

FORCE AND GEOMETRY

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Abstract .

Will describe a geometric link related with the ratio between two physical forces , gravitational force and electromagnetic force .

Keywords . Gravity , electromagnetism , geometry .

Let's write gravitational force between proton and electron :

$$F_G = \frac{G e_m p_m}{r^2}$$

Newtonian constant of gravitation $G = 6.6735 \times 10^{-11} \frac{m^3}{Kg s^2}$

Electron mass = 9.109382×10^{-31} Kg

Proton mass = 1.67262×10^{-27} Kg

Now the electromagnetic force between two units of electric charge :

$$F_{EM} = \frac{K Q^2}{r^2}$$

Coulomb's constant = $8.9875518 \times 10^9 \frac{N m^2}{C^2}$

Electric charge = 1.602176×10^{-19} J

Since the distance (r) is the same in the two forces , shall ignore .

The comparison , ie the ratio , between gravitational force and electromagnetic force when proton and electron are used :

$$\frac{F_G}{F_{EM}} = 4.4074 \times 10^{-40}$$

Will see what type of geometric value matches the dimensionless value described before .
First write the length's geometric unit from which we start :

$$it = \left(\frac{1}{10^{34}} \right)$$

(in reference to the expression coined by the physicist J.A.Wheeler : "its from bits")[1] .

Note that one 'it' is close to the Planck scale = (10^{-35})

Now let's define a particular volume's unit :

$$V_{it} = \frac{32}{3} \pi [N_A(it)]^4$$

Or , in order to an easier visualization (fig 1) :

$$V_{it} = \frac{4}{3} \pi [N_A(it)]^3 [8N_A(it)]$$

N_A refers to Avogadro's number = 6.02214×10^{23}

Resulting $V_{it} = 4.4074 \times 10^{-40}$

Therefore :

$$\frac{F_G}{F_{EM}} = V_{it}$$

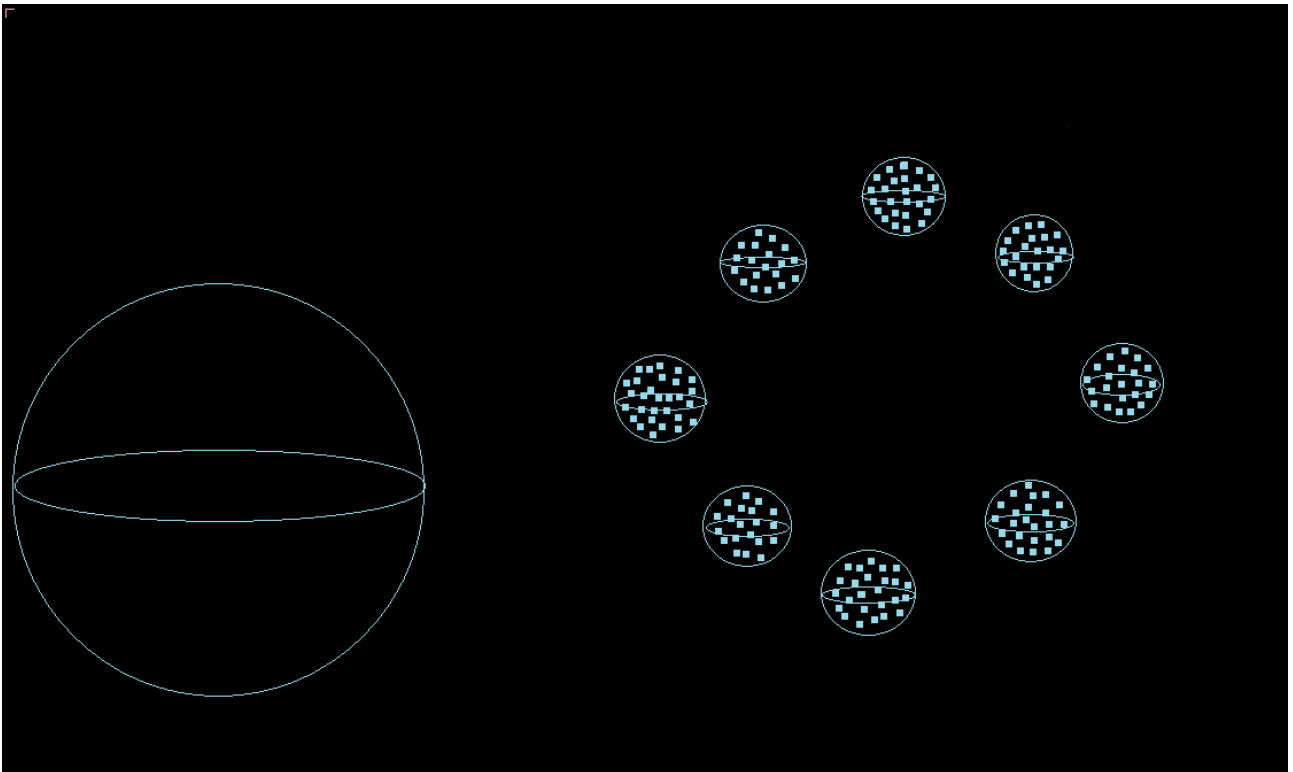


Fig 1 .

Bibliography .

[1] . "The lightness of being" . Franck Wilczek .