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The Value of the Newton Gravitation Constant Derived From a Combined Sakharov and Kaluza-Klein Model of Baryo-Genesis and Gravity EM Unification

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A model of Sakharov (1967) baryo-genesis where the 5th, compactified, dimension of Kaluza-Klein (1926) theory does 'double duty' as the creator of lepton-baryon numbers and creator of separate EM and gravity equations is proposed. The appearance of the compactified dimension breaks the symmetry of the Planckian vacuum, allowing the vacuum quantities \hbar , G , and c to generate the particle quantities e , m_p and m_e , which are the charges and masses of the proton and electron respectively. Under this model the lepton-baryon asymmetry is a reflection time-space dimensional asymmetry and the relationship of the hidden dimension size, (in esu units) $r_0 = e^2/(m_0 c^2)$, where c is the speed of light, where $m_0 = (m_p m_e)^{1/2}$, to the Planck Length, $r_p = (\hbar/c^3)^{1/2}$: is $\ln(r_0/r_p) = (m_p/m_e)^{1/2}$ and mirrors the lepton-baryon separation. Inversion of this formula leads to a highly accurate formula for G , the Newton Gravitation constant. Improvement of this model to apply corrections near the Planck scale results a formula for G further improvement in accuracy (in esu):

$G = \alpha (e^2/m_0^2) \exp(-2((m_p/m_e)^{1/2} - .86/(m_p/m_e) \dots)) = 6.6728 \times 10^{-8} \text{ dyn-cm}^2\text{-g}^{-2}$, where α is the fine structure constant. In the GEM theory of long range field unification (Brandenburg 1988, 1995, 2010) gravity fields are equivalent to an array of ExB drift cells or Poynting vectors and EM and gravity fields separate with the appearance of the Kaluza-Klein 5th dimension. The predicted hidden dimension size is 3000.0 MeV and lies right between the eta-c and J/psi particles and almost exactly on the Sigma (3000) baryon. Assuming a model where the proton-electron (lepton-baryon) field unification occurs in a U(1) symmetry with imaginary rotation angle determined by normalized charge q/e and a multiplier $\ln(s')$ where $s' = (m_p/m_e)^{1/2}$ (the square root of the mass ratio) we obtain approximately, with $q_P = \hbar c/e$ (the Planck charge), we obtain the approximate relation: $M_P/m_p = \exp(\ln(s') q_P/e)$, where M_P is the Planck Mass, when combined with the previous relations, we obtain, to leading order, "The Transcendental Cosmos Equation" relating the value of α to s' :

$s' = \ln(s') (1/\alpha^{1/2} + 1) - \ln(1/\alpha)^{42.85} \dots$ This is similar to the "MIT Bag Model" (Chodos et al., 1974) result $s' \sim (4\pi/\alpha)^{1/2}$ Humorously, this recalls the number "42" which appeared in Hitchhiker's Guide to the Galaxy as the "answer to life, the universe, and everything" however, this author makes no such claims.

Brandenburg J.E. (1988) APS Bull., 33, 1, p.32. Brandenburg, J. E., (1995), Astrophysics and Space Science, 227, pp. 133. Brandenburg J.E. (2010) OSAPS Meeting. Chodos, R. L. Jaffe, K. Johnson, and C. B. Thorn, (1974) Phys. Rev. D 10, 2599 Klein, Oskar Zeitschrift fur Physik, 37, 895, (1926). Sakharov A.D. JETP 5,24-27, (1967).

Summary

Allowing Kaluza-Klein hidden dimension to do 'double duty' as the generator of both lepton and baryon numbers as well as allowing the separate appearance of EM and gravity fields, creates, with the triggering appearance of the hidden dimension of a selected size, a cosmos filled with hydrogen with two long-range forces, EM and Gravity. Rather than a grand unification this a "petite" unification, involving only the long-range forces of nature, which none-the-less gives a thumbnail sketch of the cosmos as it is. The hidden dimension size corresponds to 3000 MeV, right between the eta-c and j/psi particles and almost exactly on the sigma(3000) baryon.

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