

Lepton Creation and the Possibility for Variable G and c .

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NARLIKAR ⁽¹⁾ has given an interpretation of the Dirac relationship ⁽²⁾ between fundamental constants, through the assumption of matter injection in a flat universe. Let us apply the argument to a special closed expanding cosmological model ^(3,4). Following Narlikar's argument we assume that there is a fluctuation of created charged particles such that the overall charge fluctuation in the universe is zero. In other terms, the fluctuation in any region is compensated by an opposite charge fluctuation in another region. This means that if certain regions inject electrons into the observable universe, others should inject positrons. We assume that these regions are represented by an average Euclidean spherical volume in whose central part the matter injection takes place, and this volume is a sufficiently small fraction of the total cosmic volume. Such regions therefore can be viewed as « osculating » flat volumes in a spherical total cosmic volume. If $R(t)$ is the « radius of curvature » of the closed cosmological model considered, the Euclidean average volume of radius $r(t)$ is given by

$$(1) \quad (4\pi/3)r^3 = (1/n)2\pi^2 R^3,$$

where n is a sufficiently large number. The electrostatic potential at the central part of the volume due to the excess of negative or positive charges is

$$(2) \quad A_0 \simeq \pm 3(\sqrt{N}/ne)/(8\pi\epsilon_0 r),$$

where N is the total number of protons in the universe as well as the total number of electrons. If we combine (1) with (2), it follows that

$$(3) \quad A_0 \simeq \pm (aN^{1/2}e)/(4\pi\epsilon_0 R),$$

where

$$(4) \quad a = \pi^{-1/2}(\frac{2}{3})^{3/2} n^{-1/2}.$$

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⁽¹⁾ J. V. NARLIKAR: *Nature*, **247**, 99 (1974).

⁽²⁾ P. A. M. DIRAC: *Proc. Roy. Soc.*, A **165**, 199 (1938).

⁽³⁾ F. M. GOMIDE and M. UEHARA: *Prog. Theor. Phys.*, **53**, 1365 (1975).

⁽⁴⁾ F. M. GOMIDE: *Nuovo Cimento*, **12 B**, 11 (1972).