Astrophysical Quantities by Allen, C-W , the Athlone Press, Univ. of London 1973. Prof. Sing IAG USP

$m_p := 1.6726231 \cdot 10^{-24} \cdot gm \quad m_e := 9.10956 \cdot 10^{-28} \cdot gm \quad esu := 4.80325 \cdot 10^{-10} \cdot \frac{gm^{0.5} \cdot cm^{1.5}}{sec}$

$Ro := 8.314510 \cdot 10^{7} \cdot \frac{erg}{mole \cdot K} \quad \alpha_b := 137.041613064 \quad N_A := 6.0221367 \cdot 10^{23} \cdot \frac{1}{mole} \quad k_b := \frac{Ro}{N_A}$

$G := 6.67259 \cdot 10^{-8} \cdot \frac{cm^3}{gm \cdot sec^2} \quad \lambda_m := \frac{2 \cdot \pi \cdot \alpha_b \cdot esu^2}{k_b} \quad c := 2.99792458 \cdot 10^{10} \cdot \frac{cm}{sec}$

$\frac{Ro}{2 \cdot \pi \cdot \alpha_b} = 9.656157253 \cdot 10^{4} \frac{gm \cdot cm^2}{sec^2 \cdot K \cdot substance} \quad \lambda_m = 1.438853782 \ cm \cdot K \quad \Delta := \frac{m_p}{m_e}$

$\frac{Ro}{2 \cdot \pi \cdot \alpha_b \cdot N_A} = 1.603443717 \cdot 10^{-19} \frac{gm \cdot cm^2}{sec^2 \cdot K} \quad \frac{k_b}{2 \cdot \pi \cdot \alpha_b} = 1.603443717 \cdot 10^{-19} \frac{gm \cdot cm^2}{sec^2 \cdot K}$

$esu := \sqrt{\frac{\lambda_m \cdot k_b}{2 \cdot \pi \cdot \alpha_b}}$

$\alpha_b := \sqrt[23]{\frac{\Delta^3 \cdot emu^2 \cdot c^2}{G \cdot m_p \cdot m_e}}$

$emu := \sqrt{\frac{\lambda_m \cdot k_b}{2 \cdot \pi \cdot \alpha_b \cdot c^2}}$

$esu = 4.80325 \cdot 10^{-10} \frac{gm^{0.5} \cdot cm^{1.5}}{sec} \quad emu = 1.60219174 \cdot 10^{-20} \ gm^{0.5} \cdot cm^{0.5}$

$h_b := 2 \cdot \pi \cdot emu^2 \cdot c \cdot \alpha_b \quad h_m := emu^2 \cdot c \cdot \alpha_b$

$$\frac{\alpha_b^{23}}{\Delta^3}\cdot\frac{G\cdot m_p\cdot m_e}{c}=\frac{\lambda_m\cdot 9.656157253\cdot 10^4\cdot\frac{gm\cdot cm^2}{sec^2\cdot K}}{N_A\cdot c}$$

$$\frac{2\cdot\pi\cdot\alpha_b^{24}}{\Delta^3}\cdot\frac{G\cdot m_p\cdot m_e}{c}=6.626450563\cdot 10^{-27}\ \frac{gm\cdot cm^2}{sec}$$

$$\frac{2\cdot\pi\cdot\alpha_b\cdot\lambda_m\cdot 9.656157253\cdot 10^4\cdot\frac{gm\cdot cm^2}{sec^2\cdot K}}{N_A\cdot c}=6.626450563\cdot 10^{-27}\ \frac{gm\cdot cm^2\cdot substance}{sec}$$

Relação entre as constantes de gravitaçao atomica e planetaria

$$1 = \frac{g_a}{g_i} \cdot \frac{\frac{4 \cdot \pi}{3} \cdot \Delta^3}{\frac{4 \cdot \pi}{3} \cdot \left(\alpha_b^{\,8}\right)^3}$$

$$g_g := \frac{G}{\alpha_b}$$

$$g_g = g_a \cdot \frac{\frac{4 \cdot \pi}{3} \cdot \Delta^3}{\frac{4 \cdot \pi}{3} \cdot \left(\alpha_b^{\,8}\right)^3}$$

