Can the Big Bang be So Precise?

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ABSTRACT

The currently popular 'Big Bang Theory' is based on 'Doppler Shift Interpretation' of the 'cosmological-red-shift'. But it is shown here that the value of Hubble-constant matches so perfectly with the strength-ratio of gravitational and electric forces, that such a coincidence is very un-likely; suggesting a need for considering alternative interpretations of the 'cosmological-red-shift'. Secondly, if the expansion of the universe is accelerating, as the recent observations suggest, e.g.(Paal, G. *et al.* 1992, Adam G. Riess *et al.*1998, and Perlmutter, S. *et al.*1999), then very large amount of dark-energy may be needed which is still not found. Therefore, it is proposed here that extra galactic photons may be loosing some of their energy through 'vacuum polarization', as described by Levine, I. (1997) and Brown et al (1996). When an extra galactic photon is absorbed by either electron or positron of the virtual electron positron pair, then not only the 'electrostatic potential energy' of the pair is increased, but also its 'gravitational potential energy' as well; but when these 'potential energies' are released, then not only a photon, but also a graviton is emitted; so the input energy gets branched out. And we find here that the energy lost by the 'cosmologically red shifted photons' is strikingly proportional to the 'strength ratio' of gravitational and electric forces.

Introduction:

If the universe were expanding due to the big bang, then the value of Hubble-constant could have been any. But the precisely measured value of Hubble-constant matches so strikingly with the strength-ratio of gravitational and electric forces, and some other constants, as this study reveals, that we get the strikingly interesting relations, as derived in the next section; which motivate us to consider alternative mechanisms for the 'cosmological red shift'. Alternative mechanisms for the 'cosmological red shift' have been rejected so far, under an assumption that they are not compatible with the observations of 'Time Dilation of Super Novae Light Curves'; but it was shown by this author in (Tank, H. K. Adv. Studies Theor. Phys., Vol. **7**, no. 18, 2013) that any mechanism which can cause 'cosmological red shift', will also cause 'time dilation of super novae light curves'. The following derivations will lead to the need for reconsidering the 'Big Bang Theory'.

2. Derivation:

The cosmological red-shift $z_c = \Delta\lambda / \lambda_0 = H_0 D / c$..(1).

i.e. $H_0 D / c = h H_0 / (h c / D)$.

Now, Weinberg has found an interesting relation that: $m_p^3 = h^2 H_0 / c G$, where, m_p is mass of a fundamental-particle, pi meson.

i.e. $G m_p^2 / (h / m_p c) = h H_0$. ....(2).

So, from the expressions 1 and 2, we get:

$z_c = \Delta\lambda / \lambda_0 = [G m_p^2 / (h / m_p c)] / [h c / D]$. ………………...…..................(3).

i.e. $z_c = \Delta\lambda / \lambda_0 = [G m_p^2 / h c] [D / (h / m_p c)]$.

i.e. $z_c = h \Delta\nu / h \nu = [G m_p^2 / h c] [D / (h / m_p c)]$. ……………….…...................(4).

That is, the reduction in energy of photon due to cosmological-red-shift is proportional to the strength-ratio of gravitational and electric forces.

Alternatively, let us define z_e as:

$z_e = [e^2 / r_e] – [e^2 / (r_e + D)] / [e^2 / (r_e + D)]$, where, e is electric-charge, r_e is 'classical radius of electron' and D is 'luminosity distance'.

i.e. $z_e = e^2 [r_e + D – r_e] [r_e + D] / [r_e (r_e + D) e^2]$.

i.e. $z_e = D / r_e$.

From Dirac's Large-Number-Coincidence, we know, that:

$(G m_e m_p / e^2) = (r_e / R_0) = (m_p / M_0)^{1/2} = 10^{-40}$, where, M_0 total mass and R_0 radius of the universe.

i.e. $z_e = 10^{-40} (D / R_0)$. …………………………………………………………………..(5).

Since $H_0 R_0 = c$, $z_c = H_0 D / c = D / R_0$. …………….………………………………..(6).

Comparing the expressions (5) and (6), we get:

$z_c = 10^{-40} z_e$. …………………………………………………………..(7).

That is: 'cosmological-red-shift', at a distance D is ($G m_e m_p / e^2$) times the reduction expected from the 'electrostatic potential energy' of an electron at that distance D.

Secondly, the 'self gravitational potential energy' of a fundamental particle also matches strikingly with the energy $h\, H_0$ as follows:

$$G\, m_p^{\,2} / (\, h / m_p\, c\,) = h\, H_0\ , \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(8)}$$

where, m_p is mass of pi-meson, h is Planck's constant, H_0 is Hubble constant, G is gravitational-constant, and c the speed-of-light. This relation is derived from the Steven Weinberg's famous formula, $m_p^3 = h^2\, H_0 / c\, G$, where, m_p is mass of a fundamental-particle, pi meson.

Thirdly, in addition to the above, the ratios:

$$(h\, H_0 / m_p\ c^2\,) \sim (\, G\, m_e\, m_\mathrm{p} / e^2\,)\ .\ \ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(9).}$$

These expressions can be made exactly equal by inserting masses of different particles in the expression, e.g. $(\, G\, m_e\, m_\mathrm{p} / e^2\,)$ or $(\, G\, m_p\, m_\mathrm{p} / e^2\,)$, $(\, G\, m_e\, m_\mathrm{e} / e^2\,)$ or $(\, G\, m_e\, m_\mathrm{pi} / e^2\,)$…etc.

The above relations strongly suggest that 'cosmological-red-shift' seems to be related to the strengths of gravitational and electric forces. One of the possible mechanisms for the 'cosmological red shift' may be the 'vacuum polarization'.

Discussion:

This study raises a question: Can the big bang be so precise? If the universe were expanding due to the big bang, then the value of Hubble's constant could be any. The precise matching of Hubble's constant with the 'self gravitational potential energy' of a fundamental particle, as we found in the expression-2, and the energy lost by the 'cosmologically red shifting photons' at a distance D being equal to $(G\, m_e\, m_\mathrm{p} / e^2)$ times the reduction in electrostatic potential energy of an electron at that distance, as we found in the expression-7; are strikingly interesting! This study may be found useful for finding theoretically predictable value of Hubble's constant. Currently measured value of Hubble constant may be lesser than the actual value, because, when the extra galactic photon enters our milky way galaxy, the photon also experiences some gravitational blue shift; so we may be measuring lesser value of Hubble constant; we may need to launch Hubble like telescope out side our milky way galaxy!

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