Perfect Cosmological Principle

of a

Relativistic Singularity

A mathematical singularity consists of two terms whereby one is zero and the other infinite according to the mathematical function

$$F(y) = 0 - \infty \tag{1}$$

A singularity of general relativity theory is apparent according to the Schwartzschild Metric of the mathematical form

$$ds^2 = c^2 dt^2 \alpha^2 - dr^2 \alpha^{-2} - r^2(d\theta^2 + sin^2\theta d\varphi^2) \tag{2}$$

The increment ds is a spacetime interval as to be determined, c is light speed as in the vacuum of gravitational free space, dt is an increment of time, dr is an increment of distance, α is a relativistic factor, and the term on the far right of the equation represents polar coordinates of the gravitational field similar to the y and z axes of transformation coordinates perpendicular to the direction of relative motion having no relativistic contraction of length.

The relativistic factor for v as either relative motion or the Newtonian gravitational escape speed at radius R from a mass M equates as

$$\alpha^2 = 1 - v^2 c^{-2} = 2GMR^{-1}c^{-2} \tag{3}$$

The letter G is the gravitational constant of proportionality. The equality is according to the equivalence of gravitational mass and inertial mass inasmuch as mass is defined according to Newtonian Mechanics as an initial condition of comparison.

In ignoring polar coordinates, the Schwartzschild Metric is of the form

$$ds^2 = c^2 dt^2 \alpha^2 - dr^2 \alpha^{-2} \tag{4}$$

Significantly, if either v as relative motion or as the escape speed from the gravitational field equals light speed, then the relativistic factor squared, $[1 - v^2c^{-2}]$, becomes zero, $[1 - c^2c^{-2}] = [1 - 1]$, and the metric becomes

$$ds^2 = c^2dt^2(0) - dr^2(0)^{-2} = 0 - \infty \tag{5}$$

An interpretation is that the mass-energy of the gravitational field at radius dr approaches infinite density as spacetime c·dt shrinks to zero volume size.

Local observers in the field are unaware of their shrinkage because light speed and relative motion in the gravitational field become slower. That light moves slower is derived from equation (4) in accordance with the principle of simultaneity determining a difference between light speed and relative motion. If the event pertains to light speed, then the interval ds becomes zero. Hence

$$0 = dt^2\alpha^2 - dr^2\alpha^{-2} \tag{6.1}$$

$$dr^2\alpha^{-2} = \alpha^2 \tag{6.2}$$

$$\frac{dr^2}{dt^2} = \alpha^4 \tag{6.3}$$

$$\frac{dr}{dt} = \alpha^2 \tag{6.4}$$

Light speed is thus slower in a gravitational field by the relativistic factor squared. In contrast, c·dt is only shorter by the relativistic factor, and dr is only greater by the relativistic factor.

Consider an orbital distance r of the moon around Earth in time t as representing a natural clock. The moon's orbital speed in proportion to light speed is also slower by the relativistic factor squared, but the orbital distance is shorter only by the relativistic factor. The orbital time is thus longer by the relativistic factor such that earthlings with slower clocks by the relativistic factor detect no difference of local events whether inside or outside the sun's gravitational field, as outside the field in gravitational free space are the observers who determine the events in it differently. With

their relatively faster clocks they measure an orbital time slower only by the relativistic factor, as according to slower orbital speed by the relativistic factor squared and a shorter orbital distance by the relativistic factor.

The term dr/α is a more complex analysis with regard to its inclusive interpretation of mass-energy. It is merely assumed the mass-energy condenses into a contracted volume of space.

Big Bang theory assumes our universe, as finite, expands from this singularity. The particular rate it now expands at is also according to the Hubble Constant H_o whereby starlight from more distant sources is red-shifted or weaker according to the Doppler principle, whereby sound, light and bullets from receding sources have less momentum and energy upon impact. If the universe is indeed expanding, then the more distant stars are receding from us at a greater rate.

If H_o is now about 70 km/sec/Mpc. Dividing 70 km/sec by a million parsecs (30,9 million kilometers) equals 2.27×10^{-18} units of something per time. If the unit is one kilometer and the time is per second, and if c represents an upper limit for maximum speed of recession, then R_u is the present radius of the universe whereby $R_u = c/H_o \approx 1.32 \times 10^{26}$ kilometers. Dividing R_u by c obtains a time of expansion of about 4.4×10^{17} sec $\approx 7.3 \times 10^{15}$ min $\approx 1.2 \times 10^{14}$ hr $\approx 5 \times 10^{12}$ days $\approx 1.38 \times 10^{10}$ as about 13.8 billion years. In another 13.8 billion years the numerical value of H_o should be half of what it is now. However, the relative density of the universe would also be less than what it is now along with different relative motion of light speed and clocks.

As the universe expands, it would seem that the value of H_o, as a measure per distance, should decrease. However, there is no awareness of change by observers inside the singularity, such that there could be a relativistic nullification in a decreased value of H_o.

There is also assumed a perfect cosmological principle by which observers are relatively at the center of the universe that is isotropic and homogeneous on the larger scale, as due to the path of light being more curved towards the outer edge. The red-shift in the more distant starlight is thus consistent with observing the past in every direction, as from the singularity.

Locally an Earth-moon system is perceived the same inside the sun's gravitational field as if outside it, which is a nullification effect of relativity that can apply to the universe as a whole. The universe must thus not appear to change as it expands. In effect, the observable size of the universe remains the same, which could explain a Cosmic Coincidence: A product of the Hubble Constant H_o of about 70 kilometers per second per million parsecs and the diameter $2r_a$ of the hydrogen atom per light speed equals the ratio of the gravitational and the electrostatic forces between two hydrogen atoms:

$$\frac{H_o(2r_a)}{c} = \frac{Gm_a^2}{e^2} \cong 8.08 \times 10^{-37} \tag{7.1}$$

By dividing each side of equation (7.1) by r_a and multiplying them by the electrostatic unit of charge squared e^2, it becomes

$$\frac{2H_o e^2}{c} \cong \frac{Gm_a^2}{r_a} \tag{7.2}$$

By substituting the radius R_u of the universe for c/H_o, equ. (7.2) becomes

$$\frac{2e^2}{R_u} \cong \frac{Gm_a^2}{r_a} \tag{7.3}$$

By substituting the product of the parameters $m_a v^2 r_a$ of e^2 for e^2, equ. (7.3) becomes

$$\frac{2m_a v^2 r_a}{R_u} \cong \frac{Gm_a^2}{r_a} \tag{7.4}$$

By dividing both sides of equ. (7.4) by r_a, it becomes

$$\frac{2m_a v^2}{R_u} \cong \frac{Gm_a^2}{r_a^2} \tag{7.5}$$

The centripetal force of two hydrogen atoms circling the universe the universe thus equate with a gravitational force between two atoms separated a distance equal to the hydrogen atom radius r_a.

It is thus theoretically possible the universe is expanding, shrinking or neither. However, a black hole and its singularity also can exist for half the mass of the universe within a smaller volume of space of half the radius. The universe could thus have evolved from a singularity of a different size and radius. A singularity can also exists within a singularity. Even the gravitational fields of the sun and Earth change how we perceive the universe, such that the law of conservation of energy at large is not necessarily applicable with regard to an observer's change of state, as by a local change of either relative motion or gravity. However, there is a possibility the universe is also somehow quantized in consistent manner of the quantization of mass-energy within it.

Suppose mass-energy of the field is in equilibrium with the mass-energy of the universe as an observable part of a multiverse, but more of it is spent while condensing into a greater magnitude of mass-energy in the field. This assumption merely complies with conservation of energy in that work energy of gravity is spent for it to condense to a greater state of mass-energy.

To explain this conversion, consider the primary cause of gravity is a vacuum effect from the wake of emitted gravitational radiation. Gravitational radiation is emitted and absorbed equally according to a Doppler effect in compliance with the equivalence of inertial and gravitational mass. However, emitted radiation is of a different form than the same amount of energy absorbed. The emitted radiation is long range, as gradually detected by matter, as compared to the radiation absorbed by matter. An analogy is the neutrino whereby there is only a small probability of detection of it passing through Earth. It also changes from a particular state into another as it propagates from our sun to Earth.

Suppose tired theory is conditional to observing the finite universe within the multiverse. Instead of the universe expanding, the red-shift in starlight is caused by its energy partly absorbed by the space through which it propagates. However, to consider light as merely waves of energy leads to a contradiction. Greater waves of energy lose the same proportion of energy, but they lose less of it as they continue. In effect, waves with twice energy move twice as far. In order to avoid this contradiction, light must somehow be packets of quantum energy of a particular number similar to gases

of a particular temperature and pressure that contain a particular number of molecules. Thus, as either electromagnetic radiation or gravitational radiation lose the same quantum number of energy, then a multiverse theory is possible where conservation of energy is conserved in all respects.