$$\frac{1}{\alpha_b} = \frac{g_a}{G} \cdot \frac{\frac{4 \cdot \pi}{3} \cdot \Delta^3}{\frac{4 \cdot \pi}{3} \cdot \left(\alpha_b^{\,8}\right)^3}$$

$$G = g_a \cdot \alpha_b \cdot \frac{\frac{4 \cdot \pi}{3} \cdot \Delta^3}{\frac{4 \cdot \pi}{3} \cdot \left(\alpha_b^{\,8}\right)^3}$$

$$\frac{1}{g_a} = \frac{\alpha_b}{G} \cdot \frac{\frac{4 \cdot \pi}{3} \cdot \Delta^3}{\frac{4 \cdot \pi}{3} \cdot \left(\alpha_b^{\,8}\right)^3}$$

$$\frac{\alpha_b}{G} \cdot \frac{\frac{4 \cdot \pi}{3} \cdot \Delta^3}{\frac{4 \cdot \pi}{3} \cdot \left(\alpha_b^{\,8}\right)^3} = 6.604274382 \cdot 10^{-33} \ \frac{gm \cdot sec^2}{cm^3}$$

$$\frac{G}{\alpha_b} \cdot \frac{\frac{4 \cdot \pi}{3} \cdot \left(\alpha_b^{\,8}\right)^3}{\frac{4 \cdot \pi}{3} \cdot \Delta^3} = 1.514170887 \cdot 10^{32} \ \frac{cm^3}{gm \cdot sec^2}$$

$$g_a := \frac{G}{\alpha_b} \cdot \frac{\frac{4\cdot\pi}{3}\cdot\left(\alpha_b^{8}\right)^3}{\frac{4\cdot\pi}{3}\cdot\Delta^3}$$

$$g_a = 1.514170887\cdot 10^{32}\ \frac{cm^3}{gm\cdot sec^2}$$

$$g_a\cdot\alpha_b\cdot\frac{\frac{4\cdot\pi}{3}\cdot\Delta^3}{\frac{4\cdot\pi}{3}\cdot\left(\alpha_b^{8}\right)^3} = 6.67259\cdot 10^{-8}\ \frac{cm^3}{gm\cdot sec^2}$$

$$\frac{g_g}{g_a} = \frac{\frac{4\cdot\pi}{3}\cdot\Delta^3}{\frac{4\cdot\pi}{3}\cdot\left(\alpha_b^{8}\right)^3}$$

$$\frac{g_g}{g_a} = 3.215645273\cdot 10^{-42}$$

$$\frac{\frac{4\cdot\pi}{3}\cdot\Delta^3}{\frac{4\cdot\pi}{3}\cdot\left(\alpha_b^{8}\right)^3} = 3.215645273\cdot 10^{-42}$$

$$\frac{\Delta}{\alpha_b^{\frac{23}{2}}}$$

$$r_e := \frac{emu^2}{m_e}$$

$$\frac{g_a}{g_g}\cdot\frac{\frac{4\cdot\pi}{3}\cdot\Delta^3}{\frac{4\cdot\pi}{3}\cdot\left(\alpha_b^{8}\right)^3} = 1$$

$$\frac{\alpha_b^{\frac{23}{2}}}{\Delta}$$

Massa da terra

$Mdt := 5.97630000000 \cdot 10^{27} \cdot gm$

Raio da terra

$Rdt := 6.376808079 \cdot 10^{8} \cdot cm$

Massa do sol

$Mds := 1.989102533 \cdot 10^{33} \cdot gm$

$Vtgs := 3.361959172 \cdot 10^{24} \ \frac{cm^3}{sec^2}$

$Vtt := 2.978606277 \cdot 10^{6} \ \frac{cm}{sec}$

$Rst := 1.49597870 \cdot 10^{13} \cdot cm$

$Ttt := 3.15567433638 \cdot 10^{7} \cdot sec$

$V_b := \frac{c}{\alpha_b}$

Aceleração causada pelo proton na altura da órbita de Bhor

$$\frac{\frac{r_e \cdot \alpha_b^{\,2} \cdot V_b^{\,2}}{m_p}}{\frac{Rst \cdot Vtt^2}{Mds}} = \frac{\alpha_b^{\,23}}{\Delta^3}$$

