's gravitational attraction. That task is assigned by contemporary physics' theory to a *gravitational field*, a vector field that is an assignment of a direction of action and its magnitude to each point in a region of space.

However, that designation of the field, while facilitating the description of the action fails to explain the cause, the mechanism of the field and thus fails to explain or account for the action at issue. It also fails to account for the time delay due to the limitation of the speed of light that must exist between a change at the attract**ing** particle and its effect at the attract**ed** particle.

Something flowing is required, something flowing at the speed of light, continuously, carrying the direction and magnitude information, spherically outward, from every gravitating *Spherical-Center-of-Oscillation* to every other *Spherical-Center-of-Oscillation*. That flow is contemporary physics theory's gravitational field.

For such a flow to persist there must be a supply of that outward flowing substance in every particle. And, for that flow to have persisted the billions of years since the "Big Bang" that "supply" must be an extremely concentrated reservoir of that which flows outward [concentrated relative to the outward flow].

THE PARTICLE "CORE"

Consider a small individual particle such as a proton. Newton's law of gravitation expressed in terms of the masses, m_{source} and $m_{acted\text{-}on}$, and with both sides of the equation divided by $m_{acted\text{-}on}$ is, of course,

(4-7) $$a_{grav} = G \cdot \left[\frac{m_{source}}{d^2} \right]$$

However, mass and energy are equivalent, so that [using c = light speed and h = Planck's constant] a mass, m, is proportional to a frequency, f, that is characteristic of that mass. That is

(4-8) $$m \cdot c^2 = h \cdot f \quad \text{or} \quad f = [\, c^2 / h \,] \cdot m$$

so that the m_{source} of equation 4-7 has a corresponding equivalent frequency, f_{source}.

That being the case, the gravitational acceleration, a_{grav}, can be expressed in terms of that frequency as the change, Δv, in the velocity, v, of the attracted mass per time period, T_{source}, of the oscillation at the corresponding frequency, f_{source}, as follows.

(4-9) $$a_{grav} = \Delta v / T_{source} = \Delta v \cdot f_{source}$$

It can then be reasoned using equation 4-9 = equation 4-7 as follows .

(4-10) $$a_{grav} = \Delta v \cdot f_{source} = G \cdot \left[\frac{m_{source}}{d^2} \right]$$

Equation 4-11, below, is obtained by using that frequency is proportional to mass. With f_p and m_p as the proton frequency and mass then $f_{source} = [m_{source} / m_p] \cdot f_p$.

(4-11) $$\Delta v \cdot \left[\frac{m_{source}}{m_p} \right] \cdot f_p = G \cdot \left[\frac{m_{source}}{d^2} \right]$$

Rearranging and canceling m_{source} on both sides of the equation,

(4-12) $$\Delta v = \frac{G \cdot m_p}{d^2 \cdot f_p} \quad \text{per cycle of } f_{source}.$$

Then substituting, per equation 4-8, $m_p = [\, h \cdot f_p] / c^2$,

(4-13) $$\Delta v = \left[\frac{G}{d^2 \cdot f_p} \right] \cdot \left[\frac{h \cdot f_p}{c^2} \right]$$

$$= \frac{G \cdot h}{d^2 \cdot c^2} \quad \text{per cycle of } f_{source}.$$

The Planck Length, l_P, is defined as

(4-14) $$l_P \equiv \left[\frac{h \cdot G}{2\pi \cdot c^3} \right]^{\frac{1}{2}} \quad \text{so that} \quad G = \left[\frac{2\pi \cdot c^3 \cdot l_P^{\,2}}{h} \right]$$

Substituting G as a function of the Planck Length from equation 4-14 into G as it is in equation 4-13, the following is obtained.

