HUBBLE VOLUME AND THE FUNDAMENTAL INTERACTIONS

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ABSTRACT

If we do not yet know whether the universe is spatially closed or open, then the idea of Hubble volume can be used as a tool in cosmology and unification. In the universe, if the critical density is $\rho_c \cong \left(3H_0^2 / 8\pi G\right)$ and the characteristic Hubble radius is $R_0 \cong \left(c / H_0\right)$, mass of the cosmic Hubble volume is $M_0 \cong c^3 / 2GH_0$. There exists a charged heavy massive elementary particle M_X in such a way that, inverse of the fine structure ratio is equal to the natural logarithm of the sum of number of positively and negatively charged M_X in the Hubble volume. Surprisingly it is noticed that, M_X mass is close to Avogadro number times the rest mass of electron. Interesting observation is that, ratio of M_X and $\sqrt{e^2 / 4\pi\varepsilon_0 G}$ is 295.0606338. For any observable charged particle, there exist two kinds of masses and their mass ratio is 295.0606339. This idea can be applied to electron and proton and thus their corresponding interaction ranges can be fitted. If $\hbar$ is the quanta of the observed angular momentum, then its electromagnetic quanta can be expressed as $\left(\hbar / X_E\right)$.

KEYWORDS: Hubble radius, Hubble volume, Hubble mass, Mach's principle, Planck mass, Coulomb mass, Fine structure ratio, cosmological strong interaction range and CMBR temperature

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