Aceleração causada pelo sol na altura da órbita de Terra

$$\frac{\Delta^3 \cdot r_e \cdot \alpha_b^{\,2} \cdot V_b^{\,2}}{m_p} = 9.372964259 \cdot 10^{41} \ \frac{cm^3}{gm \cdot sec^2}$$

$$\frac{\alpha_b^{\,23} \cdot Rst \cdot Vtt^2}{Mds} = 9.37296426 \cdot 10^{41} \ \frac{cm^3}{gm \cdot sec^2}$$

$$\frac{Rst \cdot Vtt^2}{Mds} \cdot \frac{\alpha_b^{\,23}}{\Delta^3} = 1.514170888 \cdot 10^{32} \ \frac{cm^3}{gm \cdot sec^2}$$

$$\frac{r_e \cdot \alpha_b^{\,2} \cdot V_b^{\,2}}{m_p} = 1.514170887 \cdot 10^{32} \ \frac{cm^3}{gm \cdot sec^2}$$

$$g_a := \frac{\Delta^3 \cdot r_e \cdot \alpha_b^2 \cdot V_b^2}{m_p} \qquad g_g := \frac{G \cdot Mdt}{Rdt^2} \qquad g_p := \frac{\alpha_b^{23} \cdot Rst \cdot Vtt^2}{Mds}$$

$$g_a = 9.372964259 \cdot 10^{41} \ \frac{cm^3}{gm \cdot sec^2} \qquad g_g = 980.663785601 \ \frac{cm}{sec^2} \qquad g_p = 9.37296426 \cdot 10^{41} \ \frac{cm^3}{gm \cdot sec^2}$$

Kepler do sol

$$Kds := Rst \cdot Vtt^2$$

$$Kds = 1.327246567 \cdot 10^{26} \ \frac{cm^3}{sec^2} \qquad Rst \cdot Vtt^2 = 1.327246567 \cdot 10^{26} \ \frac{cm^3}{sec^2}$$

Kepler do Proton

$$Kdp := r_e \cdot c^2$$

$$Kdp = 2.532637203 \cdot 10^{8} \ \frac{cm^3}{sec^2} \qquad r_e \cdot c^2 = 2.532637203 \cdot 10^{8} \ \frac{cm^3}{sec^2}$$

Constante de gravitação

$$\frac{Rst \cdot Vtt^2}{Mds} = \frac{esu^2}{m_p \cdot m_e} \cdot \frac{\Delta^3}{\alpha_b^{23}}$$

Planetas

$$\frac{Rst \cdot Vtt^2}{Mds} = 6.672590001 \cdot 10^{-8} \frac{cm^3}{gm \cdot sec^2}$$

Átomo

$$\frac{esu^2}{m_p \cdot m_e} \cdot \frac{\Delta^3}{\alpha_b^{23}} = 6.67259 \cdot 10^{-8} \frac{cm^3}{gm \cdot sec^2}$$

$$\frac{Kds}{Mds} = \frac{Kdp}{m_p} \cdot \frac{\Delta^3}{\alpha_b^{23}}$$

$$\frac{Kds}{Mds} = 6.672590001 \cdot 10^{-8} \frac{cm^3}{gm \cdot sec^2}$$

$$\frac{Kdp}{m_p} \cdot \frac{\Delta^3}{\alpha_b^{23}} = 6.67259 \cdot 10^{-8} \frac{cm^3}{gm \cdot sec^2}$$

$$\frac{4 \cdot \pi^2 \cdot Kds}{Mds} = \frac{4 \cdot \pi^2 \cdot Kdp}{m_p} \cdot \frac{\Delta^3}{\alpha_b^{23}}$$

$$\frac{4 \cdot \pi^2 \cdot Kds}{Mds} = 2.634232946 \cdot 10^{-6} \frac{cm^3}{gm \cdot sec^2}$$

$$\frac{4 \cdot \pi^2 \cdot Kdp}{m_p} \cdot \frac{\Delta^3}{\alpha_b^{23}} = 2.634232945 \cdot 10^{-6} \frac{cm^3}{gm \cdot sec^2}$$

$$\frac{r_e \cdot \alpha_b^{\,2} \cdot V_b^{\,2}}{m_p} = \frac{\alpha_b^{\,23}}{\Delta^3} \cdot \frac{Rst \cdot Vtt^2}{Mds}$$