(4-15) $$\Delta v = \left[\frac{2\pi \cdot c^3 \cdot l_p^{\,2}}{h}\right] \cdot \left[\frac{h}{d^2 \cdot c^2}\right]$$

$$= c \cdot \frac{2\pi \cdot l_p^{\,2}}{d^2} \quad \text{per cycle of } f_{source}.$$

This result states that:

- the velocity change due to gravitation, Δv,
- per cycle of the attracting mass's equivalent frequency, $f_{source,}$ which quantity, $\Delta v \cdot f_{source}$, is the gravitational acceleration, a_{grav},
- is a specific fraction of the speed of light, c, namely the ratio of:
  - 2π times the Planck Length squared, $2\pi \cdot l_P^{\,2}$, to
  - the squared separation distance of the masses, d^2.

That squared ratio is, of course, the usual inverse square behavior.

This also means that at distance $d = \sqrt{2\pi} \cdot l_P$ from the center of the source, attracting mass, the acceleration, Δv, per cycle of that attracting mass's equivalent frequency, f_{source}, is equal to the full speed of light, c, the most that it is possible to be. In other words, at that [quite close] distance from the source mass the maximum possible gravitational acceleration occurs. That is the significance, the physical meaning, of l_P or, rather, of $\sqrt{2\pi} \cdot l_P$.

The physical significance of $\sqrt{2\pi} \cdot l_P$ is that it sets a limit on the minimum separation distance in gravitational interactions and it implies that a "core" of that radius is at the center of fundamental particles having rest mass. That is, equation 4-15 clearly implies that it is not possible for a particle having rest mass to be approached closer than that distance.

That physical significance of $\sqrt{2\pi} \cdot l_P$, is so fundamental to gravitation and apparently to particle structure, that it more truly represents a fundamental constant than does l_P. For those reasons that length should replace l_P as a fundamental constant of nature as follows.

(4-16) The fundamental distance constant, δ

$$\delta^2 \equiv 2\pi \cdot l_p^{\,2}$$

$$\delta = 4.051{,}34 \times 10^{-35} \text{ meters}$$

Equation 4-15 then becomes equation 4-17.

(4-17) $$\Delta v = c \cdot \frac{\delta^2}{d^2} \quad \text{per cycle of } f_{source}$$

a quite pure and precise statement of gravitation: that gravitation is a function of the speed of light, c, and the inverse square law, in the context of the oscillation frequency, f_{source}, corresponding to the attract**ing**, source body's mass.

That makes clear that an oscillation is an integral part of gravitation as should be the case because gravitation is an action between particles having mass, which are the *Spherical-Centers-of-Oscillation* products of the "Big Bang".

Having now just determined:

- That δ sets a limit on the minimum separation distance in gravitational interactions and therefore that a "core" of that radius is at the center of fundamental particles, and
- That an extremely concentrated reservoir supply of that which is flowing outward is required at the center of all particles to support the billions of years of their outward flow;

Therefore:

- The reservoir is the spherical "core" of radius δ at the center of all particles;
- That it is impenetrable is because of its immense density concentration [billions of years worth of flow of the flow substance [*Medium*] in the minute ($\delta = 4.05134 \times 10^{-35}$ meters radius spherical core) of every particle having rest mass], and.
- The *Spherical-Center-of-Oscillation* is a spherical oscillation of that immensely concentrated flow substance, *Medium*.

Then, what "contains" that core's supply or why doesn't it all just quickly "slosh" out and be gone ? It is trying to do just that, to "slosh" out, as hard as it can. It cannot help propagating outward because it has no container. But it can only propagate outward at the limiting rate determined by its surface area, $4 \cdot \pi \cdot \delta^2$ and the fastest speed possible for flow, the speed of light, c. Thus is the *Propagated Outward Flow*.

The Speed of the Flow – The Speed of Light

Every oscillation that we know in nature exhibits, and the very theory of oscillations in the abstract requires, that the oscillation consist of two aspects of the oscillating substance storing and exchanging back and forth the energy of the oscillation [e.g. pendulum position and velocity or electric potential and current]. With one aspect varying in oscillatory fashion then when that aspect decreases there must be some "place" for its energy to go, a place in which it is stored until it reappears in that aspect when that aspect increases again. It cannot completely disappear or be lost because the oscillation would die. That "place" is the oscillation's second aspect and it obviously must vary in a manner related to the first aspect's oscillatory variation with its energy storage in opposite phase.

As is the case for electric inductance and capacitance determining the speed of propagation along a transmission line, μ_0 and ε_0 determine the speed of the *[1 - Cosine]* form oscillation propagation by setting the two aspects of the oscillation in which they are involved, the aspects between which the oscillation energy exchanges back and forth.

But, when the original oscillation came into existence it did so in absolute nothing. There was no "free space" with μ_0 and ε_0. There was nothing but the original oscillation and nothing at all beside that. And, after the immediate explosion into all of the particles of the universe, each of those particles was sending its *Propagated Outward Flow* into nothing, into emptiness.

Where did the *Propagated Outward Flow*'s μ_0 and ε_0 come from? The only thing they could have come from was the original oscillation. There is no other possible source because everything else was absolute nothing. The μ_0 and ε_0 are inherent in the substance of the oscillation, which means, μ_0 and ε_0 are also inherent in the outward propagation. Each particle's *Propagated Outward Flow* of *Medium* contains and carries its own μ_0 and ε_0.

Having established the supply of *Medium* [flow substance] and its on-going *Propagated Outward Flow* serving the role of gravitational field as a property of every particle exhibiting rest mass, the question arises, "What of the electric field, much stronger than gravitation and co-present with gravitational field whenever the gravitating particle has electric charge ?"

Just as is the case for gravitation as presented above, every particle having electric charge must communicate its similar "message" to every other such particle. That requires something flowing outward at the speed of light continuously, carrying the direction and magnitude information, spherically outward, from every electrostatic *Spherical-Center-of-Oscillation* to every other *Spherical-Center-of-Oscillation*. That flow-communication is the electric field, an active process not a static state.

The theory of an *electric field*, just as with that of a *gravitational field*, above, while facilitating the description of the action fails to explain the cause, the mechanism of the field and thus fails to explain or account for the action at issue. It also fails to account for the time delay due to the limitation of the speed of light that must exist between a change at the attract**ing** particle and its effect at the attract**ed** particle

Two such simultaneous flows, gravitational and electric, and two supporting reservoirs supplying the flows, is clearly untenable. There can only be one reservoir in each particle's "core" and one resulting *Propagated Outward Flow* producing both the gravitational action and the electric action if for no other reason than because two supply reservoirs would mutually interfere with a spherically outward flow of each.

The one sole flow performs both the Coulomb and the gravitational action: the Coulomb mediated by the flow amplitude and the gravitational mediated by the flow's frequency or repetition rate. The dual functions of the sole single outward flow from all particles is important in the development of control of gravitation later in this work. It means that electro-magnetic light and gravitation are closely related through their shared common *Propagated Outward Flow.*

See On the *Nature of Matter*, Roger Ellman, The-Origin Foundation, Inc.

SUMMARY FOR SECTION 4 – THE OUTWARD FLOW FROM ALL PARTICLES

The form of matter is not that of the "particles" of classical modern physic's Standard Model. Rather the form of matter is:

- *Spherical-Centers-of-Oscillation*, spherical oscillations of `[1 – Cosine]` form;
- Propagating spherically outward a continuous oscillatory *Propagated Outward Flow* of *Medium* in *[1 - Cosine]* form, according to its source *Spherical-Center-of-Oscillation* magnitude, sign, and frequency;

- The speed of the *Propagated Outward Flow*, c, set by the net μ and ε in the *Medium* being propagated;

(4-18) $$c = \frac{1}{\sqrt{\mu \cdot \varepsilon}}$$

The *Spherical-Center-of-Oscillation* consists of a central "core", a spherical volume of radius $\delta = 4.051,34 \times 10^{-35}$ meters that consists entirely of a high density concentration of the oscillating *Medium*, which propagates outward at an extremely low rate determined by the surface area of the "core" and the radial outward speed of flow of the propagated *Medium,* the speed of light, c.