ON THE CONSTANT OF GRAVITATION

(Letter to the Editor)

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It has often been mentioned by physicists that the formal relationship of numerical values of fundamental physical constants can lead to new physical principles. In some cases, when they arise as a consequence of physical theory, they can be considered as an indirect proof of validity of its main postulates or an eventual picture of the structure of matter.

At present the numerical values of physical constants are practically all related in current theories of the atomic and elementary particles structure. But it is well known that till now the constant of gravitation G cannot be obtained from any theoretical combination of other physical constants nor can it be numerically evaluated in the framework of a physical theory.

The numerical value of G has a purely experimental origin, being equal to $G = 6.6732(31) \times 10^{-8}\text{cgs}^{-2}$ (cf. Taylor *et al.*, 1969). Now G can be easily evaluated from the equations of the new theory of fundamental field (FFT) (cf. Gerlovin, 1973). It was also observed that there can be found a simple relation between G and only four atomic constants with a high degree of accuracy. This results from a new picture of the structural geometry of a physical vacuum. Within the framework of this theory, the gravitational field is considered as having a common nature with the electromagnetic field. The constant G is entirely determined from the structural parameters of elementary particles and has one and the same value for every kind of particle. The new theoretical (predicted) value of G is

$$G = A_g \frac{e^2}{m_p^2} = 6.67311\,(4) \times 10^{-3} \text{ cgs}, \tag{1}$$

where e is the electronic charge and m_p is the mass of a proton. The dimensionless constant $A_g = 8.09189 \times 10^{-37}$ is determined in FFT without any hypothetical constants.

The constant A_g can be expressed as a combination of other physical constants multiplied by a factor $a_g = 1.000888$. Then the resulting formula will be

$$A_g = a_g \frac{9}{32\pi^2} (\lambda\!\!\!^{-}_p R_\infty)^4 . \tag{2}$$

Inserting the values of constants after Taylor *et al.* (1969) into (2) we find that

$$G = a_g \frac{9}{32}\left(\frac{\lambda_p^2 R_\infty^2 e}{m_p}\right)^2 \tag{3}$$

(λ is the Compton wavelength for a proton).

The numerical value of G in (3) coincides with (1) in the range of computation accuracy. It seems to be of interest that even if we omit a_g, we can obtain G with the accuracy of its value found experimentally.

The result obtained seems to be a serious argument in favour of the new FFT, and can be used in new cosmological theories.

References

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