$$\frac{r_e \cdot \alpha_b^{\,2} \cdot V_b^{\,2}}{m_p} = 1.514170887 \cdot 10^{32}\ \frac{cm^3}{gm \cdot sec^2} \qquad \frac{\alpha_b^{\,23}}{\Delta^3} \cdot \frac{Rst \cdot Vtt^2}{Mds} = 1.514170888 \cdot 10^{32}\ \frac{cm^3}{gm \cdot sec^2}$$

$$\frac{\frac{r_e \cdot \alpha_b^{\,2} \cdot V_b^{\,2}}{m_p}}{\frac{Rst \cdot Vtt^2}{Mds}} = \frac{\alpha_b^{\,23}}{\Delta^3}$$

$$\frac{\frac{r_e \cdot \alpha_b^{\,2} \cdot V_b^{\,2}}{m_p}}{\frac{Rst \cdot Vtt^2}{Mds}} = 2.269240111 \cdot 10^{39} \qquad \frac{\alpha_b^{\,23}}{\Delta^3} = 2.269240111 \cdot 10^{39}$$

$$\frac{esu^2}{m_p \cdot m_e} = \frac{r_e \cdot c^2}{m_p}$$

$$\frac{esu^2}{m_p \cdot m_e} = 1.514170887 \cdot 10^{32}\ \frac{cm^3}{gm \cdot sec^2} \qquad \frac{r_e \cdot c^2}{m_p} = 1.514170887 \cdot 10^{32}\ \frac{cm^3}{gm \cdot sec^2}$$

$$\frac{\alpha_b^{23}}{\Delta^3}\cdot\frac{Rst\cdot Vtt^2}{Mds}=\frac{r_e\cdot\alpha_b^{2}\cdot Vb^2}{m_p}$$

$$\frac{\alpha_b^{23}}{\Delta^3}\cdot\frac{Rst\cdot Vtt^2}{Mds}=1.514170888\cdot10^{32}\ \frac{cm^3}{gm\cdot sec^2}$$

$$\frac{r_e\cdot\alpha_b^{2}\cdot V_b^{2}}{m_p}=1.514170887\cdot10^{32}\ \frac{cm^3}{gm\cdot sec^2}$$

$$\frac{esu^2}{m_p\cdot m_e}\cdot\frac{\Delta^3}{\alpha_b^{23}}=\frac{Rst\cdot Vtt^2}{Mds}$$

$$\frac{esu^2}{m_p\cdot m_e}\cdot\frac{\Delta^3}{\alpha_b^{23}}=6.67259\cdot10^{-8}\ \frac{cm^3}{gm\cdot sec^2}$$

$$\frac{Rst\cdot Vtt^2}{Mds}=6.672590001\cdot10^{-8}\ \frac{cm^3}{gm\cdot sec^2}$$

$$\frac{Kdp}{m_p}\cdot\frac{\Delta^3}{\alpha_b^{23}}=\frac{Kds}{Mds}$$

$$\frac{Kdp}{m_p}\cdot\frac{\Delta^3}{\alpha_b^{23}}=6.67259\cdot10^{-8}\ \frac{cm^3}{gm\cdot sec^2}$$

$$\frac{Kds}{Mds}=6.672590001\cdot10^{-8}\ \frac{cm^3}{gm\cdot sec^2}$$

$$\frac{4\cdot\pi}{3}\cdot\left[\vec{g}_a\cdot\frac{\Delta}{\alpha^{\frac{23}{2}}}\cdot\frac{\left(r_0\cdot\alpha^2\right)^2}{m_e}\right]^3=\frac{4\cdot\pi}{3}\cdot\left[\vec{g}_p\cdot\frac{\alpha^{\frac{23}{2}}}{\Delta}\cdot\frac{R_t^2}{M_\oplus}\right]^3$$

$$\frac{\frac{\Delta^3 \cdot r_e \cdot \alpha_b^2 \cdot V_b^2}{m_p}}{\frac{\alpha_b^{23} \cdot Rst \cdot Vtt^2}{Mds}} = 1$$

