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FUNDAMENTAL CONSTANTS OF PHYSICS I - SPEED OF LIGHT

COPIES TO: D. B. Harmon, H. C. Bjornlie, L. A. Steinert, W. P. Wilson, A-830

REFERENCE:

Introduction To The Series Of Memos

The current fundamental constants of physics consist of a minimum known set from which all other physical constants can be derived. One known set consists of eight constants plus the constants representing the masses of some one-hundred quantum matter/anti-matter particle pairs. The purpose of the memo and the planned series of memos on the fundamental constants of physics is to derive the above mentioned eight fundamental constants from the four basic constants which characterize the brutino universe.

The brutino universe is an absolute (Euclidian) space-absolute (Galilean) time system containing spherically symmetric repulsive (kinetic) particles. These particles are all identical and are named brutinos. This system is characterized by four constants, which are termed the basic constants of the universe. One set of these four constants is the mean speed of the particles (with respect to their center of mass), the mass of the particle, the diameter of the particle, and the mean free path.

The set of current fundamental constants considered in this series of memos consists of:

1. Speed of Light
2. Fine Structure Constant
3. Charge of Electron
4. Planck's Constant
5. Mass of the Electron
6. Mass of the Proton
7. Gravitational Constant
8. Weak Coupling Constant
9. Hubble's Constant
10. Density of the Universe

This memo interrelates the speed of light to one of the basic brutino constants.

The next nine memos will interrelate the remaining nine fundamental constants (above) to the basic brutino constants. In addition, the mechanisms of the remaining quantum particles are discussed briefly.

Analysis of the Speed of Light

The speed of light (or more generally, photons) is the magnitude of the velocity with which photons move. In current physical theory this speed is a constant for any selected observational frame of reference. In brutino theory this speed is a constant with respect to the center of mass of the "local" background in which it is being transmitted. It is tacitly presumed that the

speed measured using the special relativity interpretation of the universe is the same as the speed relative to the brutino local background. This assumption is strongly believed to be warranted [1] but actually can not be tested until the brutino theory is developed further. In any case, corrections to the analysis given here as a result of this type refinement will be small.

A photon is presumed to be a localized [2] disturbance in the background which transmits "observable" energy from one region of space to another. This disturbance in effect is a wave which is constrained almost completely from lateral spreading and which oscillates transversely rather than longitudinally as might be anticipated for a gas. The reason for the differences between the photon wave and a wave in a gas is attributed to the former system consisting of a wave (the photon) and a background of photonless balls while the latter consists of a wave (of balls), background balls and photons which interact with the background balls and with the balls making the wave.[3]

The photon (wave) is thus transmitted at a velocity which is measured with respect to its immediate background, or more precisely, with respect to the center of mass of the local background. The background is presumed to have a Maxwell-Boltzmann distribution of speed [4] and also presumed to be "locally" isotropic. The background thus has a mean speed and a root mean square speed which is $\sqrt{3\pi/8}$ times the mean speed.

Consider the case where a photon is defined by the brutino configuration inside a sphere whose center is at the center of the momentum concentration (as measured relative to the background). Now presume that the photon is traveling into homogeneous background and that the configuration inside the sphere (which sphere moves with the photon) is unchanged from one time to the next time.[5] Thus, no work is done by the background upon the photon and, thus, the photon (wave) propagates by an "isothermal" (i.e., constant energy) process.

[1] This belief is based on the large number of observations which indicate the constancy of the speed of light.

[2] Localisation must be defined arbitrarily since any one photon is "felt" throughout the universe - in principle.

[3] All this statement indicates is that the two systems are significantly different.

[4] This rigorously results from the postulates as long as the configuration is isotropic in space and time.

[5] Actually this assumption is not valid as evidenced by the galactic red shift which is discussed later. However, this effect is believed to have almost no impact on the wave propagation speed.

Furthermore, all the brutinos in the photon then can be moving at the same speed as the background in an isothermal process - the energy transfer results from the brutino directions being biased. The photon propagation speed thus is

$$c = \upsilon / \sqrt{3}$$

where υ is the brutino mean speed. Since c is known

$$\upsilon = 2.997925 (\sqrt{3}) \times 10^8 = 5.18 \times 10^8 \text{ m/s}$$

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Advanced Concepts

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