Some Relations Between Physical Constants

Valdir Monteiro dos Santos Godoi
valdir.msgodoi@gmail.com

Most of the following numerical relationships were found by me in the year 1991, while a few in 1994. I leave registered here to make it easier to return to the theme of Eletrogravitational Unification at most favorable time, with some of these relationships in mind (some $=$ are probably $\approx$). Meanwhile, I leave it available to the public, if it is useful. The units were omitted in most case. Some corrections made in 2017.

1. $\frac{Ke}{G} \approx \frac{151}{7}$
2. $KG \approx \frac{3}{5}$
3. $\frac{1}{KG} \approx 1 + 10^{10}\, G$
4. $\frac{1}{Gc} \approx 50$
5. $\frac{K}{c} \approx 30$ (obtained by 2. and 4.)
6. $\frac{\sqrt{e}}{G} \approx 6$
7. $\frac{uec}{G} \approx \frac{151}{21} \approx \frac{Ke}{3G}$
8. $uec = 10\, c\, e \approx \frac{Ke}{3}$ (charge of electron in e.s.u. or statC)
9. $\frac{K}{c^2} = 10^{-7}$ (this is a definition)
10. $\frac{m_p c^2}{2} \approx 1.12\, G \approx \frac{\sqrt{5}}{2} G$
11. $\frac{8\pi}{c^3} \approx 557\, m_n$
12. $\frac{m_e c^2}{2} \frac{G}{Kh} \approx 0.5$
13. $\frac{h}{k_{Boltz}} \approx \left(\sqrt{3} - 1\right) G$
14. $\frac{m_p c^2}{2} / r_B \approx \sqrt{2}$
15. $\frac{G}{h} = \frac{A}{6}$
16. $\frac{\hbar}{2m_p} \approx \pi \cdot 10^{-8}$
17. $Gm_p \approx 2Ke^2\delta,\ \delta = 4.57\, r_B$

18. $\left(\frac{m_e}{m_p}\right)^3 \approx 3\, r_B$
19. $E_{gr} \approx F_{el}\, \delta,\ \delta = 9.14\, r_B$ (equivalent to 17.)
20. $\frac{Gm_p^2}{r} = \frac{5\hbar^3}{2m_p r^2},\ r = 10^{-11}\, m$

    $\Rightarrow G = \frac{5\hbar^3}{2m_p^3 r}$

21. $\frac{Grav}{Weak} \approx \frac{2}{3} m_e$ $(Grav: 0.6 \times 10^{-36},\ Weak: 0.1 \times 10^{-5})$
22. $\frac{Grav}{Eletr} \approx \frac{h}{8}$ $(Eletr: \frac{1}{137} \approx 0.0073)$
23. $\frac{m_p}{m_{Earth}} \approx \frac{1}{4}\hbar^{3/2}$
24. $F_{Earth-Sun} \approx 5\, \hbar^{-1.3}$
25. $Ke^2 \approx 5\left(Gm_p\right)^{3/4}$
26. $\frac{1}{2}mv^2 \approx \frac{Ke^2}{r}$
27. $m_p + \frac{m_e}{\sqrt{1-\frac{v^2}{c^2}}} = m_n$
28. $m_p\, c \approx 3\, e$
29. $\frac{8\pi^2}{\mu_0} \approx \frac{c}{4} = \left(\frac{m_e}{\hbar}\right)^2$ (instead of 8 a better value is 9.5)
30. $\frac{\hbar^2}{2m}\nabla^2\Psi + (E - V)\Psi = 0$

    $\Rightarrow \nabla^2\Psi + \frac{c}{4}v^2\Psi = 0\ (m = m_e)$

31. $\frac{(Ke^2)^2}{c} \approx Gm_p^2$
32. $\hbar = \frac{1}{A}\left(\frac{Ke^2}{m_p}\right)^2 \frac{1}{c}$

Another relationship, which most calls my attention, refers to the difference between the charge of the electron and the proton, based on an old theory of Eletrogravitational Unification that I created[1], is as follows:

$e - p \approx 8.376 \times 10^{-55}$

$\frac{e-p}{e} \approx 5.228 \times 10^{-36};\ h = 6.6260754 \times 10^{-34};$

$\frac{e-p}{e} \cdot \frac{1}{h} \approx 0.00789 = 7.89 \times 10^{-3} \approx \frac{1}{126.742} \approx \frac{1}{127} \approx \alpha,$

where α is the fine-structure constant:

$$\alpha = \frac{1}{4\pi\varepsilon_0}\frac{e^2}{\hbar c} = \frac{\mu_0}{4\pi}\frac{e^2}{\hbar c} = K\frac{e^2}{\hbar c} = \frac{1}{2\varepsilon_0}\frac{e^2}{hc} \approx 7.29735 \times 10^{-3} \approx \frac{1}{137.036}.$$

The recommended values of these constants you can see in [2] or [3].

References

1. Godoi, Valdir M. S., *A Unificação Eletrogravitacional do Ponto de Vista Clássico*, Boletim do Instituto de Matemática e Física da Universidade Federal de Goiás, nº 15, ano 7, novembro (1992). Available at http://gsjournal.net/Science-Journals/%7B$cat_name%7D/View/5690 (2015) and http://www.vixra.org/abs/1407.0192 (2014).

2. Peter J. Mohr, David B. Newell, Barry N. Taylor, CODATA Recommended Values of the Fundamental Physical Constants: 2014, available at https://arxiv.org/pdf/1507.07956.pdf (2015).

3. https://physics.nist.gov/cuu/Constants/index.html.