$$\frac{\Delta \cdot r_e \cdot \alpha_b^2 \cdot V_b^2}{m_p} = \frac{\alpha_b^{23} \cdot Rst \cdot Vtt^2}{Mds}$$

$$\frac{\Delta^3 \cdot r_e \cdot \alpha_b^2 \cdot V_b^2}{m_p} = 9.372964259 \cdot 10^{41} \ \frac{cm^3}{gm \cdot sec^2} \qquad \frac{\alpha_b^{23} \cdot Rst \cdot Vtt^2}{Mds} = 9.37296426 \cdot 10^{41} \ \frac{cm^3}{gm \cdot sec^2}$$

$$\frac{\Delta}{\alpha_b^{\frac{23}{2}}} \qquad r_e := \frac{emu^2}{m_e} \qquad \frac{\alpha_b^{\frac{23}{2}}}{\Delta}$$

$$\frac{g_a}{g_g} \cdot \frac{\frac{4 \cdot \pi}{3} \cdot \Delta^2}{\frac{4 \cdot \pi}{3} \cdot \alpha_b^{23}} = 2.293906341 \cdot 10^{-4} \ \frac{cm^2}{gm}$$

$$\frac{\frac{\Delta^3 \cdot r_e \cdot \alpha_b^{\,2} \cdot V_b^{\,2}}{m_p}}{\frac{Rst \cdot Vtt^2}{Mds}} = 1.404696566 \cdot 10^{49}$$

$$\frac{\frac{r_e \cdot \alpha_b^{\,2} \cdot V_b^{\,2}}{m_p}}{\frac{Rst \cdot Vtt^2}{Mds}} = \frac{\alpha_b^{\,23}}{\Delta^2}$$

$$\frac{\frac{\Delta^3 \cdot r_e \cdot \alpha_b^{\,2} \cdot V_b^{\,2}}{m_p}}{\frac{\alpha_b^{\,23} \cdot Rst \cdot Vtt^2}{Mds}} = 1$$

$$\alpha_b^{\,23} = 1.404696566 \cdot 10^{49}$$

$$g_a := \frac{V_b^{\,2}}{r_e \cdot \alpha_b^{\,2}}$$

$$g_g := \frac{G \cdot Mdt}{Rdt^2}$$

$$g_a = 9.042825988 \cdot 10^{24} \ \frac{cm}{sec^2}$$

$$g_g = 980.663785601 \ \frac{cm}{sec^2}$$

$$\frac{\Delta^3 \cdot r_e \cdot \alpha_b^{\,2} \cdot V_b^{\,2}}{m_p} = 9.372964259 \cdot 10^{41} \ \frac{cm^3}{gm \cdot sec^2}$$

$$\frac{\alpha_b^{\,23} \cdot Rst \cdot Vtt^2}{Mds} = 9.37296426 \cdot 10^{41} \ \frac{cm^3}{gm \cdot sec^2}$$

Órbita de Bhor ao centro proton

Órbita da terra ao centro do sol

$$\frac{4 \cdot \pi}{3} \cdot \frac{\Delta^3 \cdot r_e \cdot \alpha_b^{\,2} \cdot V_b^{\,2}}{m_p} = 3.926138088 \cdot 10^{42} \ \frac{cm^3}{gm \cdot sec^2}$$

$$\frac{4 \cdot \pi}{3} \cdot \frac{\alpha_b^{\,23} \cdot Rst \cdot Vtt^2}{Mds} = 3.926138088 \cdot 10^{42} \ \frac{cm^3}{gm \cdot sec^2}$$

Órbita do Bhor

Órbita da Superfice da terra ao centro da terra

$$\frac{4 \cdot \pi}{3} \cdot \left[g_a \cdot \frac{\Delta}{\alpha_b^{\,\frac{23}{2}}} \cdot \frac{\left(r_e \cdot \alpha_b^{\,2} \right)^2}{m_e} \right] = 5.705236082 \cdot 10^{14} \ \frac{cm^3}{gm \cdot sec^2}$$

$$\frac{4 \cdot \pi}{3} \cdot \left(g_g \cdot \frac{\alpha_b^{\,\frac{23}{2}}}{\Delta} \cdot \frac{Rdt^2}{Mdt} \right) = 5.705236082 \cdot 10^{14} \ \frac{cm^3}{gm \cdot sec^2}$$