The Source of the Gravitational Constant for the Dirac Cores in the Planck Vacuum Theory

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***Abstract*—The gravitational constant for the Planck particle (PP), the proton, and electron cores are examined in this paper. Results show there are three different, but numerically equal, expressions for that constant in the Planck vacuum (PV) theory and another separate theory that produce the correct numerical value for the constant. This agreement between the two different theories highly recommends both theories.**

***Index Terms*—Gravitational Constant, Planck Vacuum Theory.**

I. INTRODUCTION

THE theoretical foundation [1] [2] [3] [4] of the PV theory rests upon the unification of the Einstein, Newton, and Coulomb superforces:

$$\frac{c^4}{G}\left(=\frac{m_*c^2}{r_*}\right)=\frac{m_*^2G}{r_*^2}=\frac{e_*^2}{r_*^2}\to r_*m_*c=\frac{e_*^2}{c}\quad(=\hbar)\tag{1}$$

where the ratio c^4/G is the curvature superforce that appears in the Einstein field equations. G is Newton's gravitational constant, c is the speed of light, m_* and r_* are the Planck mass and length respectively [5, p.1234], and e_* is the massless bare (or coupling) charge. The fine structure constant is given by the ratio $\alpha \equiv e^2/e_*^2$, where e is the observed electronic charge magnitude. The ratio e_*^2/c to the right of the arrow is the spin coefficient for the PP, the proton, and the electron cores, where $\hbar$ is the reduced Planck constant. The proton and electron cores and their antiparticles are $(\pm e_*, m_p)$ and $(\pm e_*, m_e)$ respectively.

The e_*^2 in (1) is the squared coupling charge, where one of the e_*s belongs to the PP core (e_*, m_*) under consideration, and the other charge belongs to any one of the remaining PP cores making up the degenerate PV state. The product $e_*^2 = (\pm e_*)^2$ implies that both the PP and its antiparticle contribute to the PP oscillator density.

II. GRAVITATIONAL CONSTANT

Equating the Einstein and Newton superforces (12) in equation (1) leads to

$$G_{12}=\frac{r_*c^2}{m_*}\tag{2}$$

for the gravitational constant. Equating the Newton and Coulomb superforces (23) in (1) leads to

$$G_{23}=\frac{e_*^2}{m_*^2}\,.\tag{3}$$

References [6] [7] (67), on the other hand, relate G to the inverse product of the reduced Planck constant and the radian frequency integral of the zero-point electromagnetic-fluctuation field, where it can then be argued that

$$G\sim\frac{c^5}{\hbar\int_0^{\omega_c}\omega d\omega}\qquad\omega_c\sim\left[\frac{c^5}{\hbar G}\right]^{1/2}.\tag{4}$$

But from the parameters in (1)

$$\omega_c=\left[\frac{c^5}{\hbar G}\right]^{1/2}=\frac{c}{r_*}=\frac{1}{t_*}=\omega_*\tag{5}$$

(t_* is the Planck time [5, p.1233]) so it is assumed that

$$G=\frac{A}{\hbar\int_0^{\omega_*}\omega d\omega}\quad\text{with}\quad\omega_*=\frac{c}{r_*}\tag{6}$$

or

$$G=\frac{cA}{e_*^2\int_0^{\omega_*}\omega d\omega}\tag{7}$$

where A is some constant to be determined. Then using G_{23} from (3) in

$$G=\frac{cA}{e_*^2\int_0^{\omega_*}\omega d\omega}=G_{23}=\frac{e_*^2}{m_*^2}\tag{8}$$

to determine A, leads to $A = c^5/2$ and finally

$$G_{67}=\frac{c^6}{2e_*^2\int_0^{\omega_*}\omega d\omega}=\frac{c^6}{e_*^2\omega_*^2}=\frac{r_*c^2}{m_*}=G_{12}\,.\tag{9}$$

III. CONCLUSIONS AND COMMENTS

Calculating the gravitational constants from the preceding three equations leads to

$$(G_{12},G_{23};G_{67})=6.674\times10^{-8}(\mathrm{dyne}\cdot\mathrm{cm}^2\cdot\mathrm{g}^{-2})\tag{10}$$

which agrees well with the experimental data. Furthermore, the Gs to the left and right of the semicolon come from different theories, leading to greater confidence in both theories.

For reference, the zero-point fluctuation field in the PV theory is derived in an earlier paper [8].

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