The Intrinsic Vacuum Space

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Abstract

We define here intrinsic empty space as physical, hypothetical space, containing no particles but, above all, no radiation. However, there remains energy, the nature of which will be clarified. We will evaluate the fundamental physical constants in such a vacuum which differs from real vacuum space by the absence, in particular, of fossil radiation. We will also see why these constants are involved in the existence of the elementary particles constituting the universe.

Introduction

We had considered physical space as a fluid granular medium of quantum character [1], that is to say a condensate.
In such an environment, any exchange of energy at the most basic level, escapes continuity, the fundamental constituents (the QF) constitute a network of vibrators, indivisible and of extremely low energy which imposes a wave character on any particle or radiation that it contains, because they are its proper modes of excitation. The whole presents three distinct phases, two of which also superimposed concern the vacuum free of any particles and radiations (photons, neutrinos) [2].
The real vacuum contains permanent radiation present everywhere, this is the cosmic microwave background.

The presence of this radiation gives it a black body temperature of 2.73°K, so the intrinsic empty space, as defined, would therefore have 0°K temperature which can only be a limit state.

1) Influence of Cosmic Microwave Background photons on the speed of light

We know that the dielectric constant of vacuum is slightly increased by the presence of particles such as gas molecules, this is linked to the polarizability of these molecules. Likewise, photons from the diffuse background can cause such a state but, in this case, it is legitimate to consider an “abnormal” effect on the refractive index, because these photons are in an equilibrium state with the fundamental vibrators which constitute the space. This implies that the speed of light must be very slightly lower in space devoid of radiation. We will use the formula giving the index of refraction of “diluted media” in the case of abnormality:

n = 1 – (N q^2 c^2/2 eps. h nu^3), see, for example : [3]

N is the photon density of the diffuse background, q the elementary charge, c the speed of light, eps. the dielectric constant, h the Planck constant and nu the average active frequency (2c/lambda)(*) of the diffuse background photons corresponding to the black body at 2.73°K.
If we apply this formula to the characteristics of this diffuse background: N = 4 10^8/m^3, c/2nu = 0.67 10^-3 m, we find: n = 0.9991 +/-0.0001 (**) for lthe real vacuum refractive

index, this value is also the attenuation factor of the speed of light for intrinsic empty space since n is proportional to 1/c.

2) Physical constants inside intrinsic vacuum space

The modification of the speed of light c causes those of the other physical constants which are h, q eps. and G (gravitational constant), we will show how by using the writing of logarithmic differentials dx/x (dx is then the difference in the magnitude between real empty space and vacuum).

We have dc/c = - 0.88 10^-3 +/- 0.002 according to the result of the previous paragraph.
We also know that the dielectric constant (eps.) is proportional to 1/c^2, therefore d(eps.)/eps. = -2dc/c
The dimensional analysis of the constants also makes it possible to show that dh/h = dc/c and dG/G = - dc/c
If we take these deviations into account in the third factor (hc/G)^1/2 of the formula for calculating the mass of the electron [4]:
Me = (pi/8 omega) .1 /(16 e^omega)^1/3 . (hc/G)^1/2
we are led to the value of omega = 137,000 +/-0.001 to find the experimental value of Me with a precision of 10^-5.

This may lead to the reconsideration of the arguments stated by Eddington [4] on the entire value of this constant, but here for a vacuum whose temperature would be very close to 0°K.

The relative difference on omega between the real vacuum and the intrinsic vacuum (2.63 10^-4) is not explained through the modification of the other constants.

3) The intrinsic vacuum space, creator of particles

We can imagine the intrinsic vacuum as a space populated only by vibrators (the QF) part of which vibrate in ordered phase within a stationary network, this is the fundamental level that we have assimilated to “dark energy” [6], and the other in a random phase condensed and concentrated around the masses which then constitutes the gravitational energy assimilated to “dark matter” [7].

The energy density of the fundamental level is of the order of 10^-9 J/m^3.

In both cases there is no addition of amplitudes, which characterizes the empty medium, the only mobile waves which are the gravitons [2] only transport the infinitesimal energy which is that of the fundamental quantums whose value is h/T (T is the age of the universe) [2], which value is approximately 10^-51 J.
Elementary particles like the photon and the electron are, on the contrary, the result of the addition of a very large number of elementary waves, each constituted by 2 QF, which we think are produced by the fundamental level if it is brought to a sufficient temperature leading to an energy density greater than that of the core of the particles, the total energy is then proportional to the square of the sum of the amplitudes, which means that all the vibrators are then in the same phase and polarization state (wave additivity criterion), they then constitute an elementary particle.
We have shown that the electron has the same wave number ko as that of the fundamental level waves [6], this resonance

criterion must be common to all elementary particles, it so indicates that the electron was created while this level possessed a very high energy density, i.e. very soon after the big bang where the temperature was extremely high, the expansion retained the wave number identity.
Today, the fundamental level can no longer create photons or other particles whose energy is higher than that of those in the diffuse background.

Conclusion

Everything that has been said is likely to show that the characteristics of elementary particles must depend on the fundamental physical constants of the intrinsic vacuum space, as we have defined it. The formula allowing the calculation of the mass of the electron [4] according to these constants gives a consistent and precise result using the values that we have calculated, associated with a fine structure constant whose inverse would be the integer 137, this within the limit of the known precisions of these constants.
To go further, it seems necessary to formalize the quantum medium that is the Intrinsic Vacuum, with the aim of describing the mechanisms for creating particles, whose waves resonate with those of this medium, and thus account for their properties.

(*) The half-wavelength is the aliasing of the photon energy because it is proportional to the square of the amplitude, which defines the active frequency.

(**) The uncertainty is linked to that of N